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Abstract

Every month, the ifo Business Survey (IBS) asks a representative set of 9000 German firms about their current and expected economic conditions. Thus, the micro data of the IBS are ideally suited to study various aspects of firm behavior. However, methodological heterogeneities between different subsets of the IBS have prevented joint analyses of firms in all main sectors of the economy. This paper expands the scope for economic research based on the IBS by presenting a harmonization procedure that overcomes these heterogeneities and that improves the possibility to merge firms to administrative industry-specific data at disaggregate levels. Moreover, the paper exploits the harmonized dataset to shed light on the interpretation of the most widely recognized variables in the IBS: firms' current business conditions and their expectations for the next six months. The results show that firms' assessments are strongly related to current and future levels in revenues and speak in favor of interpreting both questions as referring to the similar dimension of the same latent variable.

JEL-Codes: C810, D220, D840.

Keywords: Business Survey Data, interpretation of expectations and realizations.

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1. Introduction

The micro data of the ifo Business Survey (IBS) provide unique opportunities to study the economic behavior of firms along a multitude of dimensions. Its advantages are manifold: first, the survey covers a large sample of approximately 9000 firms that is representative for the German economy on a monthly basis.[1] Second, the number of observations per firm is very large (on average, firms are observed more than 70 times), as response rates are uncommonly high and attrition is low compared to other business surveys. Third, the set of questions covered by the survey is extensive, as firms are asked every month about, *inter alia*, current trends and expectations for the development of their general business situation as well as their volume of production, demand situation, and changes in employment and prices. Moreover, these standard questions are accompanied by repeatedly asked industry-specific questions that, e.g., refer to constraints to business activity, credit supply by banks or subjective uncertainty. At times, the IBS is supplemented by questions about recent events such as the integration of refugees into the German labor market, the introduction of a statutory minimum wage in 2015, and their perceptions with respect to the conflict between Russia and Ukraine, or Brexit.

However, existing studies using the micro data of the IBS could not tab its full potential because the survey is divided into four industry surveys covering the main sectors of the economy (manufacturing, services, retail/wholesale, construction) that could not have been jointly analyzed so far. On the one hand, this is sometimes due to the fact that not all survey questions are asked simultaneously in all industry-specific surveys. On the other hand, a joint econometric analysis of firms is prevented by the fact that the industry-specific surveys are heterogeneous in the level of observational units (product or firm) as well as in the industry classification systems used in the micro data. Hence, researchers usually restricted their analyses to the subset of manufacturing firms (e.g., Pesaran and Timmermann, 2009; Bachmann, Elstner, and Sims, 2013; Carstensen, Elstner, and Paula, 2013; Strasser, 2013; Fidrmuc and Hainz, 2013; Bachmann and Elstner, 2015; Bachmann, Carstensen, Lautenbacher, and Schneider, 2018; Massenot and Pettinicchi, 2018; Huber, 2018; and Bachmann, Born, Elstner, and Grimme, 2018).

The first goal of this paper is to harmonize the micro data of the most important industry-specific surveys of the IBS in a way that allows for a joint econometric analysis of the firms. In order to ensure a high level of generality, I use the three main surveys: (a) IBS-IND (2017) covering manufacturing firms since 1980, (b) IBS-TRA (2017) including retailers and wholesalers since 1990, and (c) IBS-SERV (2017) containing service companies since 2004.[2] For this purpose, I standardize the level of observational units across industry surveys by aggregating to the firm-level. Thereby, I adjust for a methodological break in the retail and wholesale survey in 2006. Based on this procedure, the full panel of data for the retail and wholesale industries can be

[1] The IBS provides input for the ifo Business Climate Index which is the most recognized leading indicator for the German business cycle, see Becker and Wohlrabe (2008) for details. According to a meta-study by Abberger, Birnbrich, and Seiler (2009), the survey is usually answered by senior management such as firm owers, members of the executive board, or department heads. The micro data of the IBS can be accessed under strict non-disclosure agreements on-site the ifo-LMU Economics & Business Data Center (EBDC) in Munich, Germany. The codes of the data set harmonization presented in this paper are also available at the EBDC and can be jointly used with the IBS micro data.

[2] I do not use data from the construction survey (IBS-BAU, 2017) due to a lack of comparability to the other sector-specific surveys of the IBS.

analyzed for the first time.[3]

Moreover, I harmonize the industry classification in the micro data of the IBS that are originally coded according to heterogeneous classification systems within and across the different industry-surveys. The respective codes are transferred to the German standard classification systems of 2003 and 2008 (henceforth, *WZ 03* and *WZ 08*), which largely correspond to the European "NACE Rev. 1.1" and "NACE Rev. 2" classification systems. Codifying all firms to a unique classification system serves mainly two purposes: First, fixed effects can be applied along the same level of industry aggregation in order to flexibly control for industry-specific variation of any kind. Second, the IBS data can be merged to administrative data at disaggregate industry levels which are usually coded according to *WZ 03* and *WZ 08*.[4]

The second goal of this paper is to utilize the harmonized firm-level dataset to shed light on the interpretation of the most widely used variables in the IBS that are firms' assessments about their current business conditions as well as their expectations for the next six months. The previous literature has been silent on the issue of interpretation in spite of the rather vague wording of these questions with respect to the dimension and the benchmark of the latent variable. Specifically, it is not unambiguous whether these variables have to be interpreted as *changes* relative to an (unspecified) baseline date or in *levels*. For this purpose, I proceed in two steps: first, I analyze the relationship between average time series of both questions and industry-level revenue data. Then, I provide insights from panel regressions at the firm-level. The results suggest that it is most reasonable to interpret both questions in levels rather than assuming that the expectations question captures the expected change in the level of business conditions. Obviously, this finding has direct implications for the specification of both econometric models, which use the micro data of IBS, and forecasting models, which include time series based on the survey questions, alike.

The remainder of this paper is organized as follows: Section 2 describes the harmonization procedure of the micro data of the different sector-specific surveys. Then, Section 3 evaluates the interpretation of the survey questions regarding firms' current and expected future business conditions. Section 4 concludes.

2. Preparing the IBS Micro Data for Panel Data Research

The goal of this section is to harmonize the micro data of the IBS such that firms in the most important sector-specific surveys can be analyzed jointly. Panel A of Table 1 summarized the two challenges this task includes: First, in the original micro data, the level of observational units is heterogeneous between the industry surveys and has been changed over time in the retail and wholesale survey. Section 2.1 addresses this problem. Second, the original micro data provides information with respect to each firm's main sector of business based on different classification systems across and within the sector-specific surveys. Section 2.2 describes how

[3] For example, Buchheim and Link (2017) make use of this adjustment when examining the anticipation effects of the increase in German value added taxes in 2007 based on firms' responses between January 2004 and December 2007. In contrast, Schenkelberg (2014) does not adjust for the methodological break and restricts her analysis to the micro data of the retail and wholesale survey prior to 2006.

[4] For example, Link (2018) matches firms in the IBS to data on the distribution of wages in their industry and location in order to identify the degree to which firms are affected by the introduction of statutory minimum wages in Germany in 2015.

firms are assigned to the German standard classification systems of 2003 and 2008 based on this information. Finally, Section 2.3 provides descriptive statistics of the harmonized micro data of the IBS.

In principle, the harmonization procedure applies to all survey questions. For the ease of exposition, the description is exemplified using the main questions from the IBS regarding current and expected business conditions:[5]

Q1 *"Current situation: We evaluate our current business condition as [1] good, [0] satisfactory (typical for the season), [-1] bad."*

Q2 *"Expectations for the next 6 months: After elimination of purely seasonal fluctuations, the development of our business will be [1] more favorable, [0] about the same, [-1] more unfavorable."*

2.1. Standardization of Observational Units to the Firm Level

The level of observational units differs across the sector-specific surveys of the IBS as questions either refer to the firm as a whole or to specific products of the firm. Aiming at the construction of a homogeneous data set, I define the firm as the unit of observation and aggregate the micro data to this level. As the anonymized micro data of the IBS do not allow to sharply discriminate between subsidiaries of larger conglomerates in different locations and stand-alone firms, the term "firm" refers to both types of entities interchangeably. As the identification of manufacturing firms is not unambiguous in many cases during the 1980s, I restrict the dataset to firms that responded to the IBS for more than one time between 1990 and 2017.[6]

To begin with, I have to cope with a methodological change in the retail/wholesale survey: Since February 2006, firms have been asked to answer each survey question only once while referring to the firm as a whole. Before this date, firms were asked to answer the same set of questions for different products. Answers for all the products had to be given on the same questionnaire. As summarized in Column (3) Panel B of Table 1 for the example of answers to Q2, almost half of the firms (117930/239115=49%) provided assessments of expected business conditions with respect to more than one product per point in time prior to the break. This fraction decreased to less than 1% after February 2006, see Column (4).[7]

Importantly, the answers before the methodological break were almost perfectly correlated within firms at a given point in time. If retail or wholesale firms provided assessments with respect to multiple products at the same date, they reported exactly the same expected business conditions for all products in more than 82% of cases, see Panel B of Table 1. In turn, only 8% of the product-specific expectations differed from the mode expectation of each firm at a given date. After the break, these fractions are largely comparable.

[5] See Appendix A.1 for details on the coding and German wording of the survey questions.

[6] The micro data of the IBS usually contain an anonymized identification variable "idnum" which originates from ifo's address database. This variable is needed to unambiguously discriminate between firms because the firm-specific identifiers in the IBS micro data ("runnum") of firms that dropped out of the survey could potentially have been assigned to newly entering firms. As the identifier "idnum" is not available for many manufacturing firms during the 1980s, the dataset is restricted to observations since 1990 for which the identifier "idnum" is available. This restriction is not too restrictive in light of the fact that industry-level administrative datasets based on the *WZ 03* and *WZ 08* classification systems are usually only available since the early 1990s.

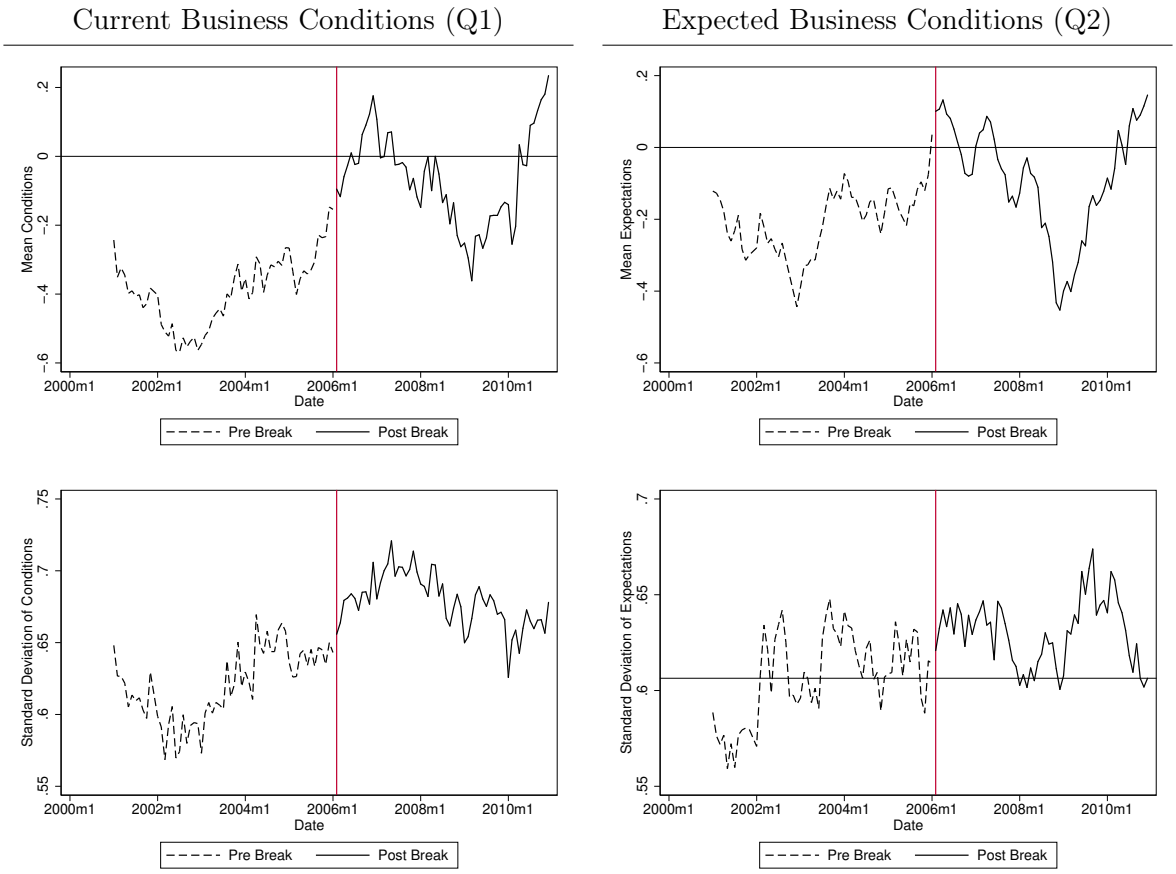
[7] Since February 2006, multiple observations per firm at a specific point in time are mainly due to firms submitting multiple questionnaires.

Table 1: Characteristics of Original Industry-Specific Surveys of the IBS

	Manufacturing 1990-2017 (1)	Services 2004-2017 (2)	Retail/Wholesale 1990-2006m1 (3)	Retail/Wholesale 2006m2-2017 (4)
Panel A: Methodological Heterogeneity Between and Within Industry-Specific IBS Surveys				
Frequency	Monthly	Monthly	Monthly	Monthly
Level of Observations Units	Product	Firm	Product	Firm
Industry Classification System Used in Micro Data				
- WZ93 ($\widehat{=}$ NACE Rev. 1)	yes	no	no	no
- WZ03 ($\widehat{=}$ NACE Rev. 1.1)	no	Until 2011m3	East Germany	yes
- WZ08 ($\widehat{=}$ NACE Rev. 2)	yes	Since 2011m4	no	no
- Other Product Classification System	yes	no	West Germany	no
Panel B: Multiple Reported Expectations per Firm and Date: Within-Firm Correlation				
# Firm-Date Combinations	1014172	374489	239115	215722
# Firm-Date Comb. w. Multiple Reports	7148	1017	117930	1597
- All Expectations in the Same Answer Category	5996	842	97196	1322
- Referring to Distinct Answer Categories	1152	175	20734	275
Fraction of Expectations Diverging from the Mode in Case of Multiple Reports per Firm and Date	0.106	0.079	0.079	0.086

Notes: Panel A documents the methodological heterogeneity between and within the different industry-specific IBS surveys with respect to their frequency, the level of observational units the survey questions refer to, and the industry classification system used in the original IBS micro data. If not stated differently, the industry identifiers are usually available during all periods covered by the respective survey. Panel B summarizes the degree to which firms in the different industry surveys provided multiple reports regarding their business expectations for the next six months (Q2) at the same date, i.e., multiple reports per firm-date combination. The frequencies for the case of Q1 are comparable and hence omitted.

Figure 1: Correction of the Methodological Break in the Retail/Wholesale Survey



Notes: The figures plot the cross-sectional means (upper graphs) and standard deviations (lower graphs) of current business conditions (left) and expected business conditions (right) of retail and wholesale firms over time. Before January 2006, the reports to the retail and wholesale survey referred to different products. This data is aggregated to the firm level by taking means and rounding to the next integer. Cross-sectional means and standard deviations of the aggregated data are plotted using a dashed line. Accordingly, the solid lines display the cross-sectional means and standard deviations of reports firms after February 2006 that referred to each retail and wholesale firm as a whole.

In order to use the entire universe of the micro data in the retail/wholesale survey, I aggregate the data before January 2006 to the firm level by taking arithmetic means of the answers. In light of the strong within-firm correlation in case of multiple reports at a given date, it is reasonable to assume that the current and expected business conditions of each firm are well captured by the average reports with respect to different products. In case of dissimilar assessments referring to different products, I round the mean response to the next integer. For the sake of symmetry, a mean of "-0.5" is rounded to "-1". Figure 1 plots the time series of cross-sectional means and standard deviations of aggregated reported business conditions and expectations of retail and wholesale firms over time. The graphs indicate that the methodological break between January and February 2006 did not generate differing patterns in the data.[8] Hence, the data before January 2006 can be aggregated to the firm-level without major concerns.

In contrast, the aggregation to the firm-level is more straightforward in the case of the man-

[8]Moreover, the distribution of reported business conditions and expectations for the next six months is similar before and after the break. In January 2006, firms reported non-neutral current (expected) business conditions in 43.6% (37.8%) of the cases. In February 2006, these numbers were largely comparable (43.9% and 39.5%).

ufacturing and services surveys of the IBS. While the questions in the services survey refer to the firm as a whole, firms in the manufacturing survey are asked for an assessment regarding a specific product. As the latter usually refers to the main product of the firm and firms are usually observed only once per month in the survey, the responses of manufacturing firms are interpreted as referring to the current and expected business conditions of the firm as a whole. In 0.8% (0.3%) of all reporting periods, however, the micro data in the manufacturing (services) survey contain multiple reports per firm at a given date. As documented in Columns (1) and (2) of Table 1, simultaneous reports are usually identical. In turn, only 11% (8%) of these multiple reports differ from the mode of firms' business expectations at the same point in time. Similar to the procedure in the retail and wholesale survey, the small number of multiple observations per month is aggregated to the firm level by taking means and rounding to the next integer.

2.2. Harmonization of Industry Classification Systems

This section describes the assignment of firms in the IBS to the German standard classification systems *WZ 03* and *WZ 08*. This mainly serves two purposes: first, fixed effects can be applied along the same level of industry aggregation in order to control for either time-invariant specificities of different sectors or fluctuations at the industry-level. Second, the IBS data can be matched to administrative data at disaggregated industry levels. As summarized in Panel A of Table 1, the organization of the original sector identifiers strongly differs between the sector-specific surveys. Thus, I describe the procedure of the assignment of firms to the *WZ 03* and *WZ 08* classification systems separately for each survey.

Manufacturing Survey

The transfer of sector identifiers to the official *WZ 03* and *WZ 08* classification systems is most straightforward for firms in the manufacturing survey. In the micro data, information about each firm's main sector of business activity is contained in three variables denoted "sector_wz93," "sector_wz08," and "sector_ifo." Importantly, these variables do not only contain sector codes, but also include verbal descriptions for each sector. While "sector_wz93" and "sector_wz08" contain five-digit codes that are roughly equivalent to the official older classification system of 1993 (*WZ 93*) as well as to *WZ 08*, "sector_ifo" refers to a four-digit code that provides additional details about the good produced by the firm. In more than 99% of the observations, all three identifiers are simultaneously filled in the dataset.

Based on this information, each observation is assigned to the respective *WZ 03* sector. To begin with, I use the "*WZ 93*→*WZ 03*" conversion table provided by the Federal Statistical Office, see Destatis (2003) p. 548ff.[9] In some cases, however, the variable "sector_wz93" is empty or only provides information at the three-digit level. I circumvent this problem by using more precise information contained in the variables "sector_wz08" and/or "sector_ifo" to group the observation to the corresponding four-digit group according to *WZ 03*.[10]

[9] In fact, the *WZ 03* classification system is only marginally different from the older *WZ 93*, while the replacement of *WZ 03* by *WZ 08* constituted a major re-organization of the classification system.

[10] For example, an observation classified as "sector_wz93=29400 Manufacture of machine tools" and "sector_wz08=28410 Manufacture of metal forming machinery" is grouped to the *WZ 03*-industry "29420 Manufacture of machine-tools for metalworking." Moreover, if information is only available at the three-digit level in

In turn, the variable "sector_wz08" is used to assign each observation to a *WZ 08* sector. Again, information from the other sector identifiers is used once the observation cannot directly be grouped to a four-digit *WZ 08* sector based on information contained in "sector_wz08."

Overall, more than 99% of all observations in the manufacturing survey can be assigned to sector identifiers of both classification systems that are informative at least at the four-digit level.

Services Survey

The organization of sector identifiers in the micro data of the services survey differs from the manufacturing survey as there is only one identifier available at any given point in time. Firms have been coded with respect to the *WZ 08* classification system only since April 2011. Before this date, the micro data contain sector identifiers according to the older *WZ 03* classification system.[11]

Updating the sector identifiers in 2011, the practitioners of the ifo Institute assigned each firm manually to the *WZ 08*-industry that was most consistent with its actual business. Hence, the transfer of firms from *WZ 03* to *WZ 08* does not necessarily coincide with the official conversion table provided by the Federal Statistical Office. Therefore, it is convenient to assign each firm's post-break *WZ 08* identifier to the period before the break assuming constancy in fims' business activities. Following this procedure, 78% of all observations prior to March 2011 can be matched to sector identifiers according to *WZ 08*. The remaining observations are assigned to the mode *WZ 08* identifier of firms in the same three-digit industry according to *WZ 03*. Accordingly, the pre-break *WZ 03* identifiers are forwarded to the post-break era. Overall, 100% (99.8%) of observations in the services survey can be assigned to sector codes according to *WZ 03* (*WZ 08*).

Retail and Wholesale Survey

The methodological break in the questionnaires of the retail and wholesale survey in 2006 involves a change in the organization of sector identifiers. Since February 2006, firms have been classified according to the *WZ 03* classification system. Then, *WZ 03*-specific identifiers can directly be used without major corrections and are transferred to the *WZ 08* classification using the "*WZ 03*→*WZ 08*" conversion table provided by the Federal Statistical Office, see Destatis (2008) p. 663ff.[12]

Until January 2006, each observation is classified in accordance with an IBS-specific product classification system that is more detailed than the *WZ 03* or *WZ 08* industry classifications.

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all sector identifiers, I group this observation to the most general four-digit code, e.g., "sector_wz93=1530(0) Processing and preserving of fruit and vegetables" is grouped to the *WZ 03*-industry "1533(0) Processing and preserving of fruit and vegetables, not elsewhere classified." Obviously, this adjustment is only relevant if administrative data at the four-digit level is merged to the firms in the IBS because the code "15.30" does not exist in the official version of the *WZ 03* classification system.

[11] In a small number of cases, the respective variables "sector_wz03" and "sector_wz08" only provide information at the two-digit or three-digit level. Analogous to the manufacturing survey, these observations are grouped to the most general four-digit code, e.g., "6200(0) Computer programming, consultancy and related activities" is grouped to "6209(0) Other information technology and computer service activities."

[12] In order to be able to match data from administrative sources at the four-digit level to the micro data of the IBS, I need to correct for minor deviations of the sector identifier in the IBS from the official *WZ 03* system. For example, the IBS-codes "[50131] Retail sale of new motor vehicles" and "[50132] Retail sale of used motor vehicles" are assigned to the official *WZ 03*-code "[50103] Retail sale of motor vehicles."

The respective identifier, denoted as "sector_ifo," contains a verbal description of the good. "sector_ifo" is usually accompanied with a variable denoted "typtra" that indicates whether the firm is a retailer or a wholesaler. I assign each combination of "sector_ifo" and "typtra" to the corresponding *WZ 03* and *WZ 08* identifiers manually.

To complicate things, retail and wholesale firms were coded differently in East Germany and West Germany to prior to 2006. In contrast to their counterparts in West Germany, the variable "sector_ifo" is very close to the *WZ 03* classification system in the case of East German firms. For example, the code "sector_ifo=[51550] chemical products" can only be found for East German firms. Therefore, this observation is assigned to the *WZ 03*-industry "[51550] Wholesale of chemical products." In contrast, the combination "sector_ifo=[51590] cosmetic articles and personal hygiene articles" and "typtra=1" (retail) is unique to West German firms and hence assigned to the *WZ 03*-industry "[52331] Retail sale of cosmetic and toilet articles."[13]

In order to finalize the standardization of observational units to the firm-level described in Section 2.1, firms with multiple observations per time period, which potentially are grouped to different sector identifiers, are assigned to unique *WZ 03* and *WZ 08* codes in each period. I proceed in the following steps: first, I use the first sector identifier in the data of each firm in every period if all sector identifiers are identical or within the same four-digit group at a given date. Second, I match the sector identifiers of firms that are still ambiguous to the unique identifier of February 2006 if the firm "survives" the methodological break. Third, if firms are not observed after the break in 2006 and observations are not within the same four-digit sector, but in the same three-digit group, I assign the firm to the mode sector of all observations at a given point in time. Lastly, the remaining observations are grouped to a unique sector identifier manually.[14]

2.3. Descriptive Statistics of Harmonized IBS Micro Data

The harmonized sample of the IBS comprises of on average approximately 5500 firms per month between 1990 and 2017 if the data is restricted to firms that responded to the survey in at least two months. As displayed in Figure A.1 in Appendix A.2, the number of reporting firms per period is largest in the manufacturing survey (on average approximately 3000 firms), but declining over time. In contrast, the number of firms in the retail and wholesale survey has been relatively constant (on average roughly 1350 firms). Moreover, an average number of 2300 firms has responded to the services survey since its introduction in October 2004.

Conditional on responding to the survey more than once, attrition is very low and firms are

[13] Moreover, there is a third industry classification variable called "sector_east" that covers all East German firms until June 1998. However, the scaling of the variable is very rough and hence cannot be transferred to the more precise *WZ 03* and *WZ 08* classification systems. The sector identifier of these firms is set to missing.

[14] If the remaining firms have distinct sector identifiers in less than three months, these observations are assigned to the sector code of the previous month. Moreover, there are 23 retailers of food in the groups *WZ 03*:52110/ *WZ 08*:47110 ("Retail sale in non-specialized stores with food, beverages or tobacco predominating") and *WZ 03*:52200/ *WZ 08*:47200 ("Retail sale of food, beverages and tobacco in specialized stores") which are manually assigned to group *WZ 03*:52270/ *WZ 08*:47290 "Other retail sale of food, beverages and tobacco in specialized stores." In addition, 28 retailers of cars and motorcycles including their maintenance are sorted to *WZ 03*:50103/ *WZ 08*:45110 "Retail sale of cars." The remaining firms with ambiguous sector identifiers are assigned to groups *WZ 03*:52120/ *WZ 08*:47789 "Other retail sale" if they are retailers or *WZ 03*:51900/ *WZ 08*:46900 "Other wholesale" if they are wholesalers.

Table 2: Relationship Between Business Conditions and Sample Attrition

	$\text{Conditions}_{i,t}$		
$\mathbb{1}$(Last Observation of Firm in Sample$_i$)	-0.14***	-0.11***	-0.048***
	(0.0055)	(0.0051)	(0.0045)
Constant	yes		
Time*4-dig. Sector FE		yes	yes
Firm FE			yes
Adjusted R^2	0.000	0.185	0.429
Observations	1748349	1748349	1741061

Notes: The dependent variable is firms' reported current business situation (Q1). $\mathbb{1}$(Last Observation of Firm in Sample$_i$) is a dummy that is one at the last date firm i is observed in the sample. Levels of significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

observed for 7.5 years on average.[15] While attrition of firms is not found to be random, dropout of firms does not appear to be problematic for most research questions. As documented in Column (1) of Table 2, firms reported current business conditions—coded on a trichotomous scale with values $\{-1, 0, 1\}$—that were significantly worse by -0.14 on average during the last month in the sample compared to the mean of reported business conditions in all other observations.[16] However, dropout of firms does not appear to be driven by industry-specific shocks because the estimated average condition in the month prior to firms' dropout is largely unaffected by the inclusion of date fixed effects at the level of four-digit industries, see Column (2). In contrast, the coefficient drops by roughly two thirds relative to its size in Column (1) after controlling for firm fixed effects in Column (3). Hence, firms that drop out of the sample generally performed worse during all other periods compared to the remaining firms. Furthermore, the pattern of attrition does not appear to have changed substantially over time. As can be inferred from Table A.1 in Appendix A.2, the survival rates are rather constant across different cohorts of firms.

Moreover, the response rates to the survey are relatively high despite of the fact that participation is voluntary. On average, firms answer the questionnaire in 80.5% of months and response rates do not differ substantially between firms in the industry surveys on manufacturing (82.3%), retail and wholesale (79.3%), and services (77.5%). Even though the response rate of firms is high, researchers working with the micro data of the IBS might need to deal with non-response of firms if their empirical approach is based on firms' reports to the IBS in several consecutive months, for example. In order not to lose too many observations, one possibility is to linearly interpolate missing answers as long as the gap in the data is shorter than a predefined number of periods. If missing answers to Q1 are interpolated as long as answers are missing for at most two consecutive months, for example, the "artificial" response rate increases to 87.7% on average. As documented in Figure A.2 in Appendix A.2, the interpolated responses do not differ substantially from the answers originally contained in the dataset.[17]

[15] The average duration in the data set of firms in the sector-specific surveys respectively is 9.6 years (manufacturing), 6.2 years (retail and wholesale), and 5.6 years (services).

[16] The respective empirical model reads: $\text{Conditions}_{i,t} = (\beta_0 +)\beta_1 \times \mathbb{1}(\text{Last Observation of Firm in Sample}_i) + (\alpha_i + \delta_t \times \mathbb{1}(\text{Sector}_i)) + \varepsilon_{i,t}$, where $\text{Conditions}_{i,t}$ denotes current business conditions as reported to Q1, $\mathbb{1}$(Last Observation of Firm in Sample$_i$) is a dummy that is one during the last date firm i is observed in the sample and α_i and $\delta_t \times \mathbb{1}(\text{Sector}_i)$ are firm fixed effects and time fixed effects at the four-digit industry level.

[17] See Seiler (2014) for a more detailed analysis on the determinants of non-response in the IBS. Moreover, Seiler

3. Interpretation of Current and Expected Business Conditions in the IBS

This section uses the harmonized firm-level data set of the IBS in order to shed light on the interpretation of the most widely used questions, i.e., firms' assessments about their current business conditions (Q1) as well as their expectations for the next six months (Q2). While the other questions in the IBS are relatively precise, the wording of the questions is rather vague with respect to the dimension and the benchmark of the latent variable firms are supposed to refer to in Q1 and Q2.[18] On the one hand, the wording of Q1 appears to ask for an assessment of the *level* of firms' current business conditions, e.g., as being "good." However, Q1 does not set a benchmark to which firms should relate this level, e.g., as a deviation from the trend. On the other hand, Q2 is formulated using relative terms such as "more favorable" but does not provide an explicit benchmark, either.

Hence, the relationship between realized current business conditions and expectations for the next six months is not clear *a priori*. The more natural interpretation is that firms relate the expected development of their business conditions during the next six months to the situation prevalent in the reporting month. In this case, Q2 would capture the expected *change* in Q1. However, it is also reasonable that firms opting for "[1] more favorable" in Q2 expect that their business conditions in the next six months will be more favorable compared to the trend. Then, Q2 captures the expected *level* of future business conditions and Q1 and Q2 should be interpreted as referring the similar dimension of the same latent variable.

This results presented in the remainder of the paper provide strong evidence that firms refer to the similar dimension of the same latent variable when stating their current business conditions and expectations for the next six months to the IBS. This finding is in line with the majority of studies that used the IBS data at aggregated levels and thereby implicitly interpreted both survey questions along the same dimension. For example, there is a large literature on the forecasting properties of the "ifo Business Climate Index" (henceforth, IBC) which is calculated as a weighted average of firms' responses to Q1 and Q2.[19] These studies usually relate the IBC to time series of aggregate production indices or GDP which are displayed either in (detrended) levels or in growth rates. Thereby, the respective authors implicitly assume that the IBC can be interpreted in a sensible way, i.e., that Q1 and Q2 can be interpreted along the same dimension and Q2 is not capturing the expected change in Q1.[20]

While time series of aggregated survey results have frequently been used in the literature, micro-econometric analyses that exploit the cross-sectional variation in firms' responses to Q1

and Heumann (2013) provide a statistical analysis of different imputation methods and conclude that the bias due to non-response does not significantly reduce the forecasting performance of the ifo Business Climate Index that is based on the micro data of the IBS.

[18] It is important to note that the ifo Institute deliberately does not provide a latent variable when asking Q1 and Q2 in order to capture the "sentiment" of firms as closely as possible in the "ifo Business Climate Index." Given this flexibility, each firm can assess its current and expected business conditions according to the variable that is most relevant in the context of its business. I thank Klaus Wohlrabe from the ifo Institute for pointing this out.

[19] See Abberger and Wohlrabe (2006) for a survey of the literature on the forecasting properties of the IBC. Precisely, the IBC is calculated as the average between the weighted mean of firms' reported current business conditions from Q1 and the weighted mean of firms' business expectations from Q2.

[20] In contrast, the "ifo Business Cycle Clock," which portrays the two components of the IBC in a four-quadrant scheme, provides an exception. For example, Abberger and Nierhaus (2011) follow this method and relate average reports to Q1 to the deviation of real GDP from its trend as well as Q2 to changes in this measure.

and Q2 are rare. In the majority of these cases, the relationship between current and expected business conditions is not at the heart of the econometric analysis and reports to Q1 (or Q2) serve as covariates that control for firm-specific business conditions in other contexts. These studies usually do not provide an interpretation of the survey questions as their main results are not depending on this issue. For example, Fidrmuc and Hainz (2013) control for firms' reported business conditions when assessing the effect of banking regulation on cross-border lending. The same applies to Kleemann and Wiegand (2014) and Bachmann, Born, Elstner, and Grimme (2018) who use answers to Q1 and Q2 as covariates when examining the role of real effects for credit supply as well as the relationship between business volatility and price setting of firms, respectively. In contrast, Buchheim and Link (2017) build on the insights of the following analysis and relate reports to Q1 and Q2 to each other in order to study the information content of firms' expectations.

The following analysis takes a step in the direction of a better understanding of the interpretation of Q1 and Q2. First, Section 3.1 summarizes evidence from the analysis of time series of average reported realized and expected business conditions and exploits the newly-created possibility to match industry-specific revenue data to the IBS. Second, Section 3.2 provides insights from panel regressions at the firm-level.

3.1. Relationship between Current Conditions and Expectations: Insights from Aggregate Time Series

This section provides first evidence that the survey questions Q1 and Q2 should be interpreted as referring the similar dimension of the same latent variable by means of analyzing firms' average reports of current and expected future business conditions ($\text{Cond}_t = \sum_i \text{Cond}_{i,t}$ and $\text{Exp}_t^{+6m} = \sum_i \text{Exp}_{i,t}^{+6m}$). For this purpose, I exploit the possibility that administrative data of industry-level revenues can be matched to the harmonized IBS data and can be compared to average responses of firms. Moreover, the relationship between Q1 and Q2 is directly examined by comparing the time series of average reported current and expected future business conditions.

3.1.1. Current Conditions: Relation to Administrative Revenue Data

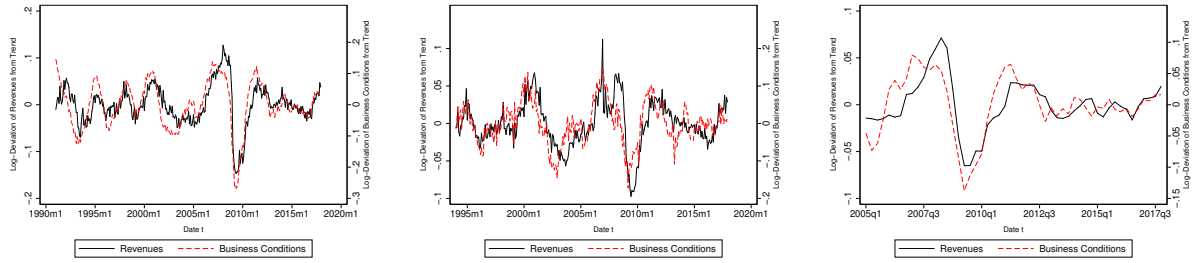
In a meta-study of the IBS, Abberger, Birnbrich, and Seiler (2009) document that firms usually refer to profits or revenues when being asked for an assessment of their current business situation in Q1 of the IBS. Unfortunately, firm-level data on revenues or comparable measures are not available at monthly frequency. I circumvent this problem by using monthly time series of seasonally adjusted revenues ($\text{Revenues}_{s,t}$) at the level of four-digit industries s in the manufacturing as well as retail/wholesale sector provided by the German Federal Statistical Office. Lacking more detailed data, I furthermore use quarterly data of seasonally adjusted revenues at the two-digit industry level in the services sector.[21] For the sake of comparability to the time series of average reported business conditions (Cond_t), the industry-level time series are weighted by the share

[21] The following time series of calendar adjusted and seasonally adjusted revenue indices are downloaded from Destatis' GENESIS database: Manufacturing (code 42152/period 1991-2017/monthly frequency/4-digit industry level) as well as Retail and Wholesale (45211,45212/1994-2017/monthly/4-digit), and Services (47414/2005-2017/quarterly/2-digit). In turn, average conditions are deseasonalized using fixed effects for each month.

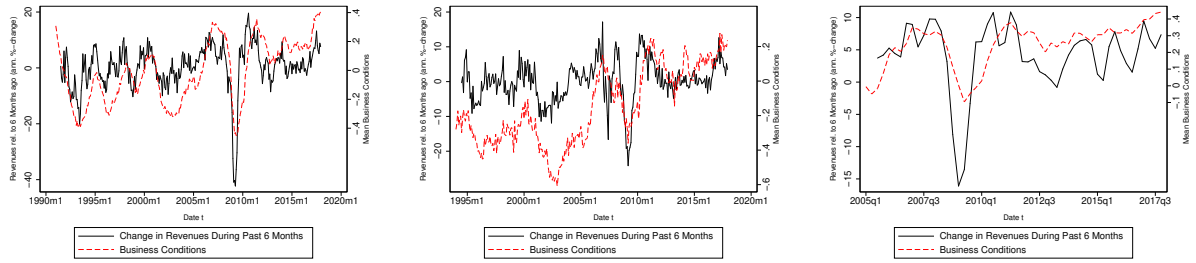
Figure 2: Business Conditions Relative to Administrative Revenue Data

Manufacturing | Retail & Wholesale | Services

Panel A: Realized Business Conditions vs. Current Level of Revenues



Panel B: Realized Business Conditions vs. Changes in Revenues Relative to 6 Months Before



Notes: Panel A plots the cross-sectional mean of current business conditions as reported to Q1 in the IBS (right axis) against the mean of industry-specific, seasonally adjusted revenue indices weighted by the number of IBS firms in each industry (left axis). Mean business conditions are deseasonalized by purging for month fixed effects. For the subset of services firms, mean business conditions are transferred to quarterly frequency by taking means as revenue data are only available on a quarterly basis. Both time series are detrended using the log-deviation from an HP-filtered trend with smoothing parameter $\lambda = 129,600$ (1,600) for monthly (quarterly) data. Panel B plots mean current business conditions (right axis) against the annualized change in weighted revenues relative to six months before reporting date t (left axis).

of firms in the respective sectors of the IBS (ω_s), i.e., $\text{Revenues}_t = \sum_s \omega_s \text{Revenues}_{s,t}$.[22] In the case of the services survey, Cond_t is transferred to quarterly frequency by taking means.

First, I examine the relationship between the cross-sectional mean in current business conditions and the level of aggregate revenues. For the sake of comparability and stationarity, both series need to be detrended. Hence, the baseline specification displayed in Panel A of Figure 2 compared the log-deviations of current conditions ($\hat{\text{Cond}}_t$) and revenues ($\hat{\text{Revenues}}_t$) from an HP-filtered trend with the standard smoothing parameters of $\lambda = 129,600$ (1,600) for monthly (quarterly) data suggested by Ravn and Uhlig (2002). Alternatively, the time series could be detrended using growth rates. As shown in Figure A.3 in the Appendix, the growth rate in revenues fits the growth rates in Cond_t to a comparable degree as in the baseline specification.

The level of reported business conditions closely tracks the variation in administrative revenue data despite the fact that the IBS data are only qualitative in nature and the revenue data are quantitative. As can be inferred from the cross-correlation structure displayed in Table 3, the contemporaneous correlation between both time series is remarkably high and ranges between 0.66 (retail and wholesale) and 0.78 (manufacturing). In all surveys, $\hat{\text{Cond}}_t$ slightly precedes the

[22] It is important to note that it is not reasonable to compare average business conditions and revenues separately for each industry because the number of firms in the IBS is too low in most four-digit industries. Consequently, the correlation between both time series is usually quite low due to the trichotomy of the survey data.

Table 3: Cross-Correlation: Current Business Conditions vs. Administrative Revenue Data

Lag/Lead l in Months	-6	-5	-4	-3	-2	-1	**0**	1	2	3	4	5	6
	Panel A: Manufacturing												
$\rho(\hat{\text{Cond}}_t, \hat{\text{Revenues}}_{t+l})$	0.243	0.357	0.462	0.561	0.650	0.725	**0.777**	0.814	0.831	0.828	0.812	0.791	0.751
$\rho(\text{Cond}_t, \Delta\text{Revenues}_{t+l,t+6+l})$	0.621	0.645	0.648	0.643	0.627	0.602	**0.561**	0.500	0.431	0.350	0.264	0.181	0.100
	Panel B: Retail and Wholesale												
$\rho(\hat{\text{Cond}}_t, \hat{\text{Revenues}}_{t+l})$	0.221	0.312	0.396	0.468	0.540	0.611	**0.656**	0.655	0.704	0.721	0.710	0.719	0.715
$\rho(\text{Cond}_t, \Delta\text{Revenues}_{t+l,t+6+l})$	0.474	0.479	0.502	0.488	0.478	0.478	**0.449**	0.401	0.380	0.348	0.300	0.264	0.238
	Panel C: Services												
$\rho(\hat{\text{Cond}}_t, \hat{\text{Revenues}}_{t+l})$	0.183			0.531			**0.770**			0.849			0.797
$\rho(\text{Cond}_t, \Delta\text{Revenues}_{t+l,t+6+l})$	0.674			0.690			**0.577**			0.333			0.071

Notes: Cross-correlation of the time series of (seasonally adjusted) business conditions (Q1) and revenues. In the first row, both time series are detrended by means of an HP-filter with smoothing parameter $\lambda = 129,600$ (1600) for monthly (quarterly) data. In the second row, business conditions are contrasted to the growth rate in revenues relative to six months before. Contemporaneous correlations are highlighed in fat font, the maximum cross-correlation is displayed in boxes.

realized level in revenues. For manufacturing, the time series correlation is highest if business conditions are lagged by two months, i.e., $\rho(\hat{\text{Cond}}_t, \hat{\text{Revenues}}_{t+2}) = 0.83$. For retail and wholesale firms as well as services, the time series correlation is if average business conditions are lagged by three months/one quarter, i.e., $\rho(\hat{\text{Cond}}_t, \hat{\text{Revenues}}_{t+3}) = 0.72$ and 0.85, respectively.

Next, the relationship between current business conditions and realized changes in revenues is examined. As shown in Panel B of Figure 2, Cond_t is positively correlated with the time series of annualized changes in revenues relative to six months before, denoted $\Delta\text{Revenues}_{t,t-6} = \frac{\text{Revenues}_t - \text{Revenues}_{t-6}}{\text{Revenues}_{t-6}}$. In all industry surveys, the contemporaneous correlation between both time series is much lower compared to the "level"-interpretation of Panel A. Moreover, current conditions *lag* past changes in revenues. Specifically, the time series correlation is highest if current conditions are compared to changes in revenues between 10 and 4 months in the past in the samples of manufacturing and retail/wholesale firms, i.e., $\rho(\text{Cond}_t, \Delta\text{Revenues}_{t-4,t-10}) = 0.65$ and 0.50, respectively. For the subset of services firms, the correlation approaches its maximum if Cond_t is related to the change in revenues between three and one quarter in the past, i.e., $\rho(\text{Cond}_t, \Delta\text{Revenues}_{t-3,t-9}) = 0.69$.

Hence, the comparison of the cross-sectional mean of business conditions and aggregate revenue data clearly points into the direction of interpreting current business conditions reported to Q1 in levels rather than changes relative to previous periods.

3.1.2. Interpretation of Expectations Regarding Business Conditions in the Next 6 Months

Next, the analysis focuses at the interpretation of firms' expected future business conditions reported to Q2. While the wording of the question refers to an expected *change* in future business conditions, the evidence presented in the following points more into the direction of an interpretation in *levels*, i.e., that firms reporting to expect "more favorable" business conditions

Table 4: Cross-Correlation: Expectations vs. Average Current Conditions in Next 6 Months

Lag/Lead l in Months	-6	-5	-4	-3	-2	-1	**0**	1	2	3
	Panel A: Manufacturing									
$\rho(\hat{\text{Exp}}_t^{+6m}, \hat{\overline{\text{Cond}}}_{t+l+1,t+l+6})$	0.277	0.397	0.508	0.607	0.689	0.750	**0.788**	0.807	0.808	0.792
$\rho(\hat{\text{Exp}}_t^{+6m}, \hat{\overline{\text{Cond}}}_{t+l+1,t+l+6} - \hat{\overline{\text{Cond}}}_{t+l})$	0.813	0.838	0.818	0.760	0.674	0.540	**0.381**	0.248	0.108	-0.028
	Panel B: Retail and Wholesale									
$\rho(\hat{\text{Exp}}_t^{+6m}, \hat{\overline{\text{Cond}}}_{t+l+1,t+l+6})$	0.667	0.741	0.797	0.835	0.854	0.847	**0.812**	0.777	0.732	0.676
$\rho(\hat{\text{Exp}}_t^{+6m}, \hat{\overline{\text{Cond}}}_{t+l+1,t+l+6} - \hat{\overline{\text{Cond}}}_{t+l})$	0.519	0.479	0.393	0.290	0.215	0.055	**-0.138**	-0.127	-0.203	-0.278
	Panel C: Services									
$\rho(\hat{\text{Exp}}_t^{+6m}, \hat{\overline{\text{Cond}}}_{t+l+1,t+l+6})$	0.215	0.345	0.465	0.573	0.663	0.733	**0.780**	0.809	0.821	0.816
$\rho(\hat{\text{Exp}}_t^{+6m}, \hat{\overline{\text{Cond}}}_{t+l+1,t+l+6} - \hat{\overline{\text{Cond}}}_{t+l})$	0.794	0.835	0.823	0.772	0.697	0.554	**0.400**	0.277	0.147	0.028

Notes: Cross-correlation of the time series of business expectations for the next six months and the average of realized business conditions between $t+1$ and $t+6$. Both time series are seasonally adjusted and detrended by means of an HP-filter with smoothing parameter $\lambda = 129,600$. In the first row, business expectations are contrasted to the level of realized business conditions between $t+1$ and $t+6$. In the second row, business expectations are related to the difference in average business conditions between $t+1$ and $t+6$ relative to conditions in t.

expect their future business conditions to be above the trend rather than to increase relative to the current level.

To begin with, I compare the cross-sectional mean of expected future business conditions in the next six months (Q2) against the ex post realized business conditions during the time span covered by the expectations, i.e., the average reported current business conditions (Q1) between $t+1$ and $t+6$, denoted $\overline{\text{Cond}}_{t+1,t+6}$.[23] Panel A of Figure 3 plots the log-deviation of expectations and average ex post realized business conditions from the HP-filtered trend with $\lambda = 129,600$.[24]

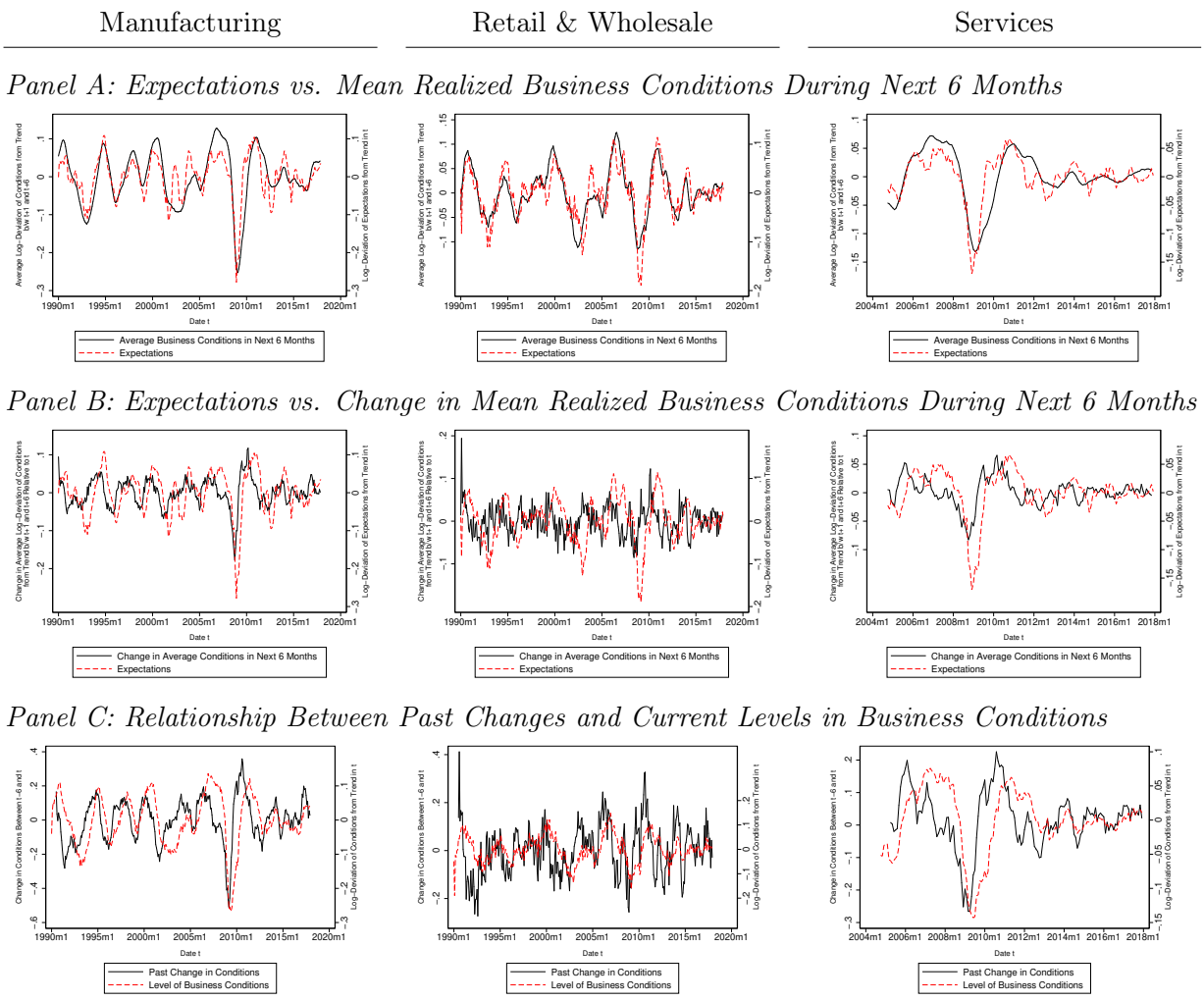
The time series of expectations for the next months and the average level ex post realized business conditions during the period covered by the expectation window are strongly correlated across all sector-specific surveys. The respective time series correlations are as high as $\rho(\hat{\text{Exp}}_t^{+6m}, \hat{\overline{\text{Cond}}}_{t+1,t+6}) = 0.78$ in the subsets of manufacturing and services firms and $\rho(\hat{\text{Exp}}_t^{+6m}, \hat{\overline{\text{Cond}}}_{t+1,t+6}) = 0.81$ for the set of retail and wholesale firms. As displayed in Table 4, these contemporaneous correlations are very close to the maxima of the cross-correlations using various lags of the variables.

Then, I examine the interpretation that is closest to the wording of the questions, i.e., that Q2 refers to an expected *change* in future business conditions captured by Q1. Panel B of Figure 3 plots expected business conditions for the next six months (Q2) and the change in average es post

[23] Anticipating the results of Section 3.2, expectations for the next six months are related to the average ex post realized business conditions during the six month expectation window rather than to the realization in $t+6$ only. However, the results of this section do not change if $\overline{\text{Cond}}_{t+1,t+6}$ is replaced by Cond_{t+6}.

[24] Deviations from the HP-filtered trend are chosen for the sake of comparability to the results presented in Figures 2 and 4. Figure A.4 in the Appendix plots the time series of average business conditions and expectations without detrending (Panel A1). Further, Panel A2 of Figure A.4 displays the cross-sectional average reports to Q1 and Q2 after purging for firm fixed effects in order to control for time-invariant firm-specific optimism or pessimism as documented by Bachmann and Elstner (2015) in a related context. The results do not deviate substantially from those using deviations from the HP-filtered trend.

Figure 3: Relationship b/w Current Business Conditions and Expectations for the Next 6 Months



Notes: Panel A plots the time series of expected business conditions for the next six months (Q2-right axis) against the ex post realized business conditions during the time span covered by the expectations (left axis), i.e., the average reported current business conditions (Q1) between $t+1$ and $t+6$. The time series are seasonally adjusted by controlling for month fixed effects and detrended using the log-deviation from an HP-filtered trend with smoothing parameter $\lambda = 129,600$. Panel B plots business expectations (right axis) against the change in average realized business conditions between $t+1$ and $t+6$ relative to t (left axis). In Panel C the time series of the change in realized business conditions (Q1) between $t-6$ and reporting date t (left axis) is plotted against the detrended level of current business conditions (Q1) in t (right axis).

realized business conditions between $t+1$ and $t+6$ relative to the level in the reporting month t, i.e., $\overline{\hat{\text{Cond}}}_{t+1,t+6} - \overline{\hat{\text{Cond}}}_t$.[25] Although the both time series are visually highly correlated, the expectations strongly *lag* future changes in conditions. As can be inferred from Table 4, the correlation between the series is strongest in all sub-samples if changes in conditions are lagged by at least 5 months. Compared to Panel A, the contemporaneous correlation between both series is much weaker. In the case of the manufacturing and services surveys, the correlation is as low as $\rho(\hat{\text{Exp}}_t^{+6m}, \overline{\hat{\text{Cond}}}_{t+1,t+6} - \overline{\hat{\text{Cond}}}_t) = 0.38$ and 0.40, respectively. In the retail and wholesale survey, the contemporaneous correlation even turns slightly negative ($\rho(\hat{\text{Exp}}_t^{+6m}, \overline{\hat{\text{Cond}}}_{t+1,t+6} - \overline{\hat{\text{Cond}}}_t) = -0.14$). This means that expectations do not appear to strongly reflect future changes in reported business conditions, but are strongly correlated with *past* changes.

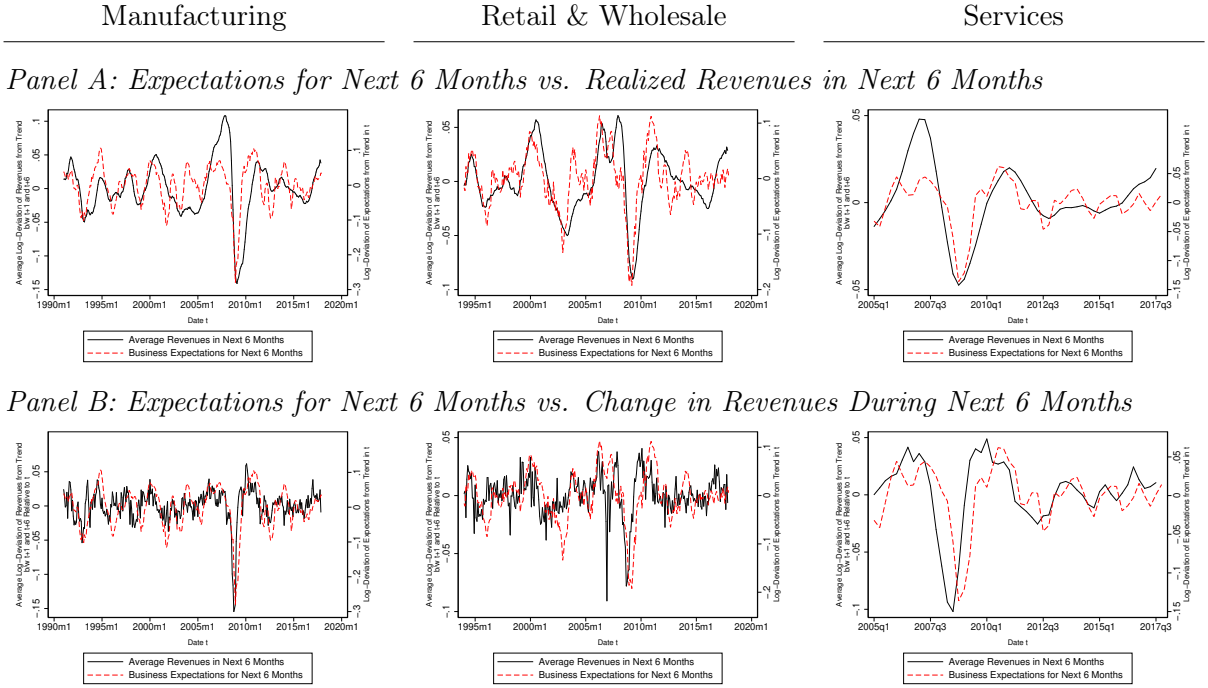
The high correlation between past changes in Q1 and business expectations for the next six months for the case of manufacturing and services firms documented in Panel B of Figure 3 could be reconciled with the "level"-interpretation of Panel A if past changes in realized conditions were a strong predictor for their future level. Panel C points into this direction as changes in business conditions of manufacturing and services firms during the previous six months are indeed strongly correlated with the subsequent deviation of business conditions from their trend. Interestingly, this pattern is much weaker in the case of retail and wholesale firms which possibly explains the lower correlation between their expectations and past changes in business conditions. Overall, expectations appear to reflect past changes in business conditions far better than changes in the near future. If Q2 was to be interpreted literally as expected change in conditions during the next six months, firms would do a rather bad job in forecasting future changes in their conditions by simply extrapolating past changes in their business conditions.

Relating expectations about business conditions in the next six months to administrative revenue data delivers a comparable picture. The cross-sectional average of firms' business expectations precedes the future *level* of administrative revenue data in all sector-specific surveys. Panel A of Figure 4 displays the detrended time series $\hat{\text{Exp}}_t^{+6m}$ and $\overline{\hat{\text{Revenues}}}_{t+1,t+6}$, which is the average level of aggregated revenues during the time span covered by the expectations, i.e., average revenues between $t+1$ and $t+6$. The cross-correlations summarized in Table 5 show that the time series correlation is highest if expectations precede $\overline{\hat{\text{Revenues}}}_{t+1,t+6}$ by four months in the case of the manufacturing survey and by three months in the case of the retail and wholesale survey. For services, the time series correlation is highest at contemporaneity.

In contrast, expectations do not precede future changes in revenues (relative to their current level) to a degree that is comparable to the "level"-interpretation of Panel A. For the case of the manufacturing and services survey, average expectations are again highly correlated with past changes in revenues, see Panel B of Figure 4 and the cross-correlations summarized in Table 5. The correlation between the time series approaches its maximum at the third lag of expectations in the subset of manufacturing firms. Similarly, the correlation between both series is highest if expectations are lagged by two quarters in the services survey. Comparable to the evidence from Panel B of Figure 3, the relationship between expectations and changes in revenues is much

[25] Again, I use deviations from the HP-filtered trend. Figure A.4 in the Appendix plots the time series without detrending (Panel B1). Further, Panel B2 of Figure A.4 displays the cross-sectional average reports to Q2 and the change in Q1 after purging for firm fixed effects. Again, the results do not deviate substantially from those using log deviations from the trend.

Figure 4: Business Expectations for Next 6 Months Relative to Administrative Revenue Data



Notes: Panel A plots expected business conditions for the next six months as reported to Q2 in the IBS (right axis) against the average level of aggregated revenues during the time span covered by the expectations (left axis), i.e., average revenues between $t+1$ and $t+6$. Aggregated revenues reflect the mean of industry-specific, seasonally adjusted revenue indices weighted by the number of firms in each industry. Business expectations are deseasonalized by purging for month fixed effects. For the subset of services firms, business expectations are transferred to quarterly frequency by taking means as revenue data are only available on a quarterly basis. Both time series are detrended using the log-deviation from an HP-filtered trend with smoothing parameter $\lambda = 129,600$ (1,600) for monthly (quarterly) data. Panel B plots detrended expected business conditions (right axis) against the change in average detrended revenues between $t+1$ and $t+6$ relative to t (left axis).

weaker for the case of retail and wholesale firms. Here, the correlation is largest if expectations are related to the change in revenues between four months prior to the reporting date and the six months thereafter.

Taken together, the evidence presented in this section appears to be more consistent with the "level"-interpretation of Q2. In this case, Q2 captures the expected level of future business conditions being above/below the trend instead of the expected future change in conditions relative to the level in the reporting month. With the exception of the retail and wholesale survey, the latter interpretation cannot be ruled out with certainty, however, as expectations stated in Q2 appear to reflect past changes in business conditions and revenues to a comparable degree.

3.2. Relationship between Current Conditions and Expectations: Panel Regressions

The evidence based on aggregate time series presented in the previous section showed that it is reasonable to interpret firms' assessments of their current business conditions in levels. In contrast, the picture is less clear regarding the interpretation of firms' expectations about their business conditions in the next six months. The evidence points into the direction of interpreting expected conditions along the same lines as current conditions, while the analysis could not rule

Table 5: Cross-Correlation: Business Expectations vs. Administrative Revenue Data

Lag/Lead l in Months	-6	-5	-4	-3	-2	-1	**0**	1	2	3	4	5
	Panel A: Manufacturing											
$\rho(\hat{\text{Exp}}_t^{+6m}, \overline{\hat{\text{Revenues}}}_{t+1+l,t+6+l})$	-0.135	-0.012	0.112	0.230	0.339	0.433	**0.508**	0.563	0.602	0.625	0.634	0.631
$\rho(\hat{\text{Exp}}_t^{+6m}, \overline{\hat{\text{Rev.}}}_{t+1+l,t+6+l} - \overline{\hat{\text{Rev.}}}_{t+l})$	0.614	0.679	0.725	0.731	0.699	0.638	**0.541**	0.424	0.313	0.214	0.121	0.035
	Panel B: Retail and Wholesale											
$\rho(\hat{\text{Exp}}_t^{+6m}, \overline{\hat{\text{Revenues}}}_{t+1+l,t+6+l})$	0.193	0.288	0.383	0.471	0.550	0.619	**0.678**	0.721	0.750	0.763	0.763	0.747
$\rho(\hat{\text{Exp}}_t^{+6m}, \overline{\hat{\text{Rev.}}}_{t+1+l,t+6+l} - \overline{\hat{\text{Rev.}}}_{t+l})$	0.546	0.551	0.553	0.537	0.497	0.448	**0.396**	0.326	0.239	0.152	0.072	-0.026
	Panel C: Services											
$\rho(\hat{\text{Exp}}_t^{+6m}, \overline{\hat{\text{Revenues}}}_{t+1+l,t+6+l})$	0.447			0.664			**0.740**			0.693		
$\rho(\hat{\text{Exp}}_t^{+6m}, \overline{\hat{\text{Rev.}}}_{t+1+l,t+6+l} - \overline{\hat{\text{Rev.}}}_{t+l})$	0.895			0.792			**0.474**			0.105		

Notes: Cross-correlation of the time series of average (seasonally adjusted) business expectations for the next six months (Q2) and average realized revenues between $t+1$ and $t+6$. In the first row, both time series are detrended by means of an HP-filter with smoothing parameter $\lambda = 129,600$ (1600) for monthly (quarterly) data. In the second row, business expectations are related to the difference in average revenues between $t+1$ and $t+6$ relative to revenues in t.

out that Q2 captures the expected future changes in Q1. In order to shed more light on the interpretation of the two main questions in the IBS, this section takes a step forward by exploiting the panel dimension of the harmonized micro data.

For this purpose, I compare the degree to which firms' expectations about business conditions during the next six months either reflect the *level* of ex post realized future business conditions or represent the ex post realized *change* in future business conditions compared to the reporting month. Specifically, I perform several regressions of the following form

$$\text{Exp}_{i,t}^{+6m} = \beta_{\mathbf{1}}' \, \mathbf{Cond}_i + \beta_{\mathbf{2}}' \, \mathbf{\Delta Cond}_i + \varepsilon_{i,t}, \tag{1}$$

where $\text{Exp}_{i,t}^{+6m}$ denotes firm i's expectations for the next 6 months reported in month t to Q2. The column vector $\mathbf{Cond}_i$ subsumes the level of business conditions reported to Q1. In turn, the column vector $\mathbf{\Delta Cond}_i$ refers to changes in reported business conditions relative to the reporting month t.[26] The vectors $\beta_{\mathbf{1}}$ and $\beta_{\mathbf{2}}$ entail the coefficients of interest that capture the degree to which expectations reflect future levels or changes of business conditions.

First, the future level of business conditions realized six months after reporting date t is strongly reflected in previously stated expectations. Column (1) of Table 6 displays the results for firms in all three sector-specific surveys from regressing $\text{Exp}_{i,t}^{+6m}$ on the average ex post realized business conditions between $t+1$ and $t+6$, denoted $\overline{\text{Cond}}_{i,t+1,t+6}$. The estimated coefficient $\hat{\beta}_1$ can be interpreted such that a one standard deviation increase in the average level of ex post realized business conditions between $t+1$ and $t+6$ is *ceteris paribus* associated

[26] The baseline specification does not contain firm fixed effects to control for time-invariant patterns in the expectation formation process of firms such as persistence in optimism or pessimism of firms as documented by Bachmann and Elstner (2015). The results do not differ once firm fixed effects are included to the estimation as documented in Table A.2 in the Appendix.

Table 6: Relationship Between Survey Questions: Panel Regressions

	Expected Business Conditions for the Next 6 Months							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\overline{\text{Cond}}_{i,t+1,t+6}$	0.33***	0.27***			0.34***	0.32***		
	(0.0049)	(0.0054)			(0.0051)	(0.0053)		
$\text{Cond}_{i,t}$		0.082***						
		(0.0045)						
$\overline{\text{Cond}}_{i,t+1,t+6} - \text{Cond}_{i,t}$			0.0039	0.12***	-0.056***	-0.00031		
			(0.0033)	(0.0047)	(0.0031)	(0.0051)		
$\text{Cond}_{i,t} - \overline{\text{Cond}}_{i,t-1,t-6}$				0.21***		0.090***		
				(0.0049)		(0.0048)		
$\text{Cond}_{i,t+6}$							0.27***	
							(0.0045)	
$(\text{Cond}_{i,t+6} - \text{Cond}_{i,t})$								-0.0089***
								(0.0033)
R^2	0.109	0.112	0.000	0.031	0.112	0.117	0.075	0.000
Observations	1512636	1512636	1512636	1512636	1512636	1512636	1512636	1512636

Notes: The dependent variable is the business expectation for the next six months as reported by firm i to Q2 of the IBS in t. $\overline{\text{Conditions}}_{i,t+1,t+6}$ is the mean of ex post realized business conditions stated in Q1 in the six months following t. $\text{Conditions}_{i,t}$ and $\text{Conditions}_{i,t+6}$ are realized business conditions in t and $t+1$. Accordingly, $(\overline{\text{Conditions}}_{i,t+1,t+6} - \text{Conditions}_{i,t})$ and $(\text{Conditions}_{i,t} - \overline{\text{Conditions}}_{i,t-1,t-6})$ capture the difference between realized business conditions at the respective dates. For the sake of comparability, all variables are standardized by their standard deviation. Standard errors are (two-way) clustered at the firm and date levels. Level of significance: * p < 0.10, ** p < 0.05, *** p < 0.01.

with an appreciation of expectations by 0.33 standard deviations.[27] Moreover, the variation in $\overline{\text{Cond}}_{i,t+1,t+6}$ explains 11% of the variation in expectations according to the R^2. As documented in Table 7, this pattern can be observed for firms in all industry-specific surveys of the IBS to a comparable degree.

As displayed in Column (2) of Table 6, the inclusion of the current level of business conditions does neither substantially alter the degree to which ex post realized business conditions are captured by expectations, nor add strongly to the variation explained by the regression. Hence, firms incorporate at least some information about the future level of business conditions into their expectations that is not captured by their current business condition. While the picture is rather similar across the industry-specific surveys, firms in the retail and wholesale sector are slightly different as the respective coefficient capturing the effect of $\overline{\text{Cond}}_{i,t+1,t+6}$ drops from 0.45 to 0.27 after controlling for $\text{Cond}_{i,t}$. This pattern is most likely due to heterogeneity in the forecast horizons of firms in the different sector-specific surveys of the IBS. See Buchheim and Link (2017) for a detailed analysis of this issue.

Second, firms' expectations are less strongly associated with the ex post realized change in business conditions during the next six months relative to the reporting month, i.e., $\overline{\text{Cond}}_{i,t+1,t+6} - \text{Cond}_{i,t}$. The results summarized in Column (3) of Tables 6 and 7 show that future changes in conditions are only very weakly reflected in expectations compared to the future level in realized business conditions documented above. In the pooled sample, $\hat{\beta}_2$ is insignificant and the variation in $\overline{\text{Cond}}_{i,t+1,t+6} - \text{Cond}_{i,t}$ does explain variation in $\text{Exp}_{i,t}^{+6m}$ ($R^2 = 0.00$). In the case of manufacturing firms, $\hat{\beta}_2$ is only slightly positive and an increase in $\overline{\text{Cond}}_{i,t+1,t+6} - \text{Cond}_{i,t}$ by one standard deviation is associated with an appreciation in $\text{Exp}_{i,t}^{+6m}$ by 0.033 standard deviations,

[27] Although the standard deviations of $\text{Exp}_{i,t}^{+6m}$ and $\overline{\text{Cond}}_{i,t+1,t+6}$ are of comparable size, I standardize all variables by their standard deviation for the sake of comparability.

Table 7: Relationship Between Survey Questions: Panel Regressions

	Expected Business Conditions for the Next 6 Months							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A: Manufacturing							
$\overline{\text{Cond}}_{i,t+1,t+6}$	0.28***	0.26***			0.29***	0.25***		
	(0.0062)	(0.0066)			(0.0064)	(0.0064)		
$\text{Cond}_{i,t}$		0.028***						
		(0.0056)						
$\overline{\text{Cond}}_{i,t+1,t+6} - \text{Cond}_{i,t}$			0.033***	0.15***	-0.019***	0.058***		
			(0.0040)	(0.0050)	(0.0038)	(0.0056)		
$\text{Cond}_{i,t} - \overline{\text{Cond}}_{i,t-1,t-6}$				0.23***		0.14***		
				(0.0055)		(0.0054)		
$\text{Cond}_{i,t+6}$							0.24***	
							(0.0056)	
$(\text{Cond}_{i,t+6} - \text{Cond}_{i,t})$								0.016***
								(0.0039)
R^2	0.082	0.082	0.001	0.040	0.082	0.094	0.059	0.000
Observations	866308	866308	866308	866308	866308	866308	866308	866308
	Panel B: Retail & Wholesale							
$\overline{\text{Cond}}_{i,t+1,t+6}$	0.45***	0.27***			0.49***	0.49***		
	(0.0082)	(0.0066)			(0.0086)	(0.0094)		
$\text{Cond}_{i,t}$		0.26***						
		(0.0063)						
$\overline{\text{Cond}}_{i,t+1,t+6} - \text{Cond}_{i,t}$			-0.097***	0.015***	-0.18***	-0.18***		
			(0.0039)	(0.0050)	(0.0043)	(0.0066)		
$\text{Cond}_{i,t} - \overline{\text{Cond}}_{i,t-1,t-6}$				0.17***		-0.011**		
				(0.0049)		(0.0053)		
$\text{Cond}_{i,t+6}$							0.33***	
							(0.0072)	
$(\text{Cond}_{i,t+6} - \text{Cond}_{i,t})$								-0.10***
								(0.0037)
R^2	0.187	0.222	0.011	0.031	0.222	0.222	0.107	0.012
Observations	355112	355112	355112	355112	355112	355112	355112	355112
	Panel C: Services							
$\overline{\text{Cond}}_{i,t+1,t+6}$	0.28***	0.29***			0.27***	0.26***		
	(0.011)	(0.011)			(0.011)	(0.011)		
$\text{Cond}_{i,t}$		-0.020**						
		(0.0081)						
$\overline{\text{Cond}}_{i,t+1,t+6} - \text{Cond}_{i,t}$			0.061***	0.16***	0.013**	0.060***		
			(0.0057)	(0.0088)	(0.0055)	(0.0090)		
$\text{Cond}_{i,t} - \overline{\text{Cond}}_{i,t-1,t-6}$				0.17***		0.073***		
				(0.0097)		(0.0088)		
$\text{Cond}_{i,t+6}$							0.23***	
							(0.0095)	
$(\text{Cond}_{i,t+6} - \text{Cond}_{i,t})$								0.041***
								(0.0055)
R^2	0.072	0.072	0.004	0.021	0.072	0.075	0.051	0.002
Observations	291216	291216	291216	291216	291216	291216	291216	291216

Notes: The dependent variable is the business expectation for the next six months as reported by firm i to Q2 of the IBS in t. $\overline{\text{Conditions}}_{i,t+1,t+6}$ is the mean of ex post realized business conditions stated in Q1 in the six months following t. $\text{Conditions}_{i,t}$ and $\text{Conditions}_{i,t+6}$ are realized business conditions in t and $t+1$. Accordingly, $(\overline{\text{Conditions}}_{i,t+1,t+6} - \text{Conditions}_{i,t})$ and $(\text{Conditions}_{i,t} - \overline{\text{Conditions}}_{i,t-1,t-6})$ capture the difference between realized business conditions at the respective dates. For the sake of comparability, all variables are standardized by their standard deviation. Standard errors are (two-way) clustered at the firm and date levels. Level of significance: * p < 0.10, ** p < 0.05, *** p < 0.01.

only. This relationship is also relatively small ($\hat{\beta}_2 = 0.061$) in the subset of services firms and even turns negative in the case of retail and wholesale firms ($\hat{\beta}_2 = -0.10$).

Including the relative change in business conditions between the current level and the average level during the previous six months ($\text{Cond}_{i,t} - \overline{\text{Cond}}_{i,t-1,t-6}$) to model (1) does not substantially alter the degree to which future changes in business conditions are captured by expectations, see Column (4) of Table 6. Past changes in conditions are reflected more strongly in the expectations of manufacturing firms as well as retailers and wholesalers than the ex post realized changes in future conditions. In the case of services firms, both changes are reflected to a comparable degree. This observation is in line with the results of Section 3.1.2 that average business expectations are strongly correlated with past changes rather than future changes in business conditions.

Furthermore, a horse race between both interpretations clearly favors both variables being driven by the same latent variable. As documented in Columns (5) and (6) of Table 6, the coefficient that captures the degree to which $\overline{\text{Cond}}_{i,t+1,t+6}$ is reflected in expectations is virtually unaffected by the inclusion of future and past changes ($\overline{\text{Cond}}_{i,t+1,t+6} - \text{Cond}_{i,t}$ and $\text{Cond}_{i,t} - \overline{\text{Cond}}_{i,t-1,t-6}$). Moreover, the inclusion of changes in business conditions does not increase the variation explained by the empirical model. This pattern can be observed in all industry-specific subsets of the IBS, see Table 7.

Lastly, I demonstrate that expectations are more strongly associated with the average level of business conditions *during* the next six months compared to the level *in* six months. Regressing business expectations on reported conditions, denoted $\text{Cond}_{i,t+6}$, delivers smaller coefficients compared to the specification using $\overline{\text{Cond}}_{i,t+1,t+6}$. As displayed in Column (7) of Tables 6 and 7, a one standard deviation increase in the ex post realized business conditions six months ahead is *ceteris paribus* associated with an appreciation of expectations by 0.27 in the pooled sample, by 0.24 standard deviations in the panel of manufacturing, 0.33 standard deviations for retail and wholesale firms, and 0.23 standard deviations in the case of service companies. In turn, the change business conditions between t and $t+6$ ($\text{Cond}_{i,t+6} - \text{Cond}_{i,t}$) is again much less strongly reflected in firms' expectations as can be inferred from Column (8).

Taking together, the evidence presented in this section strongly speaks in favor of interpreting business expectations in levels rather than changes of business conditions. Despite of the potentially misleading wording of the question, it is very unlikely that Q2 captures the expected change in Q1. In contrast, it is more likely that firms refer to the current and expected level of their revenues when answering Q1 and Q2.

4. Conclusion

This paper describes how two major obstacles that have prevented panel data research based on the universe of firms in the IBS can be removed: heterogeneities (1) across different sector-specific surveys of the IBS in the level of the observational units (product vs. firm) as well as (2) in the industry classification systems used in the micro data. For this purpose, I aggregate the survey responses of the most important sector-specific surveys covering manufacturing, retail/wholesale, and services to the firm-level and transfer the sector identifiers contained in the micro data to the official German industry classification systems *WZ 03* and *WZ 08*.

The harmonized firm-level dataset expands the scope for economic research based on the micro

data of the IBS which has up to date mainly been restricted to the analysis of manufacturing firms. The value added of the harmonization procedure is largest for the micro data in the retail and wholesale survey as it adjusts for a break in the methodology in the survey in 2006. This adjustment permits to jointly analyze firms' survey responses in the time periods before and after the break. For example, Buchheim and Link (2017) make use of this opportunity in order to study the formation of firms' expectations regarding their own future business conditions across firms in all main sectors of the economy. Moreover, we are able to examine anticipation effects of retail firms to an increase in German value added taxes in 2007 based on data before and after the methodological break.

In addition, the transfer of the sector identification variables to the standard industry classification systems *WZ 03* and *WZ 08* is useful for at least two reasons. On the one hand, fixed effects can be applied along the same level of industry aggregation in order to flexibly control for industry-specific variation of any kind. On the other hand, the harmonized IBS data can be merged to industry-level data from other sources which are usually coded according to the classification systems *WZ 03* and *WZ 08*. Based on this, Link (2018) matches firms in the IBS to data on the distribution of wages in their industry and location in order to identify the degree to which firms are affected by the introduction of statutory minimum wages in Germany in 2015.

Furthermore, the harmonized firm-level dataset can be used to shed light on the interpretation of the most widely used variables in the IBS, i.e., firms' assessments about their current business conditions as well as their expectations for the next six months. The paper provides new insights on this issue based on the analysis of average time series of both questions in relation to industry-level revenue data as well as applying panel regressions at the firm-level. The results speak in favor of interpreting firms' reported business conditions and expectations as their assessment of current and expected future levels of revenues. In contrast, it is very unlikely that business expectations capture the expected change in reported current business conditions despite of the potentially misleading wording of the questions. Empirical studies that examine the relationship of firms' expected and realized business conditions should hence interpret the respective survey questions as referring to the similar dimension of the same latent variable.

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A. Supplementary Material

A.1. Wording of Survey Questions

The paper uses the main questions form the IBS regarding current and expected business conditions. In the original micro data the answers are coded as "[1] good/more favorable", "[2] satisfactory/stay the same", "[3] bad/more unfavorable". For the sake of convenience, I recode the answers in a "[1],[0],[-1]" scheme.

The original German wording of the questions is as follows

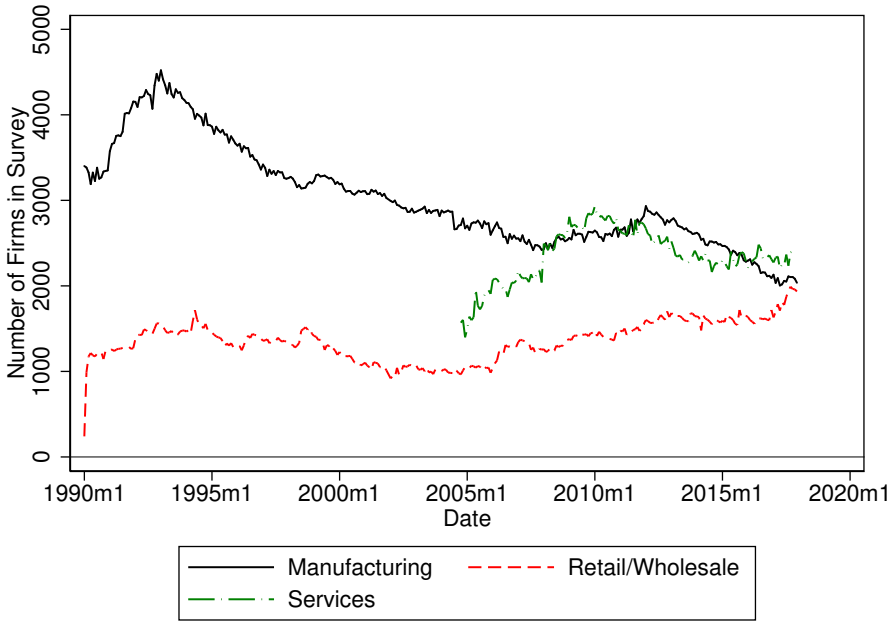
Q1 *"Aktuelle Situation: Wir beurteilen unsere Geschäftslage als [1] gut, [0] befriedigend (saisonüblich), [-1] schlecht."*

Q2 *"Erwartungen für die nächsten 6 Monate: Unsere Geschäftsentwicklung wird (unter Ausschaltung rein saisonaler Schwankungen) [1] günstiger, [0] etwa gleich bleiben, [-1] ungünstiger."*

As stated in the main text, the questions refer to a specific product X in the case of the manufacturing survey, i.e., to the "business condition for X" (German: "unsere Geschäftslage für X").

A.2. Additional Descriptive Statistics

Figure A.1: Number of Firms in the Different Sector-Specific Surveys of the IBS



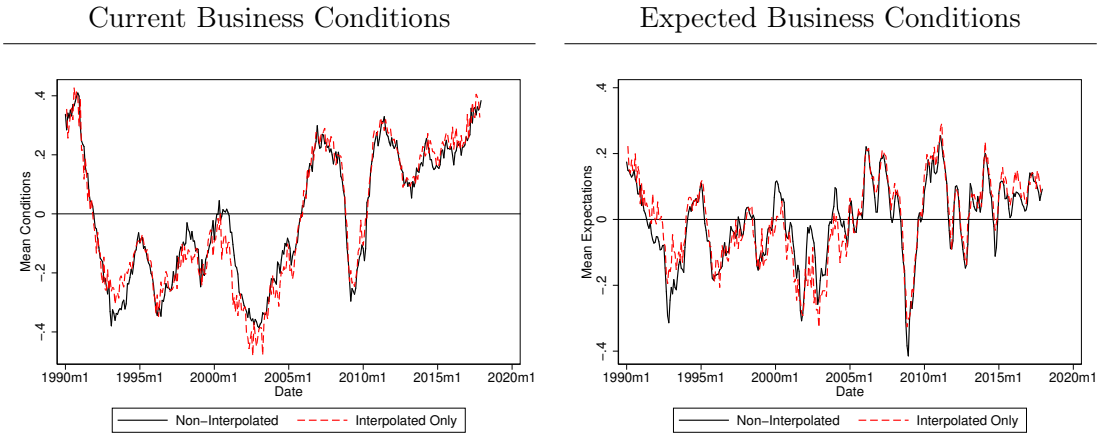
Notes: This figure plots the number of firms in the respective sector-specific surveys of the IBS over time conditional on responding in at least two months.

Table A.1: Attrition: Survival Rates Depending on Starting Dates

Start Date t	Firms @ t	Fraction of Firms Surviving (in %) For At Least...						
		6m	1yr	2yrs	5yrs	10yrs	15yrs	20yrs
1992m1	6603	98.6	95.3	89.5	70.2	49	33.9	24.1
1995m1	6914	94.8	90.4	81.2	61.8	42	29.2	20.6
1998m1	5855	94.9	89.9	81.7	63.9	43.9	31.3	
2001m1	5062	95.7	91.8	83.7	66.2	46.6	32.2	
2004m1	4586	95.6	91.5	84.9	68.2	48.5		
2007m1	7540	94.8	90.1	83.5	67.3	44.6		
2010m1	8455	96.1	92.3	85.9	67.2			
2013m1	8510	95.5	91	82.9				

Notes: This table summarizes the survival rates of firms, i.e., the fraction of firms that is still contained in the sample after a specific period of time elapsed since several predefined starting dates t.

Figure A.2: Effect of Linear Interpolation of Missing Data



Notes: Time series of average reports on current (expected) business conditions as stated to Q1 (Q2) and average values of interpolated business conditions if missing answers are linearly interpolated as long as the gap in the data is not longer than two consecutive months.

A.3. Interpretation of Current and Expected Business Conditions: Supplementary Material

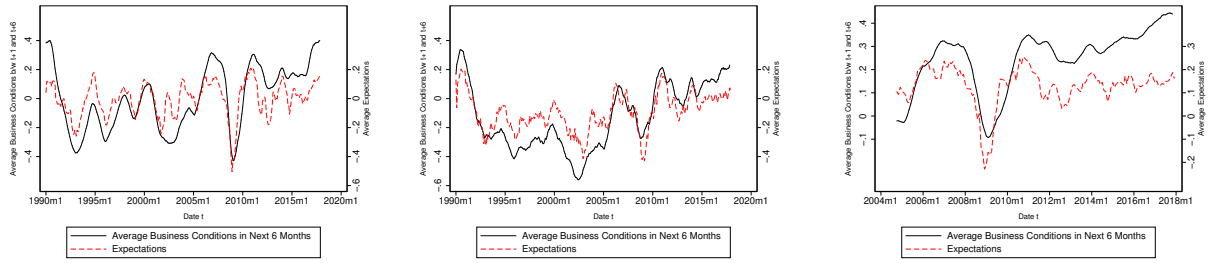
Figure A.3: Business Conditions Relative to Revenues: Detrending Using Growth Rates

Notes: Times series of seasonally adjusted current business conditions as stated to Q1 in the IBS (right axis) and the mean of industry-specific, seasonally adjusted revenue indices weighted by the number of firms in each industry (left axis). Business conditions are deseasonalized by purging for month fixed effects. Both series are detrended using the change relative to twelve months before. For the subset of services firms, mean business conditions are transferred to quarterly frequency by taking means as revenue data are only available on a quarterly basis.

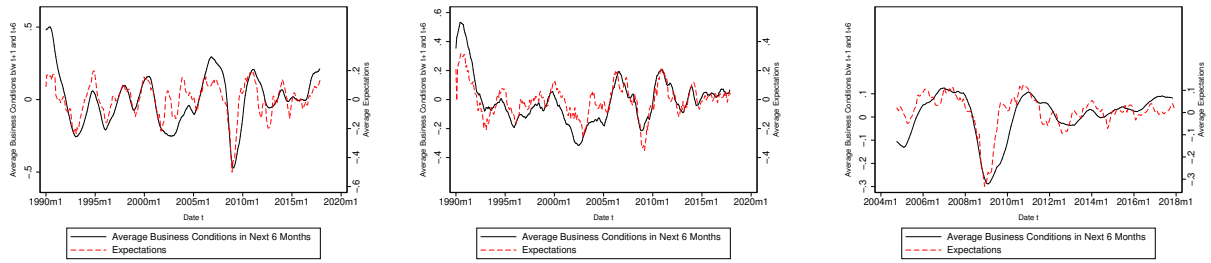
Figure A.4: Business Conditions Relative to Business Expectations: Alternative Specifications

Manufacturing	Retail & Wholesale	Services

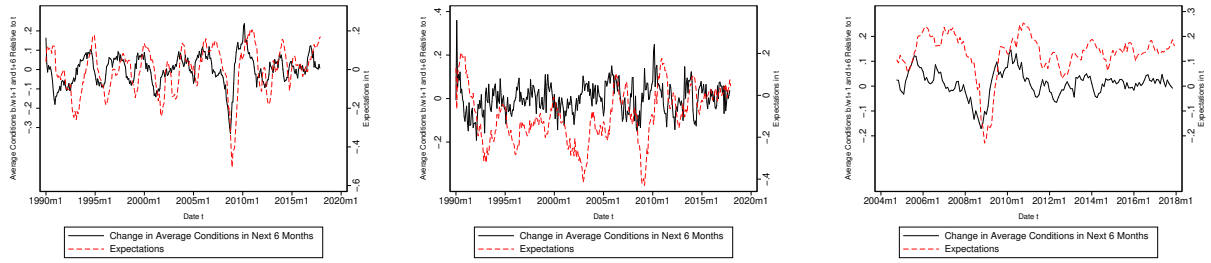
Panel A1: Expectations vs. Mean Conditions During Next 6 Months



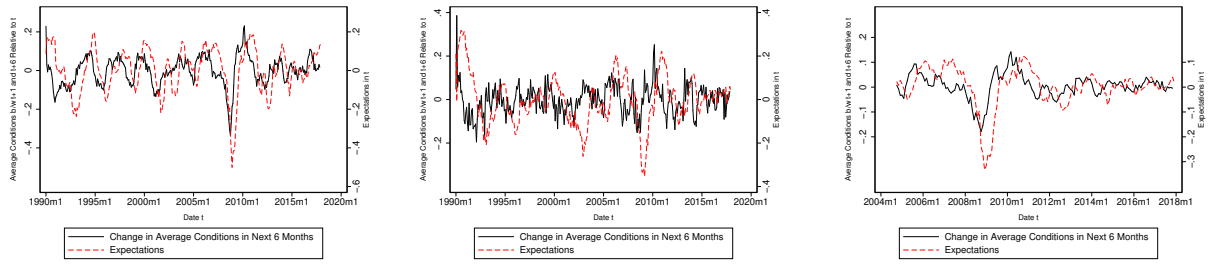
Panel A2: Expectations vs. Mean Conditions During Next 6 Months - Purged for Firm FE



Panel B1: Expectations vs. Change in Mean Conditions in Next 6 Months



Panel B2: Expectations vs. Change in Mean Conditions in Next 6 Months - Purged for Firm FE



Notes: Panel A1 plots the time series of mean current business conditions between $t+1$ and $t+6$ (Q1) and expected business conditions for the next six months (Q2). The time series are seasonally adjusted by controlling for month fixed effects, but not detrended as in Figure 3. Panel B1 plots the change in mean current business conditions between $t+1$ and $t+6$ relative to their level in t. Panels A2 and B2 plot the same series as Panels A1 and B1 after additionally purging for firm fixed effects.

Table A.2: Relationship Between Survey Questions: Panel Regressions With Fixed Effects

	Expected Business Conditions for the Next 6 Months							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\overline{\text{Cond}}_{i,t+1,t+6}$	0.29***	0.24***			0.30***	0.25***		
	(0.0068)	(0.0071)			(0.0070)	(0.0067)		
$\text{Cond}_{i,t}$		0.075***						
		(0.0045)						
$\overline{\text{Cond}}_{i,t+1,t+6} - \text{Cond}_{i,t}$			-0.000023	0.12***	-0.051***	0.023***		
			(0.0035)	(0.0051)	(0.0031)	(0.0051)		
$\text{Cond}_{i,t} - \overline{\text{Cond}}_{i,t-1,t-6}$				0.21***		0.11***		
				(0.0054)		(0.0048)		
$\text{Cond}_{i,t+6}$							0.19***	
							(0.0058)	
$(\text{Cond}_{i,t+6} - \text{Cond}_{i,t})$								-0.013***
								(0.0034)
R^2	0.291	0.293	0.245	0.273	0.293	0.300	0.268	0.245
Firm FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1511754	1511754	1511754	1511754	1511754	1511754	1511754	1511754

Notes: The dependent variable is the business expectation for the next six months as reported by firm i to Q2 of the IBS in t. $\overline{\text{Conditions}}_{i,t+1,t+6}$ is the mean of ex post realized business stated in Q1 in the six months following t. $\text{Conditions}_{i,t}$ and $\text{Conditions}_{i,t+6}$ are realized business conditions in t and $t+1$. Accordingly, $(\overline{\text{Conditions}}_{i,t+1,t+6} - \text{Conditions}_{i,t})$ and $(\text{Conditions}_{i,t} - \overline{\text{Conditions}}_{i,t-1,t-6})$ capture the difference between realized business conditions at the respective dates. Standard errors are (two-way) clustered at the firm and date levels. Level of significance: * p $<$ 0.10, ** p $<$ 0.05, *** p $<$ 0.01.