

4 Other Indicators and Analyses from the ifo Business Survey

4.1 Regional Representation of the ifo Business Survey

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4.1.1 Introduction

The results of the ifo Business Survey are analyzed for different sectors and industries, as well as for Germany as a whole. However, they are also analyzed for different regions throughout the country: As well as publishing monthly survey results for Eastern Germany and Saxony, the ifo Institute also calculates regional evaluations for Hesse, Lower Saxony, Bavaria (on behalf of the Bavarian State Ministry of Economic Affairs, Regional Development, and Energy), Baden-Württemberg (on behalf of the Landeskreditbank Baden-Württemberg), and North Rhine-Westphalia (on behalf of the NRW.Bank).

Since current data for many important economic indicators are not available with the required frequency or are altogether absent from official statistics at the state level, the results of the ifo Business Survey make an essential contribution to business cycle analysis, business cycle research, and economic forecasts at the subnational level. Even one of the most important economic indicators - the quarterly calculation of the gross domestic product (GDP) - is not reported by the official statistics for the individual states, for methodological reasons. The only exceptions are the states of Baden-Württemberg and Rhineland-Palatinate, which regularly update quarterly GDP figures on its website. Until the fourth quarter of 2018, the ifo Institute calculated the quarterly GDP of Saxony-Anhalt on behalf of the Ministry of Economics, Science, and Digitalisation of Saxony-Anhalt and, until the fourth quarter of 2019, the GDP of Saxony. The non-official quarterly GDP of East and West Germany is published by the Halle Institute for Economic Research. Since 2022, however, Lehmann and Wikman (2022) have calculated quarterly GDP estimates for all German states from 1995 onwards until the end of 2021.² Furthermore, in March 2023 Lehmann (2023a) introduced a real-time database for German regional economic accounts, which contains information for nine macroeconomic aggregates and all federal states of Germany.

¹ This chapter based on Michael Weber's "Regionalauswertung der ifo Konjunkturumfragen" in Sauer and Wohlrabe (2020a).

² Lehmann and Wikman (2022) intend to update the data on a regular basis as soon as quarterly economic growth data are available for Germany. The latest version is Lehmann and Wikman (2023) (as of April 2023).

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This chapter presents the regional analysis of the ifo Business Survey in detail. Subsequently, the possibilities and limits of the regional evaluation of the ifo Business Survey are explained and the relevance of the regional survey results for business cycle research is demonstrated.

4.1.2 Economic Indicators at the State Level

Data that are published at high frequency without major revisions are ideal for business cycle research. The greater the delay in publication, the less appropriate the data are for business cycle analysis. The less frequently the data are published, the less they can represent cyclical patterns during the year. And the more the indicators must be revised later, the less the current data can be interpreted as a reflection of the actual economic trend.

However, the ideal of up-to-date, frequently collected, and reliable data imposes a financial and administrative burden. Unless the data must be collected for administrative purposes anyway, each additional data collection is associated with high financial and bureaucratic costs. For this reason, the number of respondents, the content and frequency of official surveys, and the regionally differentiated publication of aggregated results are often restricted by law.

Therefore, regularly available economic indicators of official statistics at the regional level are rarely available. To name just a few indicators which are available: monthly turnover and employment in manufacturing; monthly turnover, incoming orders, working hours, and employment in construction; turnover and employment indices in wholesale, retail, and automobile trade, as well as in the hospitality industry; the monthly consumer price index; and monthly data on insurable employment by economic sectors, on unemployment, and on job vacancies.³ Nevertheless, in manufacturing, the first official estimates are available with a delay of about two months after the end of the reporting month. Subsequently received data are supplemented by estimation procedures. The final results are published in March of the following year and are not subsequently revised. In contrast, in construction only final results are published, which are available approximately two months after the end of the reporting month. Only unemployment and other labour market time series are available without any time lag. However, these allow at best a limited analysis of the economic development. Thus, the ifo Business Surveys are almost more important at the subnational level than at the federal level.

The ifo Business Surveys differ from the official statistics in many aspects:

- Data is collected and published monthly, not half-yearly or quarterly
- All survey results are available without time lag

³ In some states, quarterly turnover indices or percentage changes in turnover are published for selected service sectors.

- Almost all data are seasonally adjusted, which makes it easier to identify cyclical patterns during the year
- Later revisions are not necessary, as participating companies can't correct data retrospectively

4.1.3 Possibilities and Limitations of Regional Analyses

For the regional analyses of the ifo Business Survey, only the answers of the companies from the corresponding states and regions are considered. Therefore, the descriptions given in the previous chapters on survey content, survey methodology, aggregation, and interpretation of the results also apply without restriction to the regional survey results.

For reasons of representativeness, region-specific extrapolation factors are now used instead of the nationwide ones to better represent the economic structures of the individual regions. Furthermore, the regional and economic sector-specific net sample sizes determine whether the extrapolated responses of the participants are representative of the respective branches in the individual regions. In case of regional evaluation, the net samples must be sufficiently large and similar in composition on a permanent basis so that stable extrapolation and seasonal factors can be calculated for the individual time series.

Table 4.1 shows the average number of responses to the ifo Business Survey in 2021 by state and sector.⁴ The differences in the number of participants between the states can clearly be seen. While in Bavaria an average of 1,841 companies take part in the monthly ifo Business Survey, there are 73 reports in Bremen. North Rhine-Westphalia has an average of 1,776 participants and Baden-Württemberg 1,227. The proportion of responses in the individual states corresponds roughly to the distribution of all companies in Germany. Furthermore, those “states with a high share of Germany’s gross domestic product, such as Bavaria, North Rhine-Westphalia, and Baden-Württemberg, are also most strongly represented in the ifo Business Survey” (Hiersemenzel et al. 2022, p. 8).

⁴ More precisely, it is the number of responses and not the number of companies that is shown in Table 4.1. For example, in the construction sector the participating companies submit several reports each month, because they cover different construction types at the same time. However, big companies in the manufacturing sector that operate in different branches simultaneously can also submit several questionnaires for the different branches.

Table 4.1: Regional subdivision of participants in the ifo Business Surveys (Annual averages 2021)

	Total	Manufacturing	Construction	Trade	Service	Share in Panel	Share in Germany	GDP share 2021
Baden-Württemberg	1227	386	333	213	295	14.0%	13.7%	15.0%
Bavaria	1841	405	612	349	475	21.0%	18.8%	18.5%
Berlin	173	15	41	19	98	2.0%	5.0%	4.6%
Brandenburg	207	49	65	47	46	2.4%	2.8%	2.2%
Bremen	73	8	23	17	25	0.8%	0.7%	1.0%
Hamburg	206	16	28	41	121	2.3%	2.8%	3.5%
Hesse	569	131	122	124	192	6.5%	7.6%	8.5%
Mecklenburg Western Pomerania	179	28	90	20	41	2.0%	1.7%	1.4%
Lower Saxony	751	154	281	158	158	8.5%	8.7%	8.8%
North Rhine-Westphalia	1776	477	466	354	479	20.2%	20.2%	20.5%
Rhineland-Palatinate	306	63	108	67	68	3.5%	4.7%	4.5%
Saarland	94	14	25	38	17	1.1%	1.0%	1.0%
Saxony	487	141	189	53	104	5.5%	4.4%	3.8%
Saxony-Anhalt	240	58	99	46	37	2.7%	1.9%	1.9%
Schleswig-Holstein	293	44	116	63	70	3.3%	3.6%	3.0%
Thuringia	362	116	156	42	48	4.1%	2.2%	1.8%

Note: Annual averages of the year 2021.

Source: ifo Business Survey; Federal Statistical Office.

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Due to a sufficiently large number of participants, regional results of the ifo Business Survey are calculated for Bavaria, Baden-Württemberg, North Rhine-Westphalia, Saxony, Eastern Germany⁵ as well as for Hesse and Lower Saxony. For these regions, the ifo Business Climate, the business situation, and business expectation indicators as well as further survey results (e.g., employee expectations, capacity utilization, order backlog, price expectations) can be meaningfully reported for the overall economy as well as for the individual sectors. In some cases, the number of participants allows even more disaggregated analyses. Due to the large number of participants in the federal states of Bavaria, Baden-Württemberg, and North Rhine-Westphalia, an analysis at the two-digit level of the economic sector classification is possible within manufacturing. The main construction sector can be subdivided into building construction and civil engineering. In the trade sector it can be evaluated for wholesale and retail trade and the service sector can be subdivided into individual economic sections (Table 4.2). In Hesse, Lower Saxony, Saxony, and Eastern Germany, by contrast, the results are only calculated for the four large economic sectors of manufacturing, construction, trade, and services (Lehmann et al. 2019).

Table 4.2: Maximal subdivision of the regional evaluations

	Manufacturing	Construction	Trade	Service
Baden-Württemberg	2-digit	Building construction, civil engineering	Wholesale & Retail	Economic sections
Bavaria	2-digit	Building construction, civil engineering	Wholesale & Retail	Economic sections
North Rhine-Westphalia	2-digit	Building construction, civil engineering	Wholesale & Retail	Economic sections
Hesse	No subdivision	No subdivision	No subdivision	No subdivision
Lower Saxony	No subdivision	No subdivision	No subdivision	No subdivision
Saxony	No subdivision	No subdivision	No subdivision	No subdivision
Eastern Germany	No subdivision	No subdivision	No subdivision	No subdivision

Source: ifo Institute.

Alternatively, several federal states can be combined into a region. For example, “North-Eastern Germany”, consisting of Mecklenburg-Western Pomerania, Berlin, and Brandenburg, with an average of 559 participants, would be large enough for an analysis of the four major economic sectors. Further regions could be “Northern Germany” including Schleswig-Holstein, Lower Saxony, Hamburg, and Bremen, “Central Germany” including Saxony, Saxony-Anhalt, and Thuringia, or a region comprising the Saarland and Rhineland-Palatinate. (Lehmann et al. 2022)

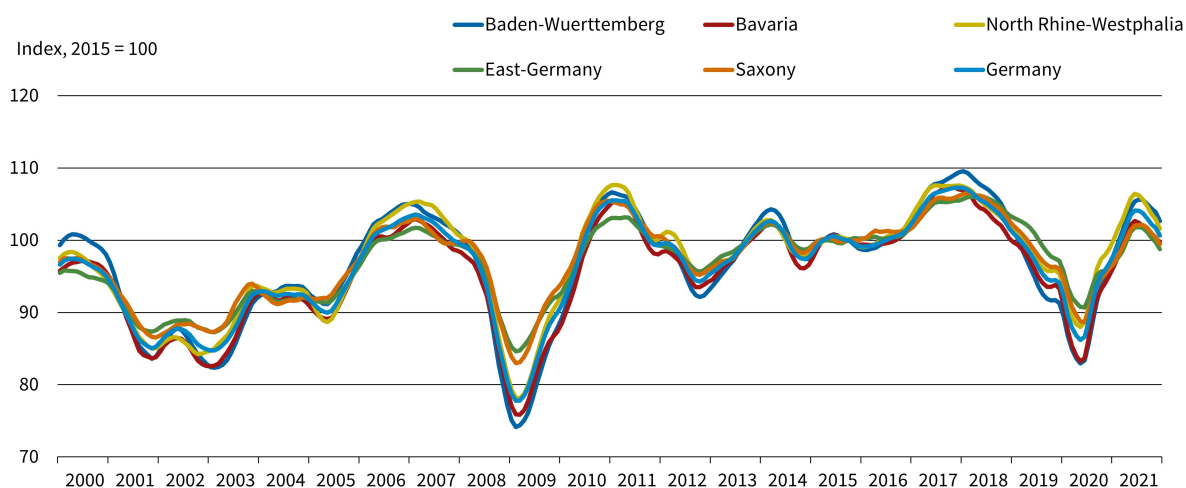
⁵ The results for Bavaria are published by the Bavarian Ministry of Economic Affairs and Media, Energy and Technology, for Baden-Württemberg by the L-Bank Staatsbank für Baden-Württemberg, for North Rhine-Westphalia by the NRW.Bank, and for Saxony and Eastern Germany by the ifo Institute Dresden.

4.1.4 Relevance of the Regional Analysis

The monthly results of the ifo Business Surveys considerably expand the data basis for regional business cycle research, in terms of quality and quantity. This will be demonstrated using the example of the overall economic development during the year.

Figure 4.1 shows the smoothed development of business climate indices for Germany and its states. The results of the survey show basically the same volatility in all regions, but with different intensities. The ifo Business Climates in the three West German states (Bavaria, Baden-Wuerttemberg, and North Rhine-Westphalia) are more volatile than in Saxony or Eastern Germany. This may reflect the more industrial character of the Western German regions. However, manufacturing is the main economic driver at both the national and regional level.

Figure 4.1: Regional ifo Business Climate indices (smoothed)



Source: ifo Business Survey.

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Overall, the ifo Business Climate Index for Germany represents the regional developments very well. The correlation coefficients of the seasonal adjusted values are more than 0.96 in each case, with exception of Eastern Germany (0.87), the value 0 indicating no correlation at all and 1 a perfect positive correlation. However, by its very nature, the ifo Business Climate Index for Germany cannot fully reflect the specific regional volatility.

Nevertheless, the individual regional analyses are very important for the economic forecast because they show the partly different developments of the ifo Business Climate Indices within Germany (Wohlrabe and Wollmershäuser 2017). Even if the overarching trend for Germany and the individual regions is moving in the same direction, indicators can develop differently due to different regional economic structures. If, for example, the business situation in the German economy improves, this does not necessarily apply to the individual states. For example, the seasonally adjusted business climate index for Saxony developed diametrically to the national business climate index in almost 30 percent of the cases between 2000 and

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2021. According to Lehmann et al. (2019), this is probably due to the greater importance of the construction industry and other less export-oriented industries in the region compared to Germany. Also in the other federal states, the ifo Business Climate does not always follow the German counterpart. This suggests that regional-specific economic developments are reflected in the regional analyses and thus emphasizes the importance of the regional analyses. With the help of the regional analyses, short-term regional economic developments can be identified early and with a high degree of certainty (Claudio et al. 2019; Henzel et al. 2015; Lehmann and Wohlrabe 2014a,b, 2015, 2017a).

To demonstrate the quality of the economic indicators collected by the ifo Institute, the results of the ifo Business Survey are compared with the GDP data of the German states. Since official quarterly GDP data are only available for the federal states of Baden-Württemberg and Rhineland-Palatinate, the estimated quarterly GDP data from Lehmann and Wikman (2022) are used. Lehmann and Wikman have estimated quarterly GDP data for all 16 federal states for the period between 1995 and 2021.

The development of the GDP should be reflected at an early stage in the business climate or in the assessment of the business situation and business expectations of the participants at state level. Thus, the business expectations should lead GDP, whereas the business situation should develop contemporarily.

This lag-lead effect of the regionalized survey results is examined with the help of cross-correlations. In this way, the correlation coefficient shows the direction, strength, and temporal dimension of the linear correlation between two time series. A perfect positive correlation (both time series always increase simultaneously) results in a correlation coefficient of 1, a perfect negative correlation (one time series always increases exactly when the other time series decreases) results in a correlation coefficient of -1 . The temporal dimension is obtained by measuring the correlation of the GDP time series with earlier or later values of the respective ifo main indicator. The business climate as the geometric mean of the business situation and business expectations should therefore have a lead on the expectations and a lag on the situation.

Table 4.3 lists the cross-correlations between the posterior mean of the annualized real GDP and the ifo main indicators consisting of business climate, business situation, and business expectations. And Table 4.4 lists the cross-correlations between the seasonally- and calendar-adjusted posterior mean of the quarter-on-quarter real GDP and the ifo main indicators. These cross correlations are examined at the regional level and for Germany as a whole. For this purpose, the monthly survey results were aggregated to the quarterly level by averaging. The period under consideration covers the first quarter of 2000 to the fourth quarter of 2021.

Table 4.3 confirms the positive correlation between regional GDP and regional business climate indicators. The ifo Business Climate, the most important leading indicator, is leading in all four states. In Baden-Württemberg and Saxony the highest correlation coefficients lead at

Table 4.3: Cross-correlations between the annualized real GDP and the ifo main indicators

lead/lags	-6	-5	-4	-3	-2	-1	0	1	2
Germany									
BC	-0.07	0.16	0.41	0.64	0.75	0.73	0.61	0.39	0.16
BS	-0.21	-0.04	0.17	0.41	0.59	0.67	0.65	0.51	0.32
BE	0.19	0.47	0.70	0.85	0.79	0.61	0.34	0.04	-0.18
Baden-Wurttemberg									
BC	-0.12	0.13	0.39	0.63	0.75	0.75	0.64	0.43	0.19
BS	-0.31	-0.12	0.12	0.38	0.58	0.68	0.68	0.56	0.37
BE	0.25	0.51	0.72	0.83	0.76	0.58	0.32	0.03	-0.21
Bavaria									
BC	-0.10	0.13	0.36	0.58	0.68	0.66	0.55	0.35	0.15
BS	-0.26	-0.08	0.13	0.37	0.54	0.61	0.58	0.46	0.29
BE	0.21	0.47	0.66	0.79	0.72	0.53	0.30	0.03	-0.16
North Rhine-Westphalia									
BC	-0.01	0.24	0.47	0.66	0.72	0.64	0.48	0.23	0.00
BS	-0.17	0.01	0.22	0.43	0.56	0.59	0.53	0.36	0.16
BE	0.27	0.54	0.75	0.84	0.75	0.53	0.24	-0.06	-0.29
Saxony									
BC	-0.22	-0.03	0.19	0.43	0.55	0.57	0.49	0.32	0.15
BS	-0.32	-0.20	-0.03	0.21	0.39	0.48	0.48	0.37	0.22
BE	0.00	0.26	0.50	0.68	0.68	0.57	0.39	0.16	-0.01

BC: Business climate, BS: Business situation, BE: Business expectations.

one quarter and in Bavaria and North Rhine-Westphalia at two quarters. The correlation coefficients range from 0.57 in Saxony to 0.75 in Baden-Wurttemberg. By contrast, the business situation indicator is contemporaneous with GDP only in Saxony. In all other states, the business situation has a lead time of one quarter. Again, the correlation coefficient has the lowest value in Saxony of 0.48 and the highest value in Baden-Wurttemberg of 0.68. The expectations component has a lead of three quarters to GDP in all four regions. North Rhine-Westphalia has the highest value of 0.84, followed by Baden-Wurttemberg (0.83), Bavaria (0.79), and Saxony (0.68). Table 4.4, on the other hand, shows a contemporaneous progression of the ifo Business Climate and business expectations indicators with GDP in all four states and Germany. In addition, the business situation indicator lags by one quarter in each state and for Germany as a whole. Overall, the highest correlation coefficient is 0.60.

Generally, the high correlation values between the regional ifo main indicators and the regional GDP demonstrate the power of the ifo main indicators to determine the economic situation of the individual states. Numerous studies confirm the quality of the regional indicators of the ifo Business Survey in terms of forecasting and business cycle analysis. Lehmann and Wohlrabe (2015) show that the quality of (short-term) economic forecasts for the states of

Table 4.4: Cross-correlations between the quarter-on-quarter real GDP and the ifo main indicators

lead/lags	-6	-5	-4	-3	-2	-1	0	1	2
Germany									
BC	-0.15	-0.13	-0.15	-0.03	0.03	0.06	0.36	0.32	0.25
BS	-0.13	-0.13	-0.17	-0.08	-0.02	-0.04	0.21	0.29	0.24
BE	-0.14	-0.08	-0.09	0.07	0.11	0.22	0.52	0.28	0.18
Baden-Wurttemberg									
BC	-0.24	-0.24	-0.20	-0.06	0.04	0.12	0.42	0.40	0.34
BS	-0.21	-0.24	-0.25	-0.16	-0.06	-0.02	0.25	0.35	0.33
BE	-0.23	-0.16	-0.05	0.13	0.21	0.34	0.58	0.35	0.24
Bavaria									
BC	-0.23	-0.19	-0.22	-0.05	0.06	0.10	0.42	0.39	0.29
BS	-0.21	-0.22	-0.23	-0.14	-0.03	-0.02	0.25	0.35	0.29
BE	-0.18	-0.08	-0.14	0.13	0.20	0.28	0.60	0.34	0.20
North Rhine-Westphalia									
BC	-0.20	-0.18	-0.15	-0.02	0.10	0.15	0.44	0.40	0.27
BS	-0.18	-0.18	-0.18	-0.09	0.01	0.02	0.27	0.36	0.27
BE	-0.16	-0.12	-0.04	0.10	0.21	0.34	0.59	0.35	0.18
Saxony									
BC	-0.10	-0.13	-0.14	-0.05	-0.03	-0.04	0.23	0.22	0.14
BS	-0.08	-0.12	-0.16	-0.06	-0.06	-0.12	0.10	0.20	0.14
BE	-0.11	-0.12	-0.07	-0.02	0.02	0.10	0.38	0.19	0.12

BC: Business climate, BS: Business situation, BE: Business expectations.

Baden-Wurttemberg and Saxony as well as for Eastern Germany can be considerably improved if the results of the ifo Business Survey are taken into account in the forecast models. The results of the ifo Business Survey already represent an overall gain in information for Germany's economy; the regional survey results provide additional information. Using the example of Saxony, Lehmann et al. (2010) demonstrated that the regional survey results reliably indicate economic development even in times of crisis, both in terms of the direction and the intensity of economic fluctuation.

In 2014, Lehmann et al. (2014) investigated the indicators of the regional results for individual branches of the economy, analogous to the procedure applied above. They focus on the manufacturing and construction sectors in Saxony and Eastern Germany. As a result, there is a strong positive correlation of the indicators of both sectors with the respective monthly sales development. The expectation indicators show the sales development with a lead of three months. Since the sales themselves are only published by official statistics with a delay of three months, the regional expectations result in an information lead of six months - a considerable gain in information for political decision-makers and scientific economic monitoring.

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Finally, Lehmann et al. (2022) developed a macroeconomic ifo capacity utilization indicator for the German states on the basis of the regional results of the ifo Business Survey. The results of this study show that, firstly, there are considerable differences in the cyclical developments in the individual federal states and, secondly, that there is a high correlation between the ifo capacity utilization and an estimated output gap at the level of the states. With this regionalization of the macroeconomic ifo capacity utilization, the public is now provided with new indicators for regional business cycle analysis.

4.1.5 Conclusion

The monthly results of the ifo Business Survey can also be analyzed for spatially delimited subgroups. The entire survey program is available for regional analyses. Restrictions result only from the number of participants in the respective regions. The available indicators reflect economic development at the regional level very well; this applies to the regional economy as well as to its subsectors. The regional results of the ifo Business Survey thus provide high-quality, relevant, and promptly available indicators for the assessment of overall economic development in the German federal states.