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Norwegian Business Tendency Survey – A summary of recent research activities

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1. Introduction

This paper contains a short summary of current research activities and development work for the Norwegian Business Tendency Survey for manufacturing, mining and quarrying (BTS). This is the only business or consumer tendency survey conducted by Statistics Norway.

With regard to the BTS, Statistics Norway has done research in the area of quantifications of sampling errors within an analytical framework, and analysis of the leading characteristics of the industrial confidence indicator[1] in regard to the industrial production, calculated in the quarterly national accounts. The first two sections of this paper give a summary of the quantification of sampling errors occurring in the population estimate, and the effect of non-response. The third section is a summary of the work carried out to analyse the leading characteristics of the Industrial Confidence Indicator.

There are no plans to carry out any major changes in the BTS in the coming tree years, but further improvements in the quality of the statistics will be worked on continuously.

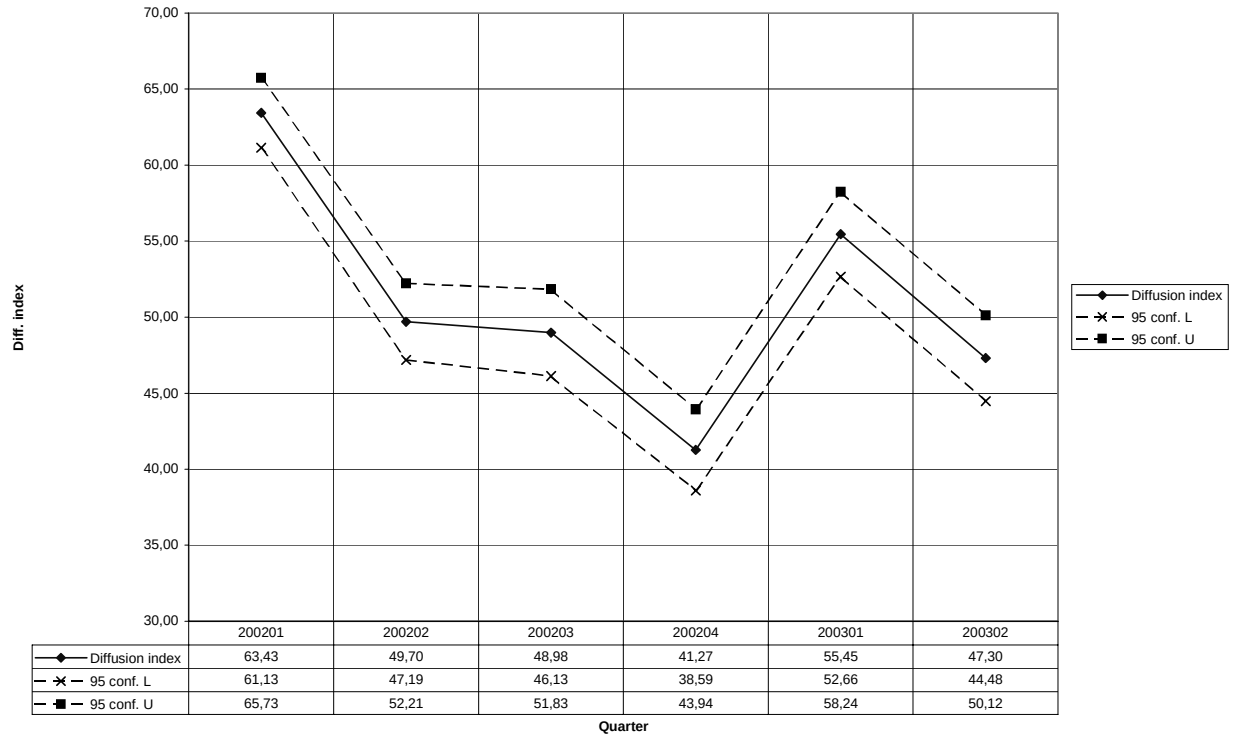
2. Sampling errors

Sampling errors are the result of calculations based on a sample instead of the population. The sampling errors are usually reduced when the sample size increases. To ensure a high degree of relevance at lowest possible cost, the sample is constructed in such a way that it covers the largest enterprises in the population. Different indicators may be used to describe the size of the sampling errors, where the proportion of the sample in regard to the population – and the sample coverage are easiest to compute. For the BTS, the proportion of sample is about 15 per cent, which shows the proportion of the population, which is covered by the sample, measured by the number of enterprises. The coverage measured by the number of employees in the sample, in regard to the population, is about 54 per cent, and 62 per cent measured by total sales value.

In addition to these simple measures, work is carried out to establish quantitative measures of the size of the sampling errors for the BTS. The analysis describes methods for calculating standard deviation and confidence interval for the sample estimates. The analysis describes two methods for constructing these measures: design-based and model-based measures of uncertainty. The design-based standard deviation measures the uncertainty that comes from the possibility for multiple samples two be drawn, while the model-based standard deviation measures the uncertainty which arises because of the stochastic properties of the employment-weighted answers. The design-based standard deviation and the confidence interval for the sample estimates are calculated quarterly and are incorporated in the production process of the BTS. Figure 1 shows the expected level of production in the next quarter and the estimated 95 per cent confidence interval.

[1] Industrial confidence indicator is the arithmetic average of the answers (balances) to the questions on production expectations, total stock of orders and stocks (the latter with inverted sign)

Fig 1. Expected level of production in the next quarter for manufacturing, mining and quarrying 1st quarter 2002 - 2nd quarter 2003. Diffusion index[2] and 95 per cent confidence interval.



	200201	200202	200203	200204	200301	200302
Diffusion index	63,43	49,70	48,98	41,27	55,45	47,30
95 conf. L	61,13	47,19	46,13	38,59	52,66	44,48
95 conf. U	65,73	52,21	51,83	43,94	58,24	50,12

3. Effect of non-response

In recent time some analytical work has been done, trying to establish the effect of non-response in the BTS. In relation to this work we have tried different methods for adjusting the sample estimates for effects of non-response. Different models for weighting for unit non-response, and different methods of imputation have been investigated. On the basis of this work, we have tried to establish whether there is any systematic skewness in the distribution of the non-response in the BTS. There are, however, no evidence of any connection between non-response and industry, or non-response and stratum based on employment (the size of the enterprise) found in this work. Nor was any connection between non-response and the variable of interest established. This work is, however, not concluded, and will be a subject for further analysis.

4. Leading properties for the Industrial Confidence Indicator

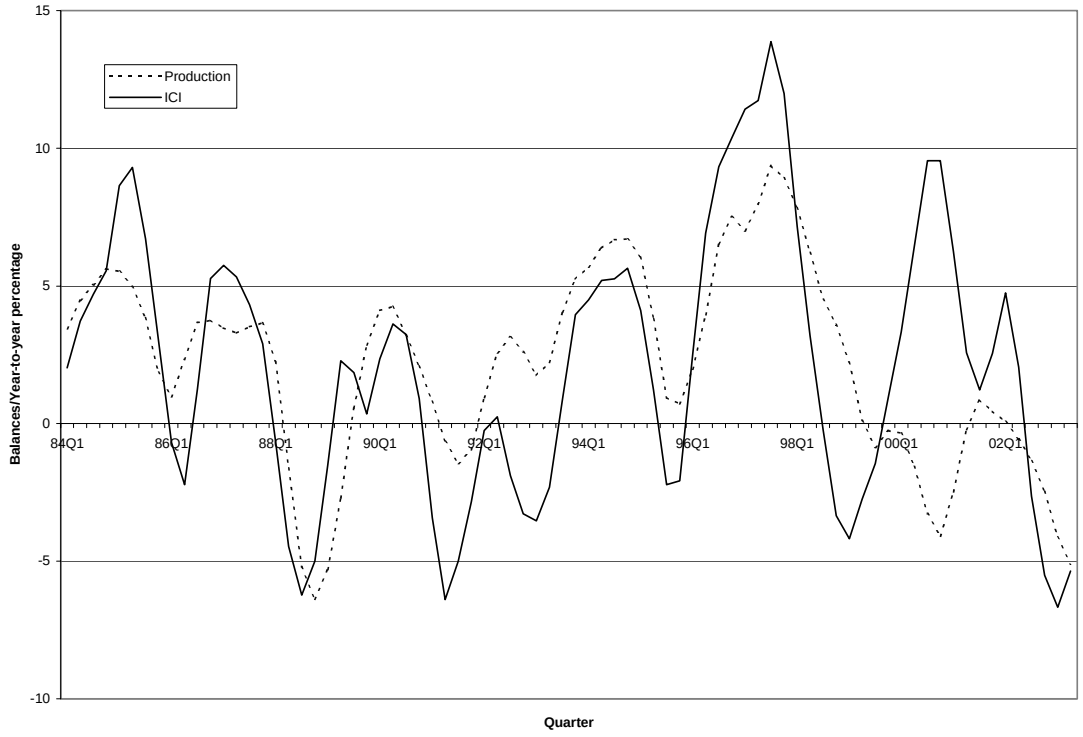
The Industrial Confidence Indicator (ICI) is calculated on the basis of selected questions from the BTS for the manufacturing industry. The ICI is one of the components in the Economic sentiment indicator (ESIN). Because Statistics Norway, at the present time, only produces business tendency survey for manufacturing, mining and quarrying, we are not able to construct the ESIN, which also contains results from consumer tendency survey and business tendency surveys for construction and retail

[2] A diffusion index is compiled using the estimated percentages on "ups" and "same" according to the formula: (ups + 0,5 * same) after adjustments for non-response. {3} The diffusion index has a turning point at 50. A common way of interpreting an index value of 50 is to say that half the respondents has had an increase while the other a fall. An increasing index at or above 50 indicates that the growth rate is increasing, while a falling index above 50 indicates a falling rate of growth. Opposite for an index below 50.

trade. We can, however, construct a quarterly ICI, which is comparable with the ICI constructed in the EU. Some work has been carried out to establish the leading characteristics of the Norwegian ICI in relation to the development of the production indicator (PI) in manufacturing industry, constructed in the quarterly national accounts. The ICI is the arithmetic average of the answers (balances) to the questions on production expectations, total stock of orders and stocks (the latter with inverted sign).

The ICI is supposed to be a leading indicator for the PI because increase in production expectations indicates directly an increase in the forthcoming level of output, an increase in the total stock of orders indicates increased level of production due to the fulfilment of the received orders, and finally, an increase in stocks indicates slow sales and reduced activity. To investigate the leading properties for the Norwegian ICI, we have analysed the correlation between the lagged ICI and the PI. Results from this work show that the trend of the ICI has leading properties compared with the year-to-year percentage change in the trend of the PI. There is, however, a weaker relationship in the last couple of years. The correlation between ICI in quarter *q*, and the PI in the quarter *q+1* in the period 1984 to 1999 is 0.81, while the correlation is 0.62 for the period 1984 to the 2nd quarter 2003. The contradictory results for the year 2000 are the main reason for the drop in correlation. This may be explained by the ICI-component, total stock of orders, which had a large increase in this period. The main contributor to this development was the Transport Equipment Industry. The development within the Transport Equipment Industry had a sharp increase in the total stock of orders, which can be explained by changes in the rules for acquisition of governmental subsidies from 1 January 2001. This increase raised the ICI to proportions that did not reflect the forthcoming level of production, since a major part of these orders was long-term contracts, and was not to be executed in the forthcoming quarter. This example shows the impact of political changes to the interpretation of indicators like the ICI.

Fig 2. The Norwegian ICI and the year-to-year percentage change in production in the manufacturing industry, trend series. 1984 - 2003.



5. Key issues

In this paper – describing recent research activities concerning the BTS – I have given a summary of the analysis carried out by Statistics Norway on the following areas:

- Sampling errors
- Effect of non-response
- Leading properties for the Industrial confidence indicator