Experimental leading indicator for turnover development from advance VAT returns

**Keywords:** administrative data, short-term statistics, advance VAT returns, turnover index

# Introduction

In times of crisis such as the current corona pandemic, the need for up-to-date statistical data (nowcasts) for early assessment of the resulting economic impact is particularly high. Against this background, a new experimental early indicator for the economic development of the “non-financial business economy”[[1]](#footnote-1) was developed building on advance VAT returns. This indicator enables early statements on the development of turnover in the “non-financial business economy” in Germany before the official results from the surveys by economic sector are available.

As part of the advance VAT return, companies must report their monthly or quarterly sales to the tax authorities. The Federal Statistical Office can employ this turnover data. Previously, data on advance VAT returns were only used at the Federal Statistical Office to supplement primary surveys by means of micro-linkage. The new leading indicator for the development of turnover expands the scope of application of advance VAT returns in several respects. For the first time, the data will be evaluated for the entire non-financial business economy. In contrast to previous short-term statistics purposes, this is a purely administrative data evaluation. No information from primary surveys is included[[2]](#footnote-2). The advance VAT returns are available with a time-lag of less than 30 days after the end of the month. At this point in time, the advance VAT returns are not yet available in full, but by using suitable methods they can be used as a meaningful indicator. The evaluations in this form are new and therefore experimental in nature.

This contribution first explains the special features of the data source. Afterwards, it deals with important methodological aspects for the preparation, evaluation and seasonal adjustment of the data. Finally, an assessment of the quality of the indicator is provided.

# Methods

## Data source: advanced VAT returns

Companies are obliged to submit monthly or quarterly reports on their taxable turnover and to pay the VAT incurred to the tax office. The advance VAT returns must be submitted to the tax authorities no later than ten days after the end of the reporting period. A permanent extension of the deadline - this is requested by around 70% of those required to submit advance returns (with a turnover share of over 80%) - extends the submission deadline by one month. Once a month, usually on the seventh working day before the end of the month, the tax authorities transmit all newly submitted advance VAT returns to the official statistics. The April delivery for the reporting period March, for example, then mainly includes the advance returns of companies without a permanent extension of the deadline. As a rule, around 20 to 25 % of sales are then available for the current month. The data situation is therefore still quite incomplete for evaluations with a timeliness of less than 30 days after the end of the reporting month. In the further course of the text, the term t+30 values is used for the current values.

When the companies with a long-term extension submit their March reports with the subsequent delivery in May, the data for the reporting month of March is almost complete (about 95 %). Thus, data are reliable for evaluation if they are up-to-date for around 60 days (hereinafter referred to as t+60 values). As the waiting period increases, the completeness of the data for a reporting month increases further until, after six months, the data can be considered complete.

## Data basis: unadjusted rates month-on-month rates

The first step in evaluating the monthly advance VAT returns is to determine the individual, as yet unadjusted rates of change compared with the previous month for this period. To calculate the unadjusted rates of change from the previous month, the values for the respective reporting month and the corresponding previous month are required, whereby the waiting period for the previous month value is one month longer. In April, for example, the current rate of change from March to February is determined using the data for March (t+30 values) and for February (t+60 values) - hereinafter referred to as MoM 30/60. At the same time in April the rate of change from February to January (MoM 60/90) is determined on the basis the values for February (t+60) and January (t+90) with then more complete data basis than still in March (at that time MoM 30/60).

If one compares the MoM 30/60 with the MoM 60/90 for the same reporting month, the unadjusted month-on-month rates for the different waiting times show a high degree of agreement despite the relatively low degree of coverage of the t+30 submission (Chart 1). However, the MoM 30/60 are on average 0.27 percentage points lower than MoM 60/90 over the period January 2015 to March 2020. Thus, the MoM 30/60 are subject to a systematic downward bias. The mean absolute deviation between the two month-on-month rates is 0.86 percentage points. The differences between MoM 30/60 and 60/90 arise because the early submitting companies are not always representative of the overall development.

Figure 1. Month-on-month rates for the non-financial business economy in %

# Results

## Index calculation, estimation and seasonal adjustment

The unadjusted month-on-month rates show a pronounced seasonal pattern. Seasonal and calendar adjustments are required to interpret the data in a cyclical statistical manner. This ensures comparability with the other established economic indicators of the Federal Statistical Office. Since seasonal adjustment methods are tailored to indices, indices need to be calculated from the month-on-month rates.

To understand the differences between the indices 30/60 and 60/90, their time series components are compared on a monthly bases over the years (Chart 2). The breakdown into components is done using the seasonal adjustment method X13 (Linz at all, 2018). Due to the differences in the mean growth rates (see above), the trend components increasingly move away from each other after the base year. The seasonal pattern deviates visible from each other, especially in the months of January and December. It is therefore advisable to subject the two series to calendar and seasonal adjustment separately.

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|  |  |
| by month, years 2015 - 2019/2020 | |

Figure 2. Time series components for the non-financial business economy

The final leading indicator is composed of the index 60/90 for the period from the first to the penultimate reference month and an estimated index value for the current reference month. In order to be able to make an early statement on the economic development, the index 30/60 is used to calculate the value for the current reference month, as data with a longer waiting period is not yet available. Since the 30/60 values are systematically distorted, the current value of the 30/60 index is corrected by the extent of this distortion. To this end, the 30/60 index value for the current month is divided by the seasonal, calendar and trend factors of the index 30/60 and multiplied by the corresponding factors of 60/90.

For the adjustment of the final experimental turnover index, the calendar and seasonal factors of the index 60/90 are used. The forecasted factors are used at the current edge. The calendar- and seasonally adjusted leading indicator of turnover development for the non-financial business economy is shown in Chart 3 as a value index. When interpreting the results, it should be borne in mind that the index has not been price-adjusted.

calendar and seasonally adjusted, 2015=100

Figure 3. Leading indicator for the non-financial business economy

## Quality assessment

The accuracy of the presented estimation method with seasonal, calendar and trend factors, is assessed by evaluating in-sample forecasts for the index over a rolling window for the period January 2015 to April 2020. The m-o-m rates calculated from the forecasts are compared to the realized ones of the index 60/90 and summarized in quality measures. For comparison, the direct use of MoM 30/60 as forecasts at the current edge is evaluated as well (Table 1). With an average deviation of 0.04 percentage points, the m-o-m rates estimated via the factors are hardly distorted compared to the realized MoM 60/90, in contrast to an estimate via the MoM 30/60. The mean absolute error as well as the root mean squared error are significantly smaller for the factor estimate than for the MoM 30/60 alternative. This evaluation shows that the chosen estimation procedure for the current value via the factors of the index is superior to using MoM 30/60 at the current edge.

Table 1. Quality measures for the estimated month-on-month rates and the MoM 30/60 compared to the realized MoM 60/90 (Jan. 2015 to Mar. 2020)

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| --- | --- | --- |
| **Estimation method of current value** | **Factor estimation** | **MoM 30/60** |
| Mean error in pp | 0,04 | 0,27 |
| Mean absolute error in pp | 0,34 | 0,86 |
| Root mean squared error in pp | 0,46 | 1,28 |

# Conclusions

As a pure administrative data evaluation, the leading indicator can be provided in a resource-saving and efficient manner without burdening companies. It should be noted, however, that political decisions can have an impact on administrative data. Examples include the extension of the deadline for submitting advance VAT returns during the Corona crisis and the temporary reduction in VAT in Germany for the second half of 2020. Both measures may have an impact on the database of advance VAT returns, although the extent of this impact is difficult to estimate.

The leading indicator with the methodology presented in this paper has an experimental character. The investigation of methods is not yet conclusive. It is conceivable to refine the extrapolation procedure for determining the unadjusted month-on-month rates. Taking into account the reports for dates further back in time could improve the results at the current edge. In order to be even more comparable with gross value added as a general business cycle indicator, a weighted indicator for the advance VAT returns could be calculated, which transfers the weight of the economic sectors in gross value added to the advance VAT returns. Furthermore, the leading indicator could also be provided as a price-adjusted turnover index.

If the newly developed sales index proves to be a reliable indicator for early statements on the sales performance of the overall economy and matures methodically, it could become a fixed component of the statistics program for economic monitoring in the future.

# References

1. Lorenz, Robin/Opfermann, Rainer. Verwaltungsdaten in der Unternehmensstatistik. In: WISTA Wirtschaft und Statistik. Edition 1/2017, pages 49 ff.-.
2. Linz, Stefan/Fries, Claudia/Völker, Julia. Seasonal adjustment of short-term statistics using X-12-ARIMA and X13 in JDemetra+. In: WISTA Wirtschaft und Statistik. Edition 4/2018, pages 59 ff.

1. “Non-financial business economy” is defined as sections B to J as well as M and N according to the classification of economic activities - WZ 2008. It thus comprises the sectors of industry, trade and business-related services. Real estate (Section L) is excluded here. [↑](#footnote-ref-1)
2. The use of advance VAT returns and other data transmitted in accordance with the Administrative Data Use Act is described in detail in Lorenz/Opfermann (2017). [↑](#footnote-ref-2)