

## GERMANY: REVISING THE PMI TO BETTER UNDERSTAND SHOCKS AFFECTING INDUSTRY

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Though the manufacturing PMI is a good indicator for assessing the dynamics of industrial production over a long period, recent constraints on supply have again highlighted a methodological problem in the index linked to the way it takes delivery times into account.

The way delivery time are handled by the manufacturing PMI must be differentiated according to type of shock, so that the index can better reflect industrial activity.

We propose a method that will detect the presence of a positive demand shock or a negative supply shock. The manufacturing PMI is then rectified according to the shock.

It is also possible to recalculate the manufacturing PMI by a principal components analysis (PCA), based on all questions available in the S&P Global survey.

Unlike the published PMI, the adjusted PMI shows the slowdown and subsequent drop in German industrial production from the end of 2021. It indicates that manufacturing output should continue to diminish towards the end of the third quarter.

GERMANY: SUPPLY SHOCKS AND DEMAND SHOCKS DISTINCTION

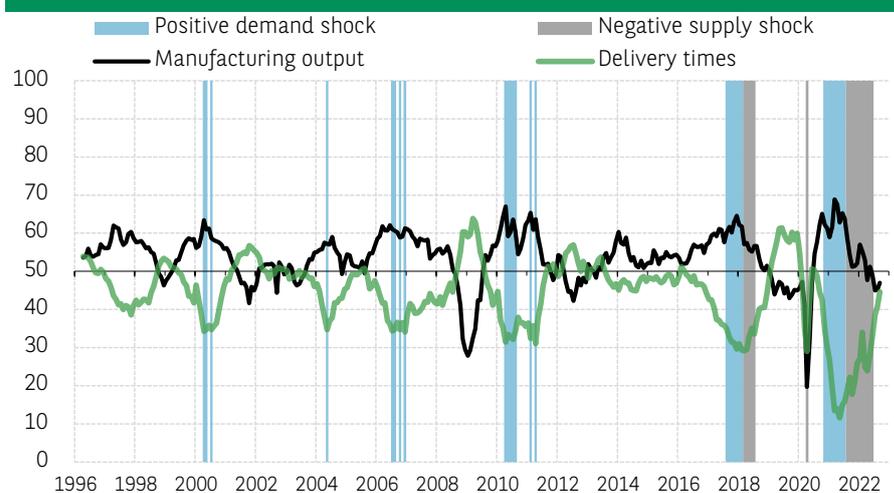


CHART 1

SOURCE: S&P GLOBAL, DESTATIS, BNP PARIBAS

In a recent publication<sup>1</sup>, we showed that the way S&P Global deals with delivery times can cause a misinterpretation of the manufacturing PMI. We go further in this article, still with our focus on Germany; however, our conclusions apply to other countries as well. The problem identified is that in calculating manufacturing PMI, a lengthening of delivery times contributes to an improvement in the index. While this makes sense during positive demand shocks, it does not in the case of a negative supply shock, where greater difficulties in supply are accompanied by a drop in industrial production. Longer delivery times can therefore be either a positive or negative sign, depending on the nature of the shocks affecting the economy.

<sup>1</sup> Graph of the week: "The need to revise the manufacturing PMI to understand the shock to German industry"

## IDENTIFYING SUPPLY AND DEMAND SHOCKS SO THEY ARE TAKEN INTO ACCOUNT WHEN CALCULATING THE MANUFACTURING PMI

To identify the presence of a positive demand shock or negative supply shock, we propose the following decision-making rule (Appendix 1): when delivery times exceed their long-term average by one standard deviation and manufacturing output has been growing over a period of one year, then the economy is experiencing a positive demand shock. Conversely, when the delivery times level is one standard deviation higher than the long-term average, but manufacturing output has been contracting over a period of one year, then the economy is experiencing a negative supply shock. In any other situation, it is considered that there is no shock. One limitation of this decision-making rule is that it does not allow us to detect the simultaneous presence of a negative supply shock and a positive demand shock, which was probably the case during the post-Covid rebound.

The results obtained are consistent with the common interpretation of past economic cycles (see Chart 1). Periods of positive demand shocks correspond to periods of strong growth (2000; 2006-2007; 2017) or recovery (2010-2011; -2021). On the other hand, supply shocks are identified during periods where there is a marked slowdown in activity: 2019 (end of the cycle of expansion and increased supply and recruitment constraints); 2020 (first lockdown: administrative closure); 2021-2022 (commodities shortages and rising energy costs, as well as China's zero-Covid strategy).

## RE-ESTIMATING THE MANUFACTURING PMI ENABLES A BETTER EVALUATION OF GERMAN INDUSTRIAL PRODUCTION DYNAMICS

Detecting different types of shock makes it possible to adjust the sign against delivery times in the manufacturing PMI calculation (Appendix 2). Therefore, when the economy experiences a positive demand shock, this positive shock is reflected in longer supply times, which rightly contribute to an increase in the manufacturing PMI. However, during a negative supply shock, a lengthening of delivery times is a bad sign, which therefore weighs on the manufacturing PMI. In the absence of any shock, delivery times are 'neutral'.

This revision produces a more accurate picture of the dynamics of industrial production in Germany, particularly during recent times (see Chart 2). From mid-2021, industrial production began to decelerate sharply, while the manufacturing PMI remained at a very high level. This discrepancy, which persisted until the summer of 2022, can be explained by very long delivery times, which pushed the index upwards when real activity was much worse. The revised PMI follows the evolution of industrial production much more closely and was able to signal its downturn towards the end of 2021.

### GERMANY: RETREATED MANUFACTURING PMI

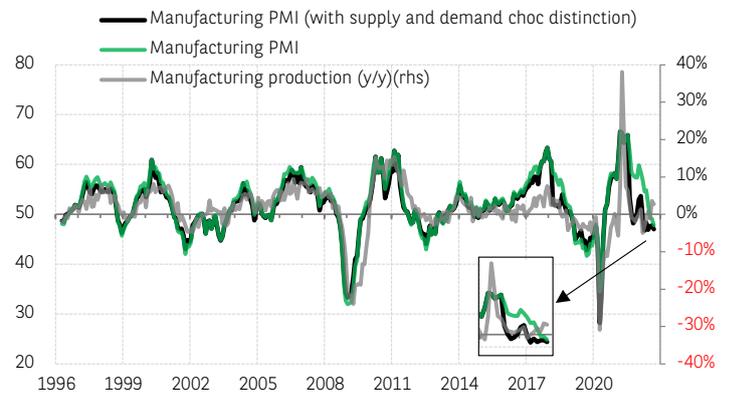


CHART 2

SOURCE: S&P GLOBAL, DESTATIS, BNP PARIBAS

### GERMANY: RE-ESTIMATED MANUFACTURING PMI

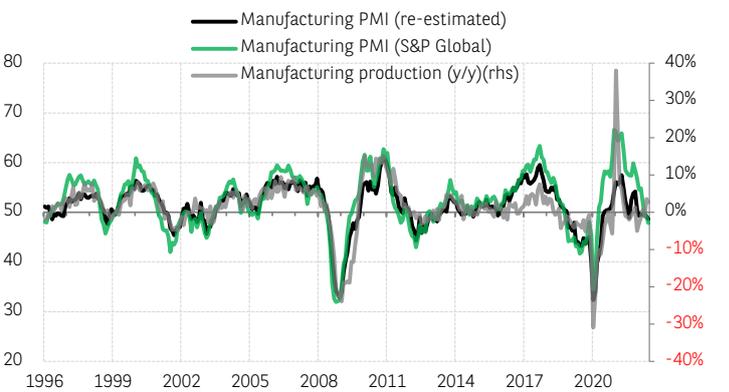


CHART 3

SOURCE: S&P GLOBAL, DESTATIS, BNP PARIBAS

Although the manufacturing PMI, as published by S&P Global, generally does well at tracking momentum in industry before the publication of official data, it has certain limitations, primarily in its construction. The first is that the weight attributed to each survey question to construct the summary index is not necessarily optimal because the weights were initially fixed and are not revised over time. The second is that S&P Global only uses a limited number<sup>2</sup> of survey questions to construct the index. However, the other survey areas available may contain information that contribute to a better appreciation of manufacturing output dynamics.

<sup>2</sup> Only 5 questions : manufacturing output, new orders, employment, delivery time, stocks of purchases



To address this, we are carrying out a second type of index revision based on a Principal Component Analysis (PCA). We integrated all available industry-related questions into the PMI survey. After selecting the dimensions with the best predictive capability using a Stepwise Regression procedure, we use them as regressors to estimate industrial production. This produces a reformulated manufacturing PMI, which reflects dynamics in industry much better (Appendix 3).

While the manufacturing PMI as published by S&P Global is one of the most useful monthly indicators for understanding industrial dynamics (for example, it performs better than the Ifo business climate index for Germany), the adjustments made to it make it even more effective. And the signals sent by the revised PMIs for August and September do not augur well: German industrial production should continue to fall markedly towards the end of the third quarter. Thus, the downturn in industry would extend into a third consecutive quarter.

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### DECISION RULE

Delivery times	Output manufacturing	Type of shock
$DT(t) > \text{Average}(DT) + 1 * \text{StandardError}(DT(t))$	$\Delta \text{OutputManuf}(t, t-12) < 0$	Negative supply shock
$DT(t) > \text{Average}(DT) + 1 * \text{StandardError}(DT(t))$	$\Delta \text{OutputManuf}(t, t-12) > 0$	Positive demand shock
Other situation		Shock-free

APPENDIX 1

SOURCE: BNP PARIBAS

### TREATMENT OF DELIVERY TIMES

Type of shock	Sign of delivery times in manufacturing PMI calculation
Negative supply shock	-
Positive demand shock	+
Shock-free	0

APPENDIX 2

SOURCE: BNP PARIBAS

### METRICS RELATED TO EACH INDICATOR

Metric	Manufacturing PMI (S&P Global)	Manufacturing PMI (shock adjusted)	Manufacturing PMI (re-estimated by PCA)
Adjusted R2	51%	56%	69%
RMSE (Root Mean Square Error)	0.81	0.75	0.61

APPENDIX 3

SOURCE: BNP PARIBAS



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