



# A Business Cycle Tracer for Small and Medium Sized Enterprises

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*Summary: Small and medium-sized enterprises (SME) play a profound role in the Dutch economy in terms of value added, employment and entrepreneurship. In order to monitor the performance of SME Statistics Netherlands introduced a business cycle tracer (BCT) in 2017. In total, twelve economic variables were selected for the BCT of SME; eight of which were fully based on SME data. The BCT of SME consists primarily of leading and coincident indicators, one indicator is lagging. Together these indicators cover five aspects of the business cycle: economic development, consumption, employment, export and finance. By graphically presenting the business cycle as the deviation from the long-term trend of these economic indicators together with the period on period mutation of the cycle itself, rapid visual insights in the current state and economic course of the SME were provided. By integrating the twelve indicators into a single indicator the BCT of SME not only displayed the current cycle position of SME, but also provided potential indications of upcoming cyclical changes at an early stage. The concepts of the BCT-SME originated from a BCT which was first published in 2005 and contained 15 macroeconomic indicators.*

*Keywords: Business Cycle Tracer, Small and Medium-sized Enterprises, short-term economic indicators, sentiment indicators*

## **1. Introduction**

Small and medium-sized enterprises (SME) play a profound role in the Dutch economy in terms of value added, employment and entrepreneurship. Currently, a range of variables covering demographic, social and economic aspects of SMEs are publicly available. Due to the importance of SMEs to the Dutch economy in terms of consumption and value added, special interest exists in the economic performance of these companies. However, interpreting the economic information in a coherent way can be a complicated and time-consuming task. From the perspective of policy makers and branch organizations, a clear need exists for easily accessible tools which present data in an intuitive manner and enable the timely detection of changes in the economic performance of SMEs.

To diagnose and monitor the state and the course of the performance of the SMEs Statistics Netherlands developed a Business Cycle Tracer (BCT). The BCT-SME displays the cyclical nature of a number of relevant economic indicators in coherence with each other and as a function of time. Periods of growth alternate with periods of slow growth or even decline.

In order for the BCT to provide relevant and reliable information, several criteria were applied for the selection of indicators.

Important aspects of the economy should be covered (economic development, consumption, employment, export and finance).

- The set of indicators should be balanced, the BCT-SME should not be dominated by one aspect of the economy or one type of indicator.
- Major turning points in economic cycles must be detected timely and reliably.
- For each indicator, a theoretical background for inclusion must be available.
- Each indicator should have a strong and timely relation with economic cycles. This is operationalized as possessing a minimum correlation of 0.70 with the reference cycles at a maximum lead or lag of six months/ two-quarters.

- Preferably indicators are derived from short-term statistics with monthly or quarterly frequency and which are available within 30 to 60 days after ending of the reporting period.

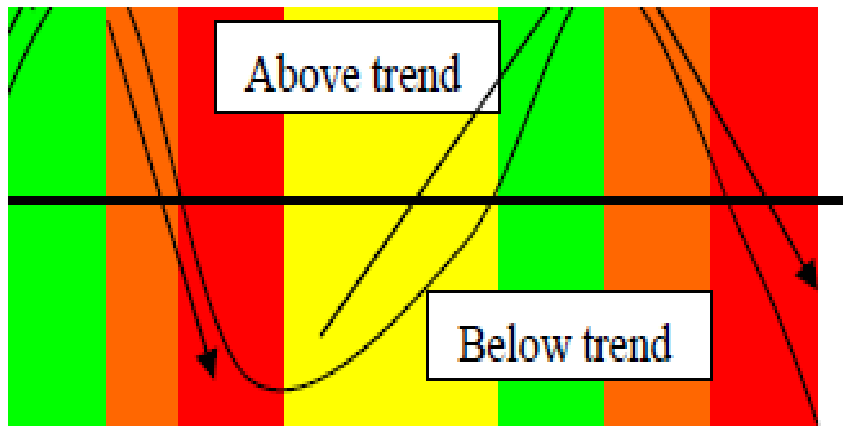
Using these criteria research was conducted to determine which set of indicators would be most suitable to integrate into the BCT for SMEs. The results of the research are described in this paper.

## **2. The BCT-SME from a conceptual perspective**

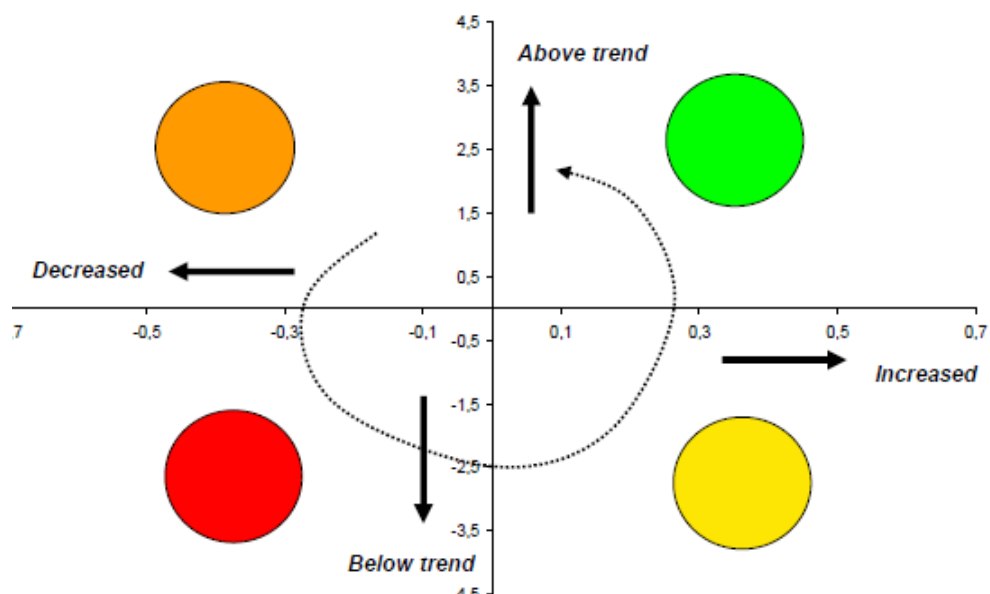
When compiling the BCT-SME, the long-term trend and the cycle of each indicator are determined in a first step. The deviations from the long-term trend are defined as the cycle. The cycle is standardised in a second step, which is necessary to compare the cycle amplitude of the separate indicators in the BCT-SME:

$$\text{Standardised value}_t = (\text{original cycle value}_t - \text{average}_{\text{time-series}}) / (\text{standard deviation}_{\text{time-series}})$$

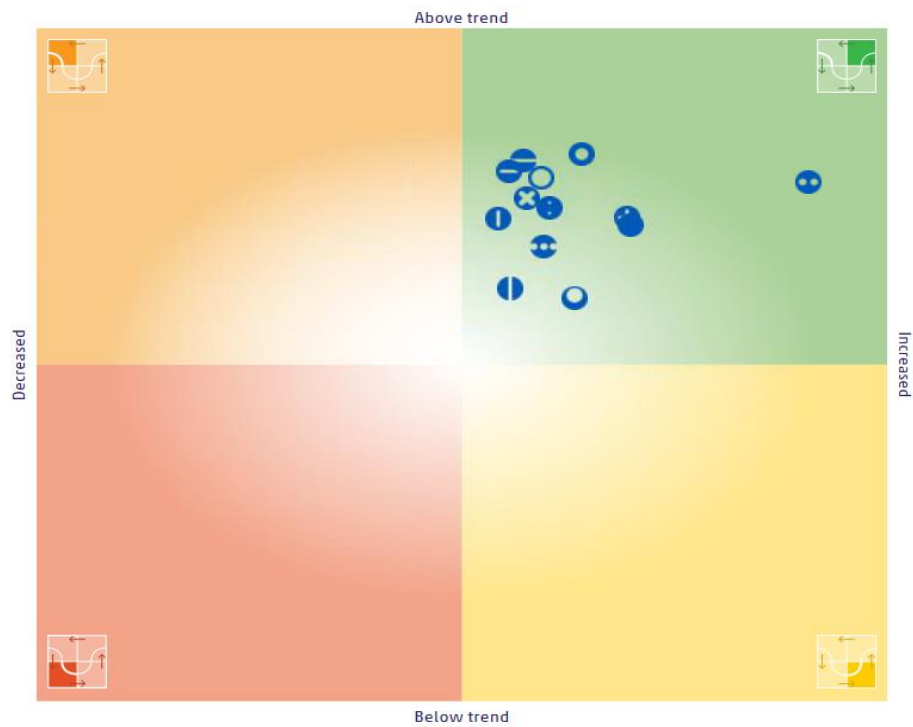
In a third step, it is determined whether the cycle is above or below the long-term trend and whether it is increasing or decreasing. Four possible cycle stages result: above trend and increasing, above trend and decreasing, below trend and decreasing, below trend and increasing. The cycle stages are visualized by the colours green (boom), orange (contraction), red (recession) and yellow (recovery) respectively. Finally, these four business cycle phases are presented in the BCT-SME as a scattergram with four quadrants in which the economic indicators are plotted.



**Figure 1.** An illustration of the concept of the BCT: the four phases of a business cycle.

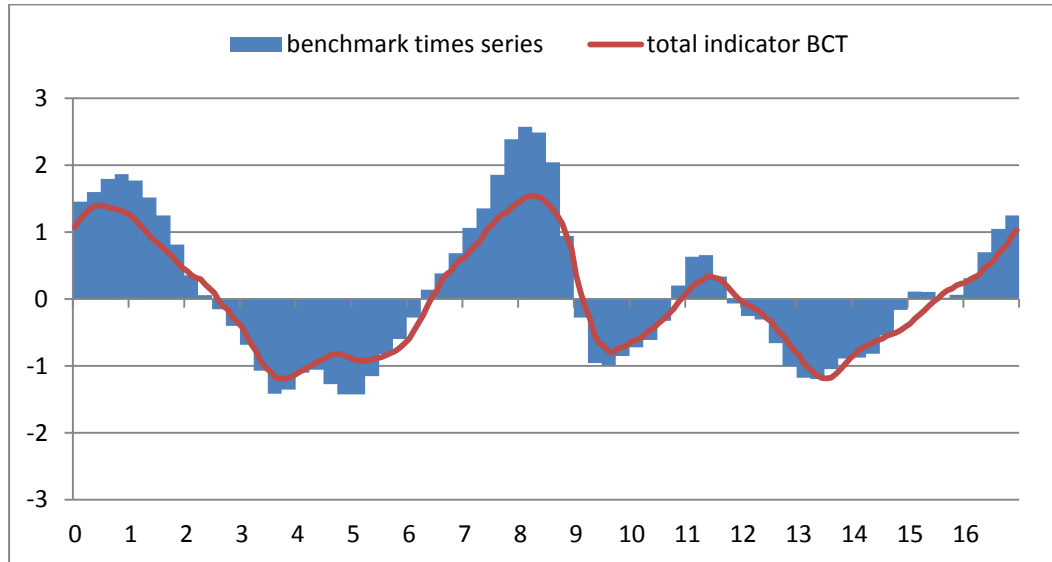


**Figure 2.** The concept of the BCT-SME visualized as a scattergram. Quadrants represent 4 main business cycle phases.



**Figure 3.** Visualization of BCT indicators.

When constructing time series, the BCT can be summarized by a core indicator. The core indicator for period  $t$  is defined as the unweighted mean of the standardized cycles from the economic indicators selected. The core indicator can only be interpreted qualitatively, i.e. in terms of 'economic growth is high/low (above / below its long term trend)' or 'economic situation is better/worse compared to previous periods'. Performance or reliability of the core indicator can be measured against gross domestic production (GDP, a macroeconomic benchmark series). This is illustrated for the Dutch Business Tracer in Figure 4.



**Figure 4.** Core indicator BCT and benchmark series GDP

The BCT-SME is constructed by repeating this procedure for each indicator. The distribution of the various indicators across the scattergram of the BCT visualizes the state and course of the business cycle. In a period of economic growth, most indicators will be above the trend. In a period of economic decline, they will be below the trend. The indicators move counter-clockwise in the BCT-SME.

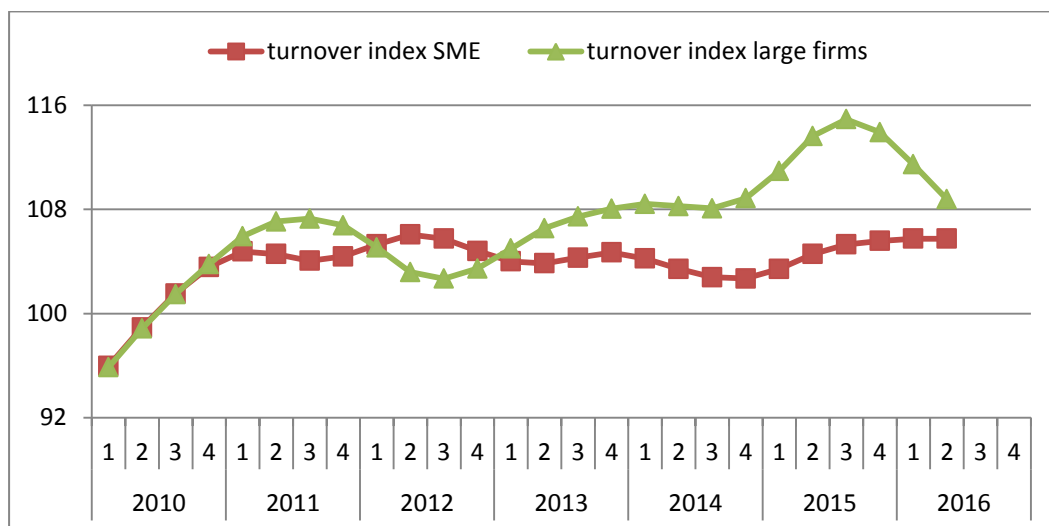
### **3. Indicators for the BCT-SME**

#### **3.1 SME versus large enterprises**

The concepts of the BCT-SME originated from a BCT, which was developed and published in 2005 by Statistics Netherlands and which contained 15 macroeconomic indicators. These indicators cover the total number of companies in the Netherlands including both SME as well as the large companies. The underlying economic behaviour of both types of enterprises, SME and large companies, may however differ. In the Netherlands, SME are somewhat more focused on domestic markets while many large companies are also involved in international activities. This can be illustrated by comparing the behaviour of SME and large companies for several economic variables in the following paragraphs. The differences observed underline the need for an additional BCT which specifically focuses on the SME.

##### *3.1.1 Turnover*

Time series analysis of the turnover development of SMEs and large enterprises (LE) show that there are differences in the extent in which turnover grows or declines. The turnover of the SME developed more steadily over the period 2010-2016 compared to the more volatile pattern of turnover of LE. SME depend to a higher extent on domestic demand and LE on international demand. The latter being cyclically more sensitive. In some periods the turnover of the SME increases, whereas that of the larger companies decreases and vice versa. Thus indicating that periods of growth and decline for SME and LE are not always in phase.

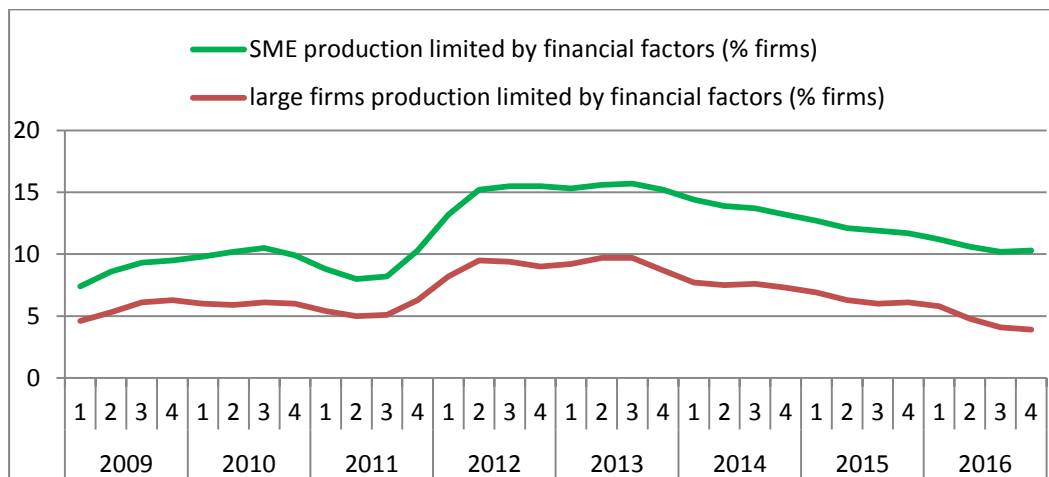


**Figure 5.** Turnover SME and large companies

### 3.1.2 Access to finance and entrepreneurship

According to the pecking order theory, small firms will rely on external finance (bank credits) more often than large firms. Indeed in the Netherlands, access to finance represents a more limiting factor for production continuity when SMEs are compared to LE. Real, official quantitative outcomes, are not available. However, results from the Dutch business tendency survey which captures the opinion of entrepreneurs on many economic variables, confirm this. A time series ranging from 2009 to 2016 shows that the percentage of SME companies, indicating that financial factors limit the continuity of their production in the actuality, is structural higher compared to that of large companies (Figure 6). In the aftermath of the Great Recession, this gap even increased. As said before SME depend more on private consumption while LE are more export oriented. During the years 2010-2014 recovery of domestic demand (i.e. the volume of private consumption) was more weak, contrary to international demand (export volume) which recovered quite some years earlier and stronger.

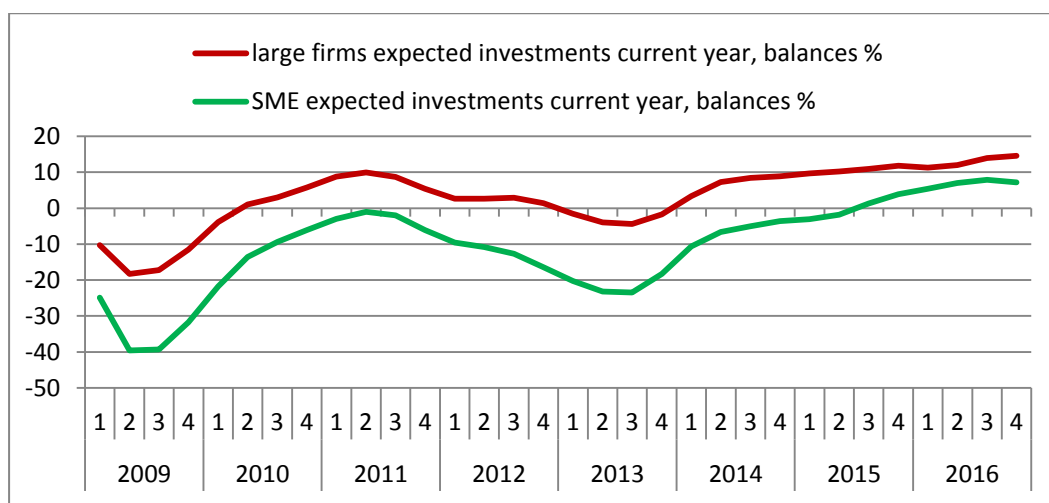




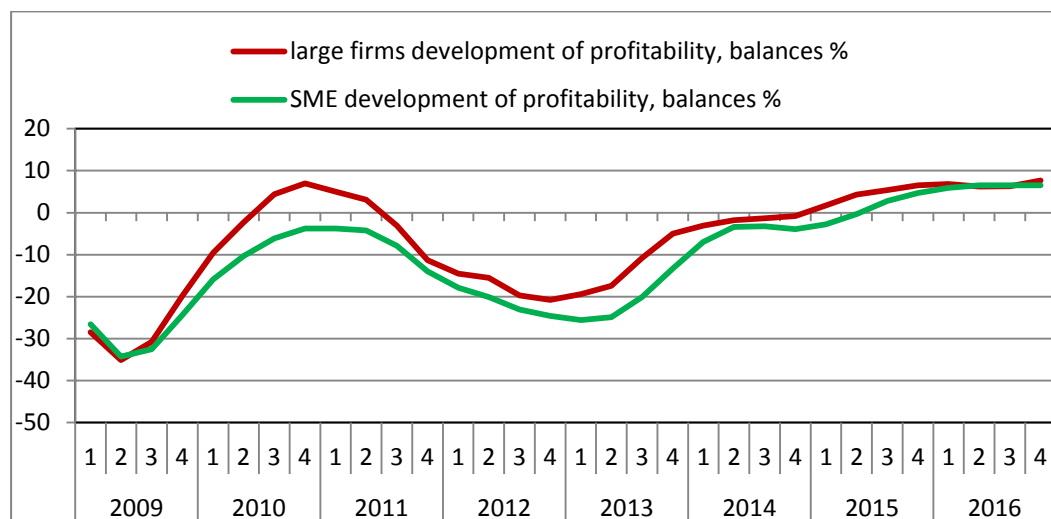
**Figure 6.** Financial factors limiting production in the actuality (% large firms and SME).

A similar pattern is visible when comparing investment expectations between SME and LE. The investment expectations of SME between 2009-2016 are (structurally) lower than that of LE, which is in line with the previously mentioned expectations with regard to access to financial means.

As a result, the development of profitability of SME compared to LE is typically lower. In fact, the recovery of export started much earlier than private consumption. Likewise, investments and profitability recovered earlier for LE compared to SME.



**Figure 7.** Expected investments current year of SMEs and large firms (% balances)



**Figure 8.** Development of profitability of SME and large firms (% balances)

### 3.2 Selection of indicators

In the original concept of BCT, a good balance between leading, coincident and lagging economic indicators should facilitate that the core or total indicator is able to reliably trace the current state of the business cycle. The idea is that:

- leading indicators, as a group, could trace the short and medium-term cyclical changes;
- coincident indicators measure the current business cycle;
- lagging indicators confirm changes detected by leading and coincident indicators.

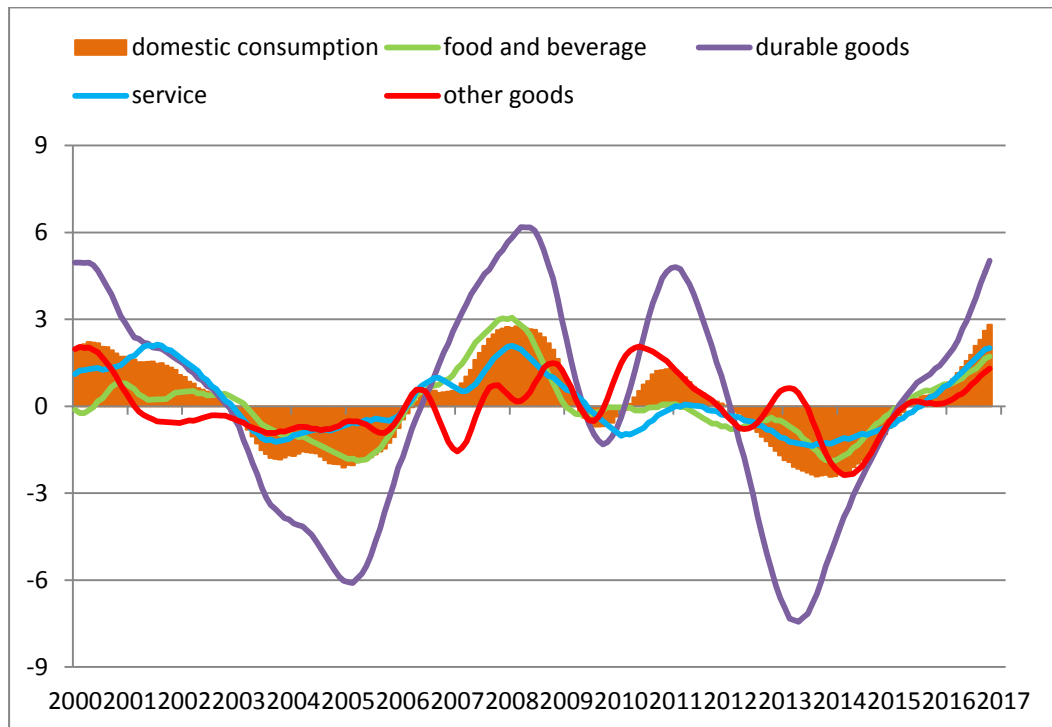
The group of leading indicators consist often of rapid indicators, i.e. qualitative, opinion results from consumer and producer opinion surveys. Coincident and lagging indicators are on the other hand often real outcomes, i.e. volume of production, consumption and investment, the number of bankruptcies and vacancies, unemployment, etc. The lagging indicators used are, as a rule, official labour market statistics. “As a rule” because by their very nature they develop much more stable than production or GDP, investment or consumption (coincident indicators). For the BCT of SME however, the available time series did limit the selection with regard to these three types of indicators.

In the following paragraphs, a distinction is made between only real indicators and rapid indicators. With real indicators, we refer to official, quantitative, statistical outcomes (turnover, consumption, GDP, bankruptcies, vacancies). With rapid indicators thus we mean qualitative outcomes of producer and consumer opinion surveys on the business cycle ( business tendency survey). Thus, for instance, rapid turnover can be compared with real turnover or another related real indicator i.e. new orders or production. Such indicators have at least a publication lead on opposite, quantitative official statistics, moreover often also a historical lead.

### *3.2.1 Real indicators*

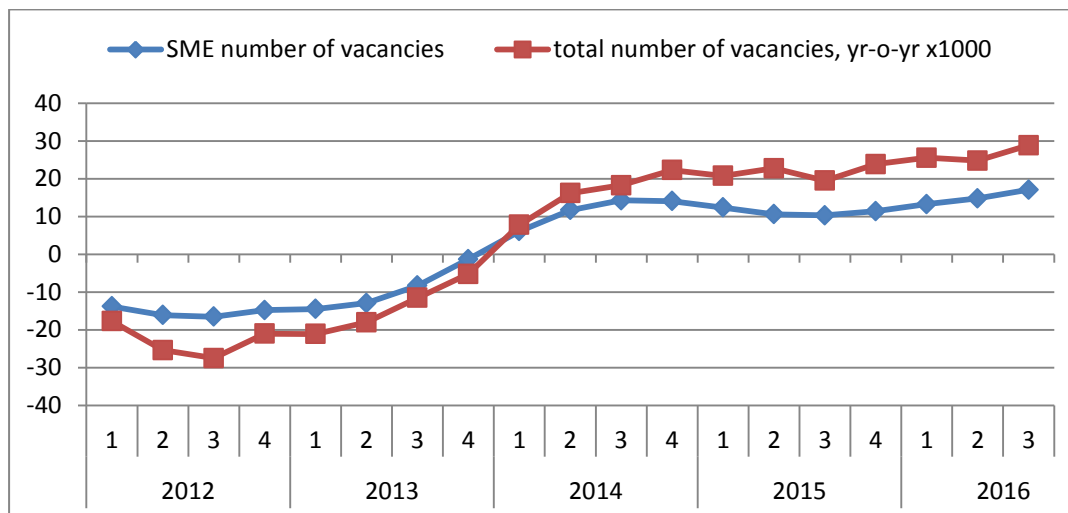
In total six real indicators have been selected based on their high correlation with the economic relevance for the SMEs:

- *Domestic consumption and consumption of durable goods:* One of the most important real business cycle indicators is domestic consumption, which also is one of the three components in the GDP. Cyclical changes in private or domestic consumption, however, are largely driven by the category of consumption of durable goods. Regression analysis revealed that in the period between 2000 and 2015 a change of 1,0 percent point in private consumption could be attributed to 0,45 percent to durable goods and for 0.38 percent to consumption of services, which is the single largest category (about fifty percent of total consumption). From the four main consumption groups (food, durable goods, other goods, and services) the cyclical amplitude of durable goods relative to the total domestic consumption indeed is much larger than that of the other main consumption groups. Hence, economic turning points are detected more sharply (Figure 9). Thus, besides total domestic consumption, the consumption of durable goods is also selected as a separate real indicator as well because of its cyclical importance in terms of its contribution both to domestic consumption and detection of turning points.



**Figure 9.** Domestic consumption: total and main components

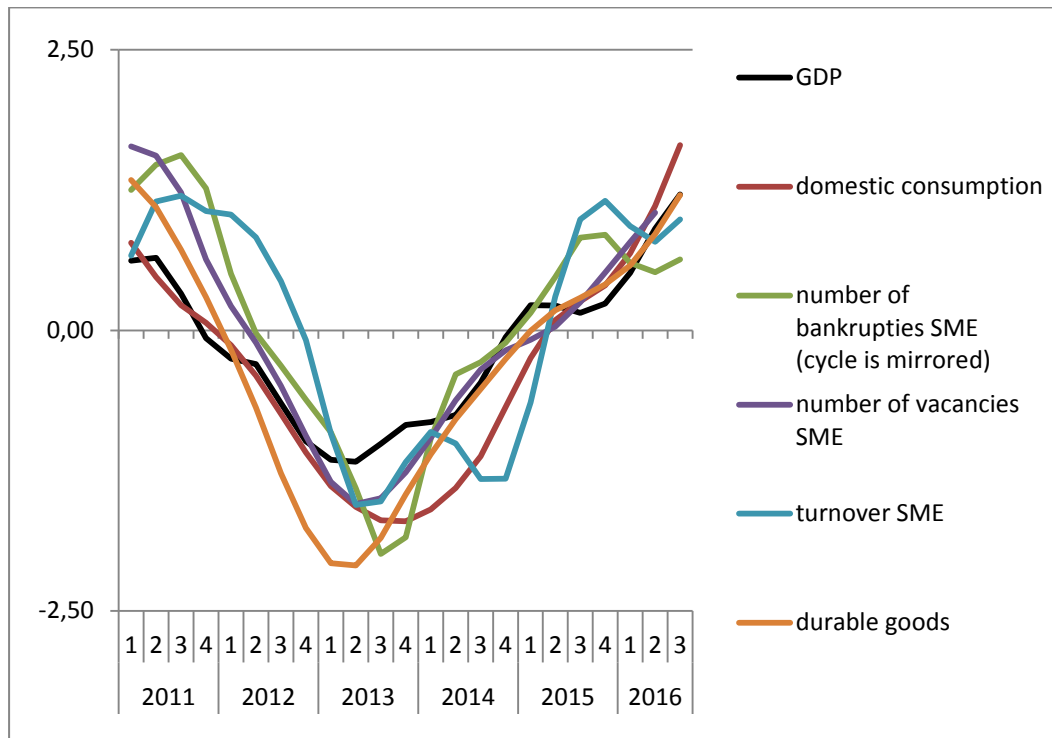
- *Bankruptcies:* Another real indicator is the number of bankruptcies. In the period 2011 – 2015, more than 98 percent of the bankruptcies in the business economy (NACE B-N, S95 excluding K) relate to SME. Although bankruptcies can be caused by a number of reasons, one of the major factors for bankruptcies are the economic conditions. That is why the number of bankruptcies is an important economic indicator in general and in particular for the SME.
- *SME vacancies:* The number of vacancies in SME represents approximately 55 percent of the total number of vacancies in the Netherlands. The development of the number of vacancies over time is similar to that of the total number of vacancies and correlates well with the GDP time series.



**Figure 10.** Number of vacancies: total and SME

- *Turnover development:* The development of turnover of the SME correlates well with GDP and represents an important real economic indicator. The turnover series is based on NACE sections B – S, excluding D, G46, K and R. The excluded sections, in particular, wholesale trade (G46), show turnover development patterns which can deviate from time to time to that of other branches, obscuring the more common business cycle development.
- *Gross domestic product (GDP):* Finally the GDP, the main economic indicator is selected as a reference to which all real BCT-indicators can be related.

As is shown in figure 11 a substantial correlation exists between the six selected real indicators.



**Figure 11.** Six real indicators of the BCT for SME

### 3.3 Rapid indicators

In total six rapid indicators have been selected for the BCT of SME. Each indicator provides rapid insights in the development of specific aspects of SME-entrepreneurship. Typically these rapid or leading indicators are compiled of multiple sub-indicators and are often referred to as composite indicators, like the well-known producer or consumer confidence.

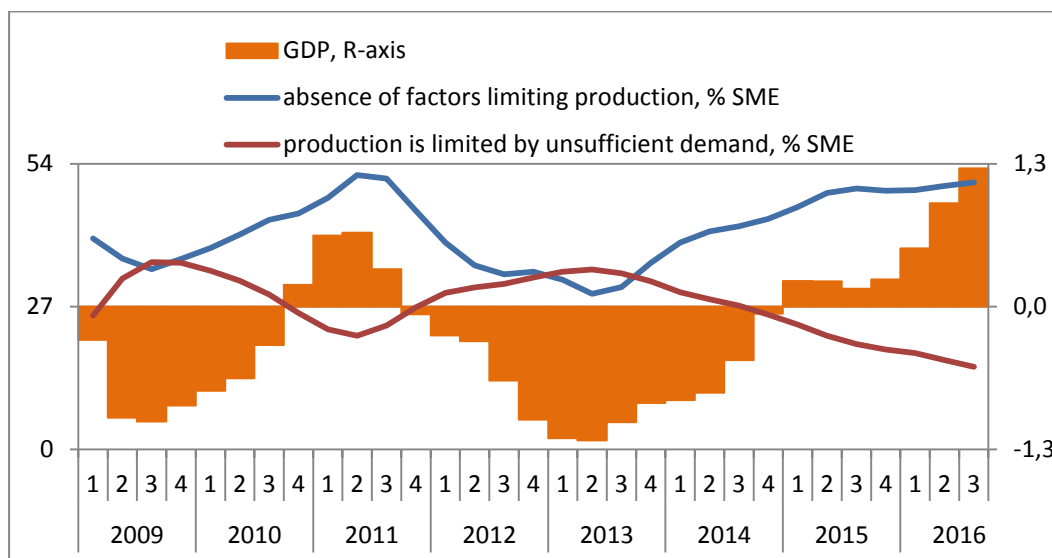
#### 3.3.1 Economic development indicator of SME

It is important to include an indicator in the BCT of SME with which the economic performance of the SME can be monitored and which relates to the overall macroeconomic development, the GDP. In order to derive such a variable, a composite indicator has been constructed, consisting of four components.

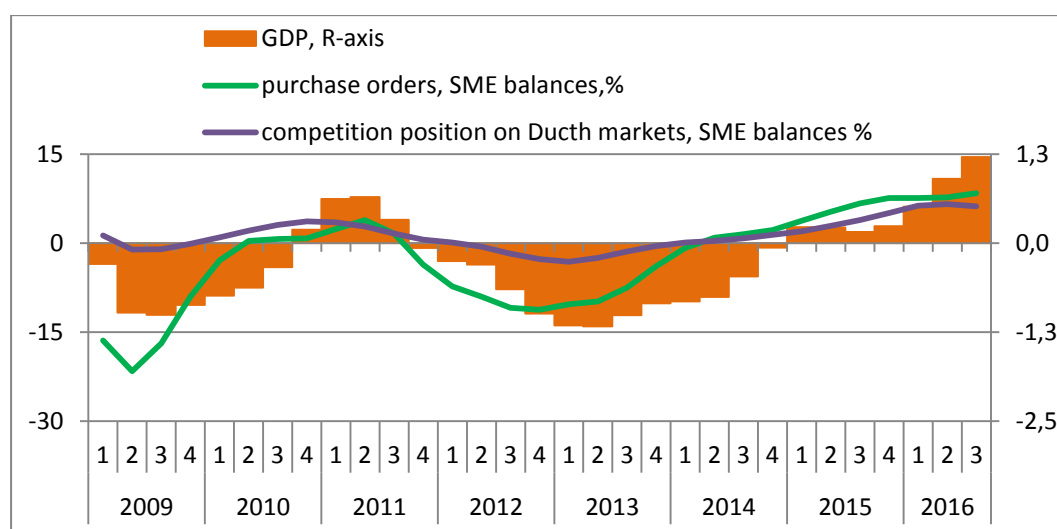
- *The absence of factors limiting production:* information on the prevalence of production bottlenecks is obtained from the Dutch business tendency survey. Information on production barriers is important as it reflects friction between factors related to supply and demand, on the short as well as medium term. A correlation exists between production barriers and the current economic state. The absence of production barriers indicates a positive economic state and vice versa (see figure 12). In 2011 and 2016 the percentage of companies reporting no production barriers exceeded 50 percent. In these years the GDP increased. In 2009 and 2013 the percentage of companies reporting no production barriers decreased to respectively 35 and 30 percent. In these years the GDP decreased.

- *Production barrier due to insufficient demand.* From the survey mentioned above information is derived from the type of barrier experienced. Others distinguished are financial factors, staff shortage, technical production capacity, like weather, shortage of materials etc. Production constraint caused by insufficient demand show a good correlation with GDP and is therefore selected as one of the components of the composite indicator: economic development of SME.

- Beside these two components related to production barriers (Figure 12), domestic competition position and purchase orders are selected as additional components due to their relevance for SME (Figure 13).



**Figure 12.** Two sub-indicators of economic development indicator for SME compared to GDP



**Figure 13.** Two sub-indicators of economic development indicator for SME compared to GDP

### 3.3.2 Producer confidence

Producer confidence plays an important role in economic decision making. This is the reason that the composite indicator producer confidence has been selected for the BCT of SME. Producer confidence reflects the confidence of entrepreneurs in the current state of the economy and on the short term. For most branches, the development of

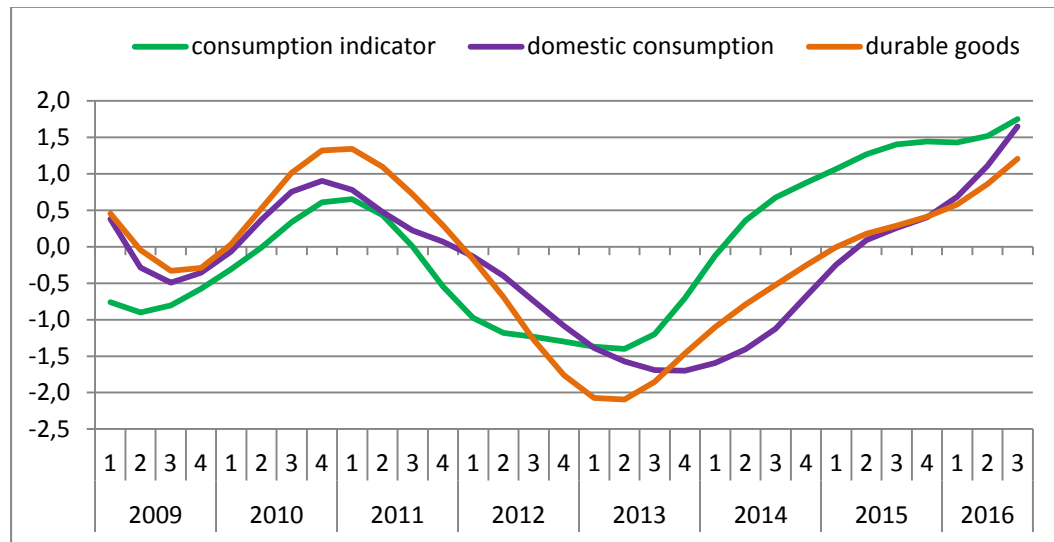


turnover in the previous period, the expected development of turnover and the economic climate on the short run are used to construct producer confidence.

### *3.3.3 Consumption indicator*

Consumer confidence is also an important macro-economic indicator. Not only for consumption but also for measuring the willingness of entrepreneurs to invest. Analysis conducted by Statistics Netherlands showed that on average changes in consumer confidence precede changes in the actual consumption by two quarters. The leading character of the consumer confidence indicator as well as the purchase of durable goods is especially visible when turning points in the economy occur. The consumer confidence indicator is composed of five underlying indicators: the economic situation for the next twelve months, the economic situation over the last twelve months, the financial situation for the coming twelve months, the financial situation over the last twelve months and the willingness for big purchases. Besides consumer confidence, other factors may play a role in consumer behaviour such as job security or the expected development of unemployment and selling prices. In order to determine which consumer opinion indicators are most suitable to be used as inputs for a composite consumption indicator, cross correlation was applied on domestic consumption. The correlation coefficients of the expected prices were lower than 0,70. From the five consumer confidence indicators the lead of the expected economic situation exceeded well above a year the development of real domestic consumption while the expected financial situation did not correlate better than the current financial situation with regard to domestic consumption. For these reasons, these indicators were not used as inputs for the composite consumption indicator. The composite consumer indicator was finally compiled with four indicators from the consumer business tendency survey: the current economic situation, the current financial situation, the season at this moment is good to buy durable goods and the expected unemployment development. Together with the real indicators of domestic

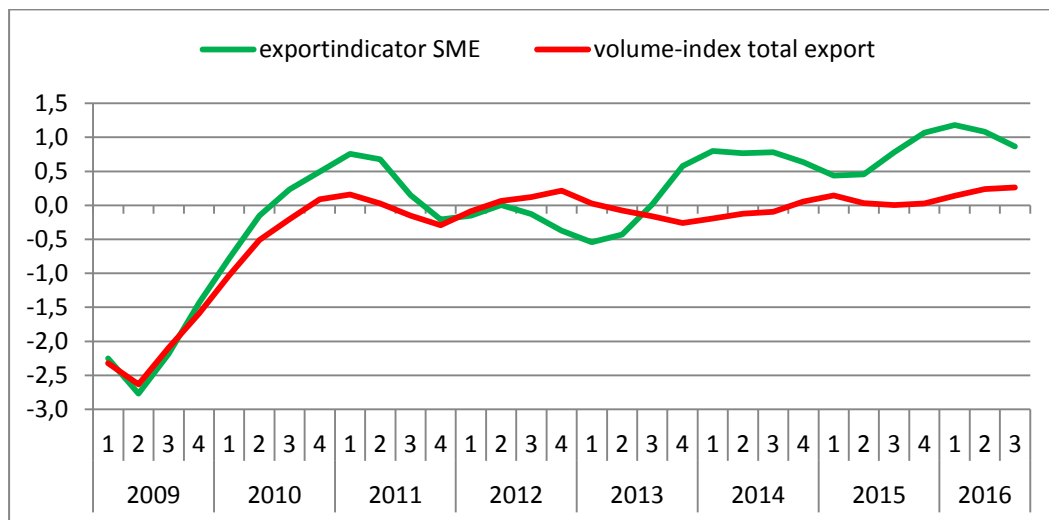
consumption and purchasing of durable goods, the development of consumption so important or vital for SME is monitored in the BCT of SME (figure 14).



**Figure 14.** Domestic consumption, consumption of durable goods, rapid consumption indicator

### 3.3.4 Export indicator SMEs

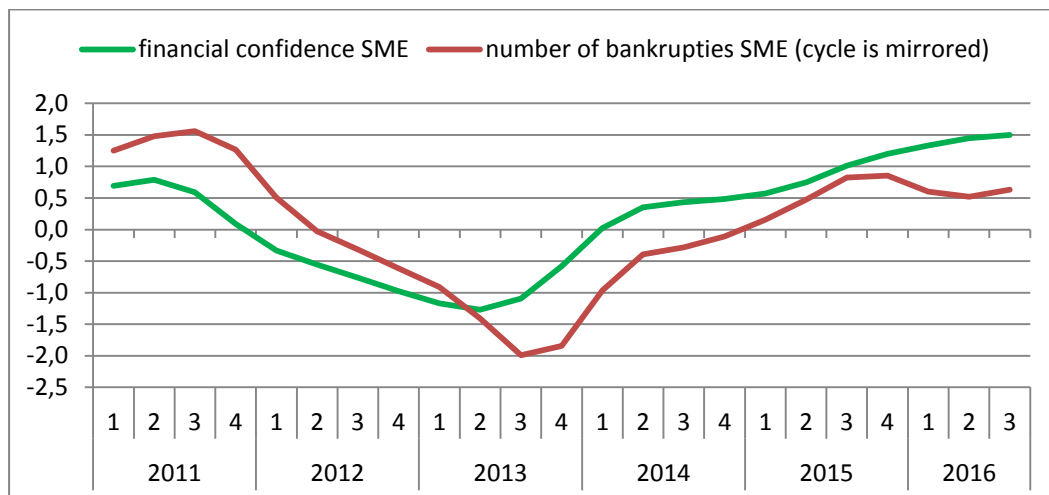
Several indicators are available for constructing an export indicator for the SME. SME predominantly exports to countries within the European Union. Export of SME amounts to one-third of the total export of goods. The development of the 'competition position on the EU-market' as well as the judgement of 'foreign order books' represents two important rapid export indicators. In addition, the development of 'foreign turnover' and 'expected new foreign orders' are also relevant for integration in the composite export indicator for BCT of SME (figure 15). As a result, the export indicator constructed consists of four underlying indicators. The timing analysis showed that there is a high degree of cyclical development between these four indicators.



**Figure 15.** Export indicator SME and volume-index total export

### 3.3.5 Financial confidence indicator

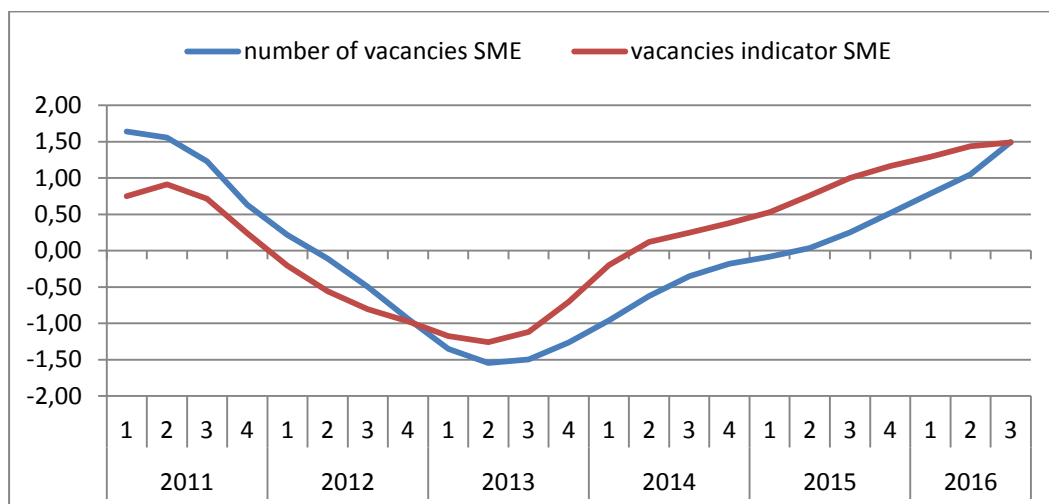
The average of three SME variables – investments, financial barriers and profitability – are used as inputs to construct the composite indicator financial confidence (figure 16). The cycle development of the financial confidence of companies shows similarity with the number of SME bankruptcies, of which about fifty percent have an economic cause. On average the business cycle of the financial confidence indicator precedes the number of SME bankruptcies by one-quarter. The rapid indicator profitability leads the number of bankruptcies by three-quarters. Investment expectations and financial factors limiting productivity are coincident with the number of bankruptcies.



**Figure 16.** Financial confidence and bankruptcies of SME

### 3.3.6 Vacancy indicator for SME

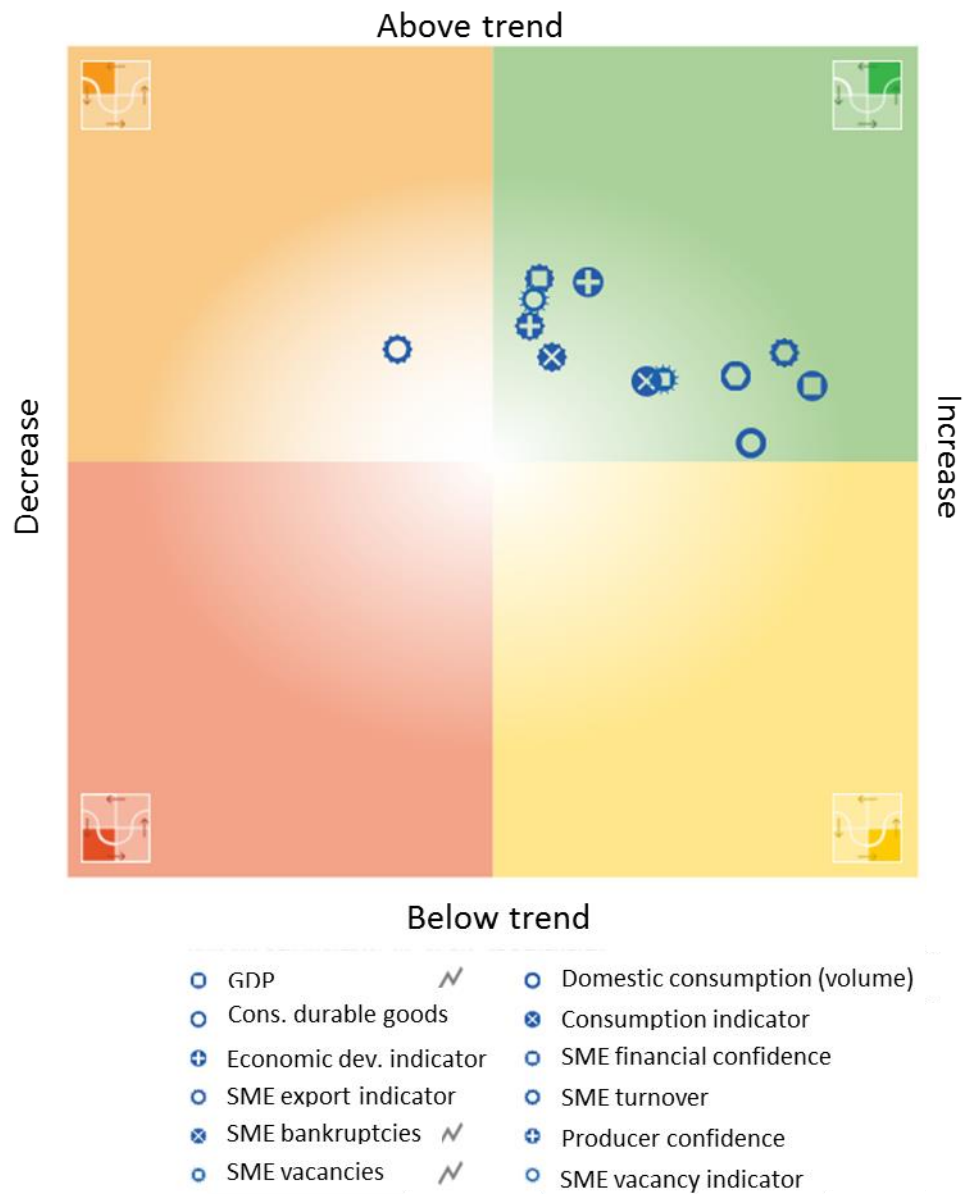
Growth or decline in the employment figures is related to economic developments. Currently, a total vacancy indicator exists and is published by Statistics Netherlands. This vacancy indicator is partly based on economic indicators and partly on employment indicators. For the development of the vacancy indicator for SME, a similar approach was followed. Five indicators were selected for the construction of the composite vacancy indicator for SME: the development of total new orders received in the previous quarter, shortage of staff limiting the production now, expected selling prices for next quarter, development of employment in the previous quarter and expected employment for next quarter. On average the resulting vacancy indicator precedes the actual development of vacancies by one-quarter (figure 17).



**Figure 17.** Number of SME vacancies: realisation and rapid indicator

#### 4. Results

The aim of the BCT of SME was to provide a tool which assists in interpreting economic information on SME in such a way that the economic state and course of SME is clear. Based on the twelve indicators selected, a BCT of SME was constructed. The results of the BCT of SME are shown for the third quarter of 2016 (figure 18). For this period almost all indicators are located in the right upper quadrant. This quadrant represents a phase in which the business cycle is located above the long-term trend and during which a maximum is reached at a certain point.



**Figure 18.** BCT of SME: the stance of the 12 indicators in the third quarter 2016.

After the maximum a phase of decline starts, although the business cycle is still above the long-term trend in this phase. This decline phase is represented by the upper left quadrant. When progressing through the BCT of SME the next quadrant (bottom left) represents a phase in which the business cycle is below the trend and reaches a

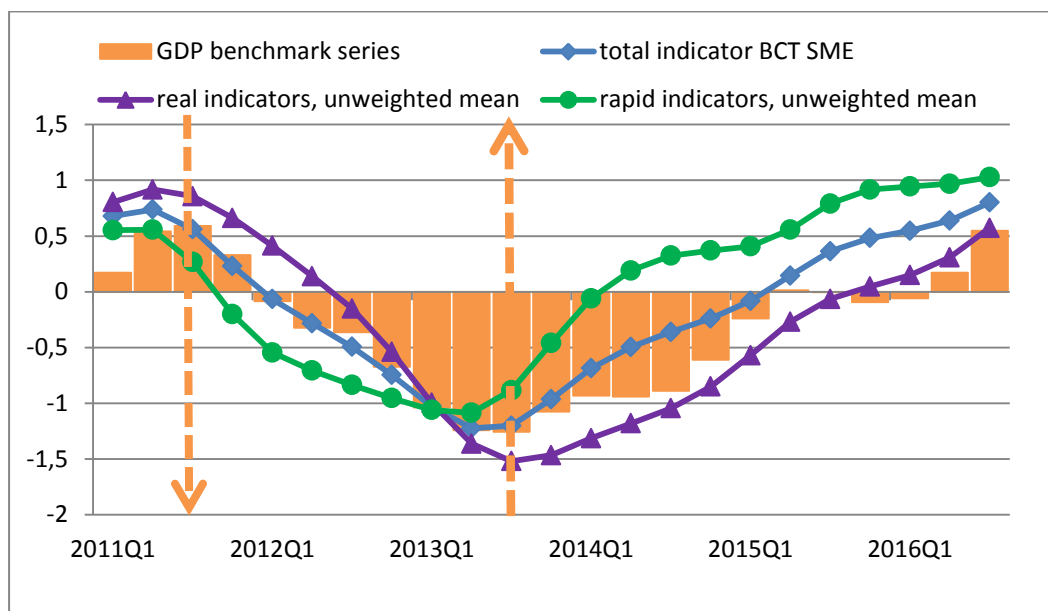
minimum. This phase is succeeded by a recovery phase (bottom right) indicating that a new cycle starts again.

The BCT of SME shows a large number of relevant economic variables in coherence with each other and relative to the long-term trend, which facilitates the rapid interpretation of the economic state and course of the SME. Eight of the twelve indicators are entirely based on SME data. The remaining four indicators are macroeconomic by nature, however, are very important for the economic activity of SME.

Using these twelve indicators five important business cycle aspects can be monitored for SME: economic development (turnover, producer confidence, indicator economic development), the development of consumption (total consumption, consumption of durable goods, consumer indicator for consumption), development of employment (number of vacancies and vacancy indicator), finance (the number of bankruptcies, financial confidence) and export (export indicator).

The BCT of SME is an interactive visualization which allows users to show results for a time range of choice. In this way, the direction in which the main point of indicators (the cloud) is moving through the BCT of SME becomes apparent and is indicative for the economic course SME are following.

Of all indicators, the rapid indicators move through the BCT of SME first and are able to detect economic changes at an early stage (figure 19). Used as a group (unweighted mean) they lead in changes from quadrant to quadrant in the concept of the BCT, first at turning points and also passing first below and above long term growth (zero line). They lead on GDP on average three-quarters ( $R=0,95$ ), but this is not a very conclusive conclusion given the rather short time period of benchmarking. While the real indicators are in majority coincident indicators, there is only one lagging indicator: turnover of SME. As a group, there is no lead or lag on GDP ( $R= 0; 0,95$ ). This also holds for the total BCT SME indicator. Due to differences in length of the 12 time series the common starting period for is the first quarter 2011.



**Figure 19.** Total, real and rapid indicators of BCT of SME and GDP as benchmark series.

## 5. Conclusion

In total, twelve economic variables were selected for the BCT of SME; eight of which were fully based on SME data. Together these indicators covered five aspects of the business cycle: economic development, consumption, employment, export and finance.

The BCT of SME represents a straightforward method in visualizing relevant economic indicators in coherence from which the state and course of economic developments can be derived rapidly. The BCT of SME contains a substantial number of indicators derived from sentiment surveys, in total six rapid indicators. When grouped together as one total single indicator they enable the detection of changes in the four main phases of the business cycle at an early stage.



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