Composite indicators: the INSEE’s experience

Application to the business climate indicator

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Business surveys: an essential tool for forecasters

- Every quarter, INSEE prepares a short-term economic scenario
  - for the 6 to 9 months ahead
  - focused on France
  - but also the Euro zone, the UK, the US, Japan and the emerging economies
- Business tendency surveys (BTS) help forecasters
  - to assess the current position of the economy in a cycle
  - to make quick estimates of the major macroeconomic indicators
- Techniques have been developed since the late 1980s
  - bridge models techniques
  - business climate indicators, turning point indicators, surprise indicators…
The INSEE business tendency surveys

- 10 surveys:
  - Industry (3), construction (4), services (1), trade (2)
  - Average response rate: 70% (2/3 by internet)
- A very narrow timetable
  - Questionnaires are sent to enterprises around the 29th of month M-1
  - Results are published around the 25th of month M
- Questions are mainly qualitative

### QUESTIONS ON YOUR ENTERPRISE’S ACTIVITY

<table>
<thead>
<tr>
<th>1. YOUR PRODUCTION</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Change in past 3 months</td>
<td>➔</td>
<td>➔</td>
</tr>
<tr>
<td>b. Likely change in next 3 months</td>
<td>➔</td>
<td>➔</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. TOTAL ORDERS (OR DEMAND)</th>
<th></th>
<th></th>
<th>above average</th>
<th>average</th>
<th>below average</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the season, do you consider your current order books (or demand) to be</td>
<td>➔</td>
<td>➔</td>
<td>➔</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Businesses provide objective, well-founded responses

- Businesses use numerical information to respond to the BTS
  - recent variations of activity
    - quantities produced,
    - amounts invoiced,
    - hours worked.
  - expected activity
    - subjective judgement,
    - current state of their order books.

- Responses are consistent with the quantitative indicators

- The answers on past and predicted activity are consistent
  - 60% of businesses predict the future variations in their output correctly
  - Businesses rarely get it wrong twice in a row
Balances of opinion, to summarise the responses

- They are considered as the most efficient way to quantify and combine responses of individual firms
- They are very simple to construct
- Their usefulness has been demonstrated both theoretically and empirically.
- They usually present a close correlation with the corresponding macro-economic variables, and thus yield good results when used in forecasts.

Balance of opinion = (% responses 🆙) - (% responses 🅿️)
A composite indicator, to summarise the different questions

- INSEE publishes six business climate indicators
  - One for each of the five major sector
  - An overall indicator for the economy as a whole
- Since 2008 the business climate indicator for France has correctly reflected the growth of the French economy
## Alternative business climate indicators

<table>
<thead>
<tr>
<th>Survey</th>
<th>Reference month</th>
<th>Period of data collection</th>
<th>Publication</th>
<th>Data collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSEE</td>
<td>m</td>
<td>The first 3 weeks of m</td>
<td>Around the 25&lt;sup&gt;th&lt;/sup&gt; of month m</td>
<td>Change in past 3 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Likely change in next 3 months</td>
</tr>
<tr>
<td>National Bank</td>
<td>m</td>
<td>The first week of m+1</td>
<td>Around the 10&lt;sup&gt;th&lt;/sup&gt; of month m+1</td>
<td>Change in m compared to m-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Likely change in m+1 compared to m</td>
</tr>
<tr>
<td>Markit</td>
<td>m</td>
<td>The last 2 weeks of m</td>
<td>Before the 5&lt;sup&gt;th&lt;/sup&gt; of month m+1</td>
<td>Change in m compared to m-1</td>
</tr>
</tbody>
</table>

### Composite indicators: the INSEE’s experience

- **INSEE**
- **European Commission**
- **Central Bank**
- **Markit-PMI**

<table>
<thead>
<tr>
<th>Year</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>120</td>
</tr>
<tr>
<td>2006</td>
<td>110</td>
</tr>
<tr>
<td>2007</td>
<td>115</td>
</tr>
<tr>
<td>2008</td>
<td>120</td>
</tr>
<tr>
<td>2009</td>
<td>110</td>
</tr>
<tr>
<td>2010</td>
<td>100</td>
</tr>
<tr>
<td>2011</td>
<td>90</td>
</tr>
<tr>
<td>2012</td>
<td>80</td>
</tr>
<tr>
<td>2013</td>
<td>70</td>
</tr>
<tr>
<td>2014</td>
<td>60</td>
</tr>
<tr>
<td>2015</td>
<td>50</td>
</tr>
</tbody>
</table>

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A composite indicator for which purpose?

- To summarise the information contained in the different questions...
  - Simple average
    - very simple
    - the choice of the retained questions and the weightings seem to be arbitrary
  - Principle component analysis
    - the first principal component is reputed to be the ‘best’ average of the balances
  - Factor analysis
    - the assumption is made that each balance can be broken down into two

- ... and to reflect the main short-term economic movements
  - Selection of the balances
  - Constraints put on the weightings
### Application to the industry with 3 methods

**Correlations between monthly questions and the manufacturing output**

<table>
<thead>
<tr>
<th></th>
<th>Past activity</th>
<th>Personal production expectations</th>
<th>General production expectations</th>
<th>Order books</th>
<th>Export order books</th>
<th>Stocks</th>
<th>Personal prices expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output (y-o-y)</td>
<td>0.77</td>
<td>0.69</td>
<td>0.74</td>
<td>0.77</td>
<td>0.79</td>
<td>-0.32</td>
<td>0.26</td>
</tr>
<tr>
<td>Output (q-o-q)</td>
<td>0.54</td>
<td>0.61</td>
<td>0.61</td>
<td>0.45</td>
<td>0.48</td>
<td>-0.44</td>
<td>0.06</td>
</tr>
</tbody>
</table>

**Weightings attributed to balances in the different composite indicators**

<table>
<thead>
<tr>
<th></th>
<th>Past activity</th>
<th>Personal production expectations</th>
<th>General production expectations</th>
<th>Order books</th>
<th>Export order books</th>
<th>Stocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple average</td>
<td>0.167</td>
<td>0.167</td>
<td>0.167</td>
<td>0.167</td>
<td>0.167</td>
<td>0.167</td>
</tr>
<tr>
<td>Principle component analysis</td>
<td>0.177</td>
<td>0.175</td>
<td>0.167</td>
<td>0.175</td>
<td>0.169</td>
<td>0.137</td>
</tr>
<tr>
<td>Static factor analysis</td>
<td>0.221</td>
<td>0.155</td>
<td>0.092</td>
<td>0.298</td>
<td>0.198</td>
<td>0.035</td>
</tr>
</tbody>
</table>
The three composite indicators
The way we build composite indicators in INSEE

- First step: the construction of the indicator
  - Standardisation of the balances $B_i$ to a mean of 0 and a standard deviation of 1
  - Estimation of the composite indicator $F$
    - $B_i = \lambda_i \times F + n_i$, $\lambda_i$ is called the loading of the balance $B_i$
    - $F = \sum_i w_i \times B_i$, $w_i$ is the weighting of the balance $B_i$
  - Standardisation of the composite indicator to a mean of 100 and a standard deviation of 10
The way we build composite indicators in INSEE

- Second step: how to assess the quality of the indicator?
  - The relevance of the balance $B_i$ in the composite indicator $F$
    $$\lambda_i = \frac{\text{covariance}(B_i, F)}{\text{variance}(F)}$$
    - The loading can be interpreted as the contribution of the balance to the variability of the composite indicator
  - The efficiency of the composite indicator $F$
    $$\text{Efficiency} = \frac{1}{I} \times \sum_{i=1}^{I} \lambda_i^2$$
  - The ability of the composite indicator to give a good idea of the main short-term economic movements
    - Correlation of the composite indicator with a reference variable
The composite indicator gives an additional information to the specific information of the balances.
Thank you for your attention!