Nowcasting GCC Quarterly GDP

(preliminary work)

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CCS-UN Technical Workshop on Nowcasting in International Organizations
03 - 04 February 2020
Geneva, Switzerland
Outline

• About GCC-Stat
• Why nowcasting?
• Data: timeliness and predictors
• Estimation techniques and evaluation
• Results and discussion
• Conclusions
About GCC-Stat

• The Statistical Centre for the Cooperation Council for the Arab Countries of the Gulf (GCC-Stat) headquartered in Muscat, stated in 2013
  • the only official source of statistics for the GCC block.

• Key strategic objectives
  • Project the GCC region as a fully integrated economic and social agglomeration.
  • Support the functioning of GCC’s Common Market and Customs Union.
  • Aims to achieve coherence, integration and coordination on statistical work in the Gulf region
  • Implement international standards and classifications in GCC statistics
About GCC-Stat

GCC Ministerial Council

Board of Directors

UAE
- FCSA

Saudi Arabia
- CDSI

Qatar
- MPS

Bahrain
- CIO

Orman
- NCSI

Kuwait
- CSB

Central Bank & Ministries

Standing Committee on Population & Social Statistics
Standing Committee on Economic Statistics
Standing Committee on Standards, Classifications, Methodologies & Data Quality
Standing Committee on Geographical, Environment, Energy & Tourism Statistics
Standing Committee on Development, Progress & Sustainability Indicators
Standing Committee of Heads of IT
About GCC-Stat

For each, we have:

- objectives over the next five years
- how the datasets will evolve over time
- their frequency and timeliness
- statistical standards to be followed
- role of GCC-Stat in developing the statistics in that field

More details:
http://www.gccstat.org
Why nowcasting?

• Monitor current state of economy in a timely manner
• Provide inputs for policy making and evaluations (customs union, common market, etc.)
• Overcome considerable publication delays in reporting QGDP in GCC region
• Quarterly estimates of GDP can then be used to nowcast/forecast annual GDP
• Hardly no previous nowcasting attempts for the GCC countries/region
Why nowcasting?

Quarterly GDP growth (YoY)

-0.08
-0.04
0.00
0.04
0.08
0.12

I II III IV I II III IV I II III IV I II III IV I II III IV I II III IV I II III IV

D4QGDP_BAH
D4QGDP_GCC
D4QGDP_KSA
D4QGDP_KWT
D4QGDP_OMN
D4QGDP_QTR
D4QGDP_UAE
Why nowcasting?

Quarterly non-oil GDP growth (YoY)
## Data: timeliness

### Table 1: Quarterly GDP in GCC Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Available time series</th>
<th>Publication lag</th>
<th>Compilation Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahrain</td>
<td>2010Q1 – 2019Q2</td>
<td>+90 days</td>
<td>production method <em>(current and constant prices)</em> <em>(2010 = 100)</em></td>
</tr>
<tr>
<td>Kuwait</td>
<td>2010Q1 – 2019Q2</td>
<td>+90 days</td>
<td>production method <em>(current and constant prices)</em> <em>(2010 = 100))</em></td>
</tr>
<tr>
<td>Oman</td>
<td>2010Q1 – 2019Q2</td>
<td>+105 days</td>
<td>production method <em>(current prices)</em></td>
</tr>
<tr>
<td>Qatar</td>
<td>2011Q1 – 2019Q2</td>
<td>+90 days</td>
<td>production method <em>(current and constant prices)</em> <em>(2013 = 100))</em> + GDP by expenditure method <em>(current prices)</em></td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>2010Q1 – 2019Q2</td>
<td>+90 days</td>
<td>production method <em>(current and constant prices)</em> <em>(2010 = 100))</em> + Gross domestic product by expenditure method <em>(current and constant prices)</em> <em>(2010 = 100)</em></td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>2012Q1 – 2019Q2</td>
<td>+90 days</td>
<td>production method <em>(current and constant prices)</em> <em>(2013 = 100))</em> + GDP by expenditure method <em>(current prices)</em></td>
</tr>
</tbody>
</table>
Data: possible predictors

**Production and Expenditures**
- No monthly IPI, Service Index, or Retail Sales / other indicators published with long lags
- Oil production / monthly imports financed by banks

**Local goods prices**
- CPI / PPI

**Financial and monetary**
- Monetary aggregates / bank credit / Interest rates / Exchange rates / Stock prices

**Global activity**
- Oil prices / commodity prices / uncertainty index / MCSI_World / US_IPI / OECD LCI

**Soft data (surveys)**
- No monthly confidence indicators
- Only quarterly for few countries

**Labor data**
- No monthly labor statistics
- Only quarterly, published with long lags
Estimation Strategy

• Nowcasting preliminary estimates of quarterly GDP using most recent monthly indicators that measure economic activity

• We take the growth rate over 4 quarters to eliminate the seasonality within the data

• Compare two mixed frequency approaches: Mixed-Data Sampling (MIDAS); and dynamic factor, and also discuss the usefulness of forecast combination.

• Monthly predictors would be available within 5-6 weeks after the last day of the reference quarter (3-4 weeks before the official QGDP is released)
  • We could nowcast GDP well before, either by smoothing missing data or by simply leaving the data with later publication dates out of the sample.

• Prepare a nowcast for each country, then combine the nowcasts for the GCC block using GDP weights
The Models

• **MIDAS: Mixed Data Sampling**

  • **directly estimates the current quarter using a lag structure**, Ghysels, Santa-Clara, and Valkanov (2004); Clements and Galvão (2008).

  • **Parsimonious and works for ragged-edge data structure**

\[
    y_t = \alpha + \sum_{i=1}^{k} \sum_{j=0}^{l_i} \beta_{i,j} x_{i,3t-j}^M + \epsilon_t
\]

• \(y_t\) denotes a GDP growth in quarter \(t\).
• \(x_{i,3t-j}^M\) denotes a monthly economic indicator \(i\) in \(3t-j\)th month.
• \(k\) stands for the number of indicators, and \(l\) denotes the number of lags for the indicator \(i\) in terms of month \(j\)
The Models

- **DFM: Dynamic Factor Model**

- Dynamic factor models summarize the information contained in the monthly dataset using a limited number of factors
  - Factors are specified as vector autoregressive processes.
- Kalman filter generates estimates of the unobserved monthly factors (Stock and Watson (2002a, 2002b))

\[
\begin{align*}
  x_t &= \mu + \Lambda f_t + \varepsilon_t, \\
  f_t &= A_1 f_{t-1} + \cdots + A_p f_{t-p} + u_t, \quad u_t \sim i.i.d. N(0, Q) \\
  \varepsilon_{i,t} &= \alpha_i \varepsilon_{i,t-1} + e_{i,t}, \quad e_{i,t} \sim i.i.d. N(0, \sigma_i^2)
\end{align*}
\]

- \( x_t \) is a vector of observed monthly indicators
- \( f_t \) is a vector of (unobserved) common factors
- \( \varepsilon_t \) is a vector of idiosyncratic components
- \( \Lambda \) denotes the factor loadings for the monthly variables.
Forecast Evaluation

• We split the sample in two parts and use data starting from 2017Q1 for the out-of-sample analysis

• Out-of-sample forecasts are obtained as follows. We first estimate the various models from 2010Q1 to 2016Q4 and obtain forecasts for 2017Q1.

• We then expand the estimation window forward by one quarter (as more information become available), re-estimate the models and calculate forecasts for 2017Q2.

• We compare forecast performances of different models using the root mean square forecast error (RMSFE)
Results

GCC quarterly GDP growth rate (YoY): Actual and various nowcasts

![Graph showing GCC quarterly GDP growth rate (YoY): Actual and various nowcasts](image-url)
Results

GCC Quarterly non-oil GDP growth (YoY): Actual and various nowcasts
Results

Table 3: Quarterly GDP Forecast performance of all models measured by RMSFE for the out-of-sample (2017Q1 – 2019Q1)

<table>
<thead>
<tr>
<th></th>
<th>Benchmark</th>
<th>Pooling Nowcasts</th>
<th>Pooling Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AR</td>
<td>MIDAS</td>
<td>MIDAS_AR</td>
</tr>
<tr>
<td>Bahrain</td>
<td>1.00</td>
<td>1.25</td>
<td>1.30</td>
</tr>
<tr>
<td>Kuwait</td>
<td>1.00</td>
<td>1.40</td>
<td>1.55</td>
</tr>
<tr>
<td>Oman</td>
<td>1.00</td>
<td>1.65</td>
<td>1.40</td>
</tr>
<tr>
<td>Qatar</td>
<td>1.00</td>
<td>1.55</td>
<td>1.38</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>1.00</td>
<td>1.18</td>
<td>1.06</td>
</tr>
<tr>
<td>UAE</td>
<td>1.00</td>
<td>1.22</td>
<td>1.15</td>
</tr>
<tr>
<td>GCC</td>
<td>1.00</td>
<td>1.30</td>
<td>1.12</td>
</tr>
</tbody>
</table>
Discussion

• Superior nowcasts using YoY growth compared to QoQ growth
• DFM and MIDAS give less accurate predication compared to other economies
  • Lack of timely economic activity measures
• findings suggest that mixed frequency models record out-of-sample performance when augmented to AR model. Also, there is a gain from combining model nowcasts
  • large body of literature that suggests that forecast combinations can provide more accurate forecasts by combining multiple models rather than relying on a specific model (see Hendry and Clements, 2004; and Timmermann, 2006)
Conclusions

• This paper presents a QGDP nowcasting exercise in a limited-data environment.

• Incorporation of monthly information in nowcasting procedures pays off partially in terms of forecasting accuracy
  • Underscore the importance of publishing high frequency leading indicators in GCC region

• Models proposed should be regularly reviewed and updated

• Future steps: nowcast other components of National Accounts
Thank you

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