Survey-based measure of output gap for Portugal

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29th March 2016

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Overview

- Introductory Note
- Results
- Conclusions
What is the Output Gap?

The Output Gap is an unobserved variable

Output Gap = GDP_{Actual} - GDP_{Potential}

- **Output Gap > 0**: Observed output is more than full-capacity output.
- **Output Gap < 0**: Actual output is less than what an economy could produce at full capacity.
Output Gap

Alternative approaches to assess slack in the economy:

- Simple statistical filters
- Production function based methods
- Unobserved component model (Phillips Curve and Okun Law)
- Survey based measures
"Insufficient Demand Limiting Production"

"Aggregate survey Indicator"

Source: Author’s Calculations.

Source: Author’s Calculations.
The Survey-based measure of slack

The model to estimate slack is a fairly simple unobserved component model

Estimated with maximum likelihood

\[ y_t = \tilde{y}_t + \hat{y}_t \]  
(1)

\[ d\tilde{y}_t = d\tilde{y}_{t-1} + \varepsilon_t \]  
(2)

\[ \hat{y}_t = \beta_0 + \beta_1 \times \text{DLP}_t + \beta_2 \times \text{DLP}_t + \beta_3 \times \text{DLP}_t + \mu_t \]  
(3)
Results

OUTPUT GAP = β₀ + β₁.break1 × DLPₜ + β₂.break2 × DLPₜ + β₃.break3 × DLPₜ µₜ

- DLP = Aggregate survey-based measure indicator
- Break1, Break2 and Break3 = Dummies variables
  - Break1 = 1 between 1995Q1 and 2001Q1 (Industry)
  - Break2 = 1 between 2001Q2 and 2008Q1 (Services)
  - Break3 = 1 between 2008Q2 and 2015Q4 (Construction)

Table 1 – Estimation Results

<table>
<thead>
<tr>
<th>Sample: 1995Q1 2015Q4</th>
<th>Coefficient</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>β₀</td>
<td>4.923</td>
<td>0.000</td>
</tr>
<tr>
<td>β₁</td>
<td>29.531</td>
<td>0.030</td>
</tr>
<tr>
<td>β₂</td>
<td>92.722</td>
<td>0.000</td>
</tr>
<tr>
<td>β₃</td>
<td>100.713</td>
<td>0.000</td>
</tr>
<tr>
<td>Akaike info criterion</td>
<td>16.011</td>
<td></td>
</tr>
<tr>
<td>Schwarz criterion</td>
<td>16.127</td>
<td></td>
</tr>
<tr>
<td>Hannan-Quinn criter.</td>
<td>16.058</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author’s Calculations.
"Insufficient Demand Limiting Production"

Source: Author’s Calculations.

"Aggregate survey Indicator"

Source: Author’s Calculations.
Results

OUTPUT GAP = \( \beta_0 + \beta_1 \cdot \text{break1} \times \text{DLP}_t + \beta_2 \cdot \text{break2} \times \text{DLP}_t + \mu_t \)

- DLP = Aggregate survey-based measure indicator
- Break1 and Break2 = Dummies variables
  - Break1 = 1 between 1995Q1 and 1997Q2
  - Break2 = 1 between 1997Q3 and 2015Q4

<table>
<thead>
<tr>
<th>Sample: 1995Q1 2015Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
</tr>
<tr>
<td>( \beta_0 )</td>
</tr>
<tr>
<td>( \beta_1 )</td>
</tr>
<tr>
<td>( \beta_2 )</td>
</tr>
</tbody>
</table>

- Akaike info criterion: 15.936
- Schwarz criterion: 16.022
- Hannan-Quinn criter.: 15.970

Source: Author’s Calculations.
The slack through time...

**Graph 5 – Survey-based measure of slack**

- **Minimum:** -5.22 in December 2012  
  (Actual output is less than what an economy could produce at full capacity)

- **Maximum:** 2.58 in December 2007  
  (Economy more significantly overheated)

Source: Author’s Calculations.
These results suggest...

The survey-based measure is reliable: it is in line with estimations of the main international organisations.

**Graph 6 – Estimates of output gap in 2015 (p.p)**

- Follow more or less the same path, with some being more volatile than other.
- There are, however, differences in the magnitude of slack, in recent years.

**Source:** European Commission, IMF, OECD, Author’s Calculations.
These results suggest...

Graph 7 – Absolute Revisions to real-time estimates of slack (p.p)

Source: OECD, IMF, European Commission, Author’s Calculations.
These results suggest…

Graph 8 – Absolute Revisions to real-time estimates of slack (p.p)

**Source:** Author’s Calculations.
These results suggest...

Graph 9 – Absolute revisions to nearly real-time estimates of slack (p.p)

Source: OECD, IMF, European Commission, Author’s Calculations.
These results suggest...

**Graph 10 – Potential Output**

Source: Author’s Calculations.
Table 3 – Comparison of results: Revisions to real-time estimates of Slack (p.p)

<table>
<thead>
<tr>
<th></th>
<th>OECD</th>
<th>IMF</th>
<th>European Commission</th>
<th>HP Filter</th>
<th>Survey-based measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without backward calculation</td>
<td>2.6</td>
<td>1.5</td>
<td>0.9</td>
<td>1.6</td>
<td>0.7</td>
</tr>
<tr>
<td>With backward calculation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.6</td>
</tr>
</tbody>
</table>

Source: OECD, IMF, European Commission, Author’s Calculations.
Conclusions

1. Aggregate survey indicator
   - Provide a representative measure of total economic slack.

2. Estimates of output gap
   - The reliability of survey-based measure of output gap is in line with estimations of the main international organisations.

3. Revisions: Survey-based estimates of slack
   - Revealed robust stability properties when considering revisions in the estimations of main international institutions (OECD, IMF and European Commission);
     - In real-time and nearly real-time estimations survey-based approach had the lower revisions.
Thank you for your attention!

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