How synchronized is Estonia with the euro area?

Small country challenges of joining the EMU

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Historical background

• 1991 – Estonia regained independence

• 1992 – Currency board adopted, pegged to GM

• 1999 – Currency board pegged to euro

• May 1, 2004 – Accession to the EU

• July 1, 2004 – Joining the ERM II
  (same parity since then)
Tradeoffs of adopting euro – based on OCA

Benefits

- Eliminating exchange rate uncertainty
  - (important given Estonia’s the high share of loans in foreign currency – below)
- Raising price transparency and competition
- Encouraging trade and FDI (particularly important for SOE such as Estonia)
- Strengthening further credibility of monetary policy
- Fostering integration of financial markets
Tradeoffs of adopting euro – based on OCA (cont.)

Cost – In Estonia’s case, most of them were already incurred

- Loss of independent monetary and exchange rate policy –
  - high degree of business cycle synchronization minimizes the need for countercyclical monetary policy
  - This cost was *largely* incurred with the adoption of the currency board in 1992
  - In the Estonia case the cost was low, given the limited human resources as well as lack of experience with macroeconomic management in the early 1990s
  - If not sufficiently synchronized with the euro area, an economy needs to exhibit flexibility (below)
Crisis has increased Estonia’s ER risks and hence benefits of euro adoption.
Crisis increased Estonia’s benefits of euro adoption
(cont.)

Estonia: Loans to deposits ratios (in %)

Source: Bank of Estonia.
Crisis increased Estonia’s benefits of euro adoption

Estonia: Share of loans and deposits in foreign currency (%)

Source: Bank of Estonia.
Crisis increased Estonia’s benefits of euro adoption

European Emerging Market Economies

Source: IMF.
Evidence from the existing empirical literature

• Literature on correlation of business cycles and synchronization of shocks in the new EU members

• Empirical methods
  
  – Correlations of aggregate output, inflation; use of filters
  
  – Structural VAR (most prevalent)
  
  – Other (dynamic factor models)
Evidence from the empirical literature (cont.)

• *The following conclusions emerged:*

  • Shocks of the new EU countries (incl. Estonia) are less synchronized with the euro area than shocks of most of the EU-15 countries (Fidrmuc and Korhonen, 2003);

  • Estonia’s shock synchronization may be comparable to the smaller EMU countries (Eickmeier and Breitung, 2005; Fidrmuc and Korhonen, 2006);

  • In some countries (incl. Estonia) synchronization of shocks increased over time (Babetskii, 2005).
Evidence from the empirical literature (cont.)

Recent research on the Baltic countries

- (1) Fadejeva and Melihovs (2008) –
  - Use dynamic factor model to extract joint fluctuations (common factors) in growth of real GDP of the Baltics and the euro area
  - Find that after 2000 real GDP growth of the Baltics became more synchronized with that of the main euro area countries

- (2) Obiora (2009) -- Utilizing VAR models, the author shows that
  - There are significant spillovers to the Baltics from the EU; these outweigh spillovers from Russia
  - Financial and trade channels dominate the transmission
Estonia’s structural similarity with the euro area

Structural similarity measured by value added

Figure 1. Bray-Curtis Structural Similarity Index, 1996-2006

Source: OECD database and authors’ calculations
Structural similarity with the euro area
Measured by valued added (cont.)

- Bray-Curtis index of structural similarity

\[
d = \sum_i \left| \frac{x_{iEST} - x_{iEUR}}{x_{iEST} + x_{iEUR}} \right|
\]

- Where \( x_{iEST} \) is the share of good \( i \) in total Estonia’s value added.

- Index takes on values between [0,1]; lower value indicates greater structural similarity between the two areas.

- Estonia’s index is relatively low and lower than that of the Czech Republic, but higher than number of the euro area countries.
Estonia’s structural similarity with the euro area

Structural similarity measured by Intra-Industry trade

<table>
<thead>
<tr>
<th>Measure of intensity of trade with the euro area</th>
<th>Table 1. Exports to advanced EU countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estonia</td>
<td>51.2</td>
</tr>
<tr>
<td>Latvia</td>
<td>39.4</td>
</tr>
<tr>
<td>Lithuania</td>
<td>37.2</td>
</tr>
</tbody>
</table>

Estonia’s structural similarity with the euro area
Measured by intra-industry trade (cont.)

Grubbel Loyd Index of intra-industry trade in industry $j$:

$$C_j = 100 - \frac{\sum_{i} \left| X_{ij} - M_{ij} \right|}{\sum_{i} (X_{ij} + M_{ij})} \times 100$$

- Where $j$ denotes industry, $i$ denotes sub-group within the industry, $X$ is exports and $M$ is imports.

- 100 indicates all trade is intra-industry, 0 indicates none is intra-industry.
Estonia’s structural similarity with the euro area
Measured by intra-industry trade (cont.)

Using 4-digit SITC breakdown, Estonia’s intra-industry trade with the euro area 12 countries amounted to less than 30 percent in 2007.

Table 2. Intra-Trade with the Euro Area – 12 (in percent)

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2005</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>All goods</td>
<td>26</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>Chemicals</td>
<td>7</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Manufactured goods</td>
<td>21</td>
<td>24</td>
<td>29</td>
</tr>
<tr>
<td>Machines, transport eq.</td>
<td>37</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>Food</td>
<td>10</td>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: Authors' calculations.
Correlation of economic activity with the Euro area

Source: OECD database and authors’ calculations.
Do Euro Area Shocks Play a Substantial Role in Estonia’s Output Fluctuations? – Choleski Decomposition

- Structural shocks to output are decomposed into global, regional and country-specific

- Relative shares of these shocks in Estonia’s output fluctuations are examined

- **Global shocks** -- affect all countries, i.e. are due to global events (oil price shock; changes in international interest rates)

- **Regional shocks** -- affect output in the Euro area; due to common regional events (EU enlargement or ECB change of interest rate)

- **Estonia-specific shocks** -- affect output in Estonia (changes in TOT, productivity shocks; changes in macropolicy)
Do Euro Area Shocks Play a Substantial Role in Estonia’s Output Fluctuations? – Choleski Decomposition (cont.)

- Data – (global=OECD; regional = euro)

- Quarterly, seasonally adjusted data for 1997Q2 to 2008Q3; from the OECD and Eurostat databases.

- Real GDP measured by the first difference of natural logarithms of quarterly real GDP

- Percentage of output variation; after 20 horizon periods

- In Estonia, domestic shocks accounted for majority of the GDP growth volatility (transition; Russian crisis; low share of intra-industry trade)
**Table 3. Variance decomposition of output growth**

<table>
<thead>
<tr>
<th></th>
<th>OECD</th>
<th>Scandinavia-Baltic area</th>
<th>Estonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estonia</td>
<td>16.0</td>
<td>15.8</td>
<td>68.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>OECD</th>
<th>Euro area</th>
<th>Estonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estonia</td>
<td>14.6</td>
<td>4.6</td>
<td>80.8</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th></th>
<th>OECD</th>
<th>Euro area</th>
<th>Finland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland</td>
<td>43.3</td>
<td>6.9</td>
<td>49.7</td>
</tr>
</tbody>
</table>
The Nature and Symmetry of Shocks in Estonia and the Euro Area

• A bivariate structural VAR model is applied to recover the underlying demand and supply shocks

• The degree of their correlation with the euro area shocks determined

• The structural VAR model consists of two variables – output growth and change in CPI inflation

• Real quarterly GDP (in log-difference form) and quarterly CPI inflation (in log-difference form) represent output and inflation
• 1. The underlying framework (AD-AS)

- **AS:**
  \[ y_t^S = E_{t-1} y_t + \alpha (\pi_t - E_{t-1} \pi_t) + \varepsilon_t^S \]

- **AD:**
  \[ y_t^D + \pi_t = E_{t-1} (y_t^D + \pi_t) + \varepsilon_t^D \]

- **Equilibrium:**
  \[ y_t = y_t^S = y_t^D \]
The Nature and Symmetry of Shocks in Estonia and the Euro Area (cont.)

- **Supply shocks** -- influence cost of inputs (oil prices, interest rates, changes in technology, and permanent changes to the labour force)

- **Demand shocks** -- (i) *real shocks* such as changes in consumer confidence or in government spending, and (ii) *nominal shocks* such as changes in expected inflation or monetary policy (interest rates)

- **Identification** *(Bayoumi and Eichengreen, 1993)*

  - Both shocks – supply and demand -- may have **short run effects** on output and inflation.
  - Supply shocks have permanent effect on both output and inflation.
  - Demand shocks have permanent effect on inflation, but do not have permanent effect on output.
The Nature and Symmetry of Shocks in Estonia and the Euro Area (cont.)

Table 4. Predicted responses from AD-AS framework (ex-post check)

<table>
<thead>
<tr>
<th></th>
<th>SR</th>
<th>LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output response to positive</td>
<td>AS</td>
<td>positive</td>
</tr>
<tr>
<td></td>
<td>AD</td>
<td>positive</td>
</tr>
<tr>
<td>Inflation response to positive</td>
<td>AS</td>
<td>negative</td>
</tr>
<tr>
<td></td>
<td>AD</td>
<td>positive</td>
</tr>
</tbody>
</table>
Symmetry of Shocks in Estonia and the Euro Area (cont.)

Results — Variance decomposition was carried out on real GDP and inflation data (Q2 1997 - Q3 2008), to identify contributions of supply and demand shocks to fluctuations in real output and inflation.

The supply shocks (including the real interest rate) accounted for majority of the real output variability, while the demand shocks accounted for majority of the variability in inflation.

Verification of results — impulse responses

(i) In LR, the supply shock has a permanent impact on the real GDP.

(ii) The impulse response of inflation to positive demand shock is positive as predicted.

(iii) The positive response of inflation to positive supply shock due to accommodating demand management (procyclical fiscal policies)
Symmetry of Shocks in Estonia and the Euro Area (cont.)

Table 5. Shocks recovered from SVARs of quarterly growth of real GDP and the GDP deflator

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Demand</td>
<td>Supply</td>
<td>Demand</td>
</tr>
<tr>
<td>Estonia</td>
<td>-0.20</td>
<td>0.31</td>
<td>-0.50</td>
</tr>
<tr>
<td>Finland</td>
<td>0.11</td>
<td>0.13</td>
<td>0.22</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.03</td>
<td>0.32</td>
<td>-0.07</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>-0.25</td>
<td>0.18</td>
<td>-0.50</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.27</td>
<td>0.30</td>
<td>0.22</td>
</tr>
</tbody>
</table>
Symmetry of Shocks in Estonia and the Euro Area (cont.)

Demand Shocks: Estonia and the Euro Area, 1997 - 2008

The graph presents demand shocks in Estonia (EST) and the Euro Area (EUR) from 1997 to 2008. The x-axis represents the quarters from 1997Q1 to 2008Q4, while the y-axis measures the shock intensity ranging from -4 to 3. The data shows fluctuations in shock intensity over time, with both regions experiencing varying degrees of demand shocks during the specified period.
Symmetry of Shocks in Estonia and the Euro Area (cont.)

Supply shocks: Estonia and the Euro area, 1997 - 2008
Symmetry of Shocks in Estonia and the Euro Area (cont.)

Synchronization of Estonia’s shocks with those of the Euro area is low, but comparable to other smaller EMU members.

The shocks of Estonia and of the Euro area have become somewhat more synchronized over time.

Asymmetry underscores the importance of other adjustment mechanisms, such as labor market flexibility; countercyclical fiscal policies; financial markets integration (risk sharing).
Possible sources of divergence -- CAD

CAD 2001 - 2008 and Real GDP growth (2009 for.)

real GDP growth (%)
Possible sources of divergence -- FP

Fiscal balance, 2003-07 (% of GDP)
Possible sources of divergence – FP
Correlations of the cyclical components of real gov. consumption and real GDP
0 to ±1 indicating increasing positive/negative correlation
Adjustment mechanisms – how flexible are labor markets?

Employment protection – before the Dec 2008 reform
Index of 0 to 6 from least to most restrictive legislation

[Graph showing index values for different countries, with OECD average indicated.]
Conclusions – some policy recommendations

• Gradually phase out pro-cyclical FP

• Increase flexibility of LMs
  – Along the lines of the recently approved Employment Contract Law, which deregulated EPL
    • After reforms, Estonia’s EPL comparable to the CEE countries
  – Wage policies (min. wage, public sector wage setting)