Using business and consumer survey results for flash estimates in Slovakia (An econometric approach)

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Motivation

Business and consumer survey (BCS) data

• are **frequently used** for short-term economic analysis
• provide **early information** about recent developments in the economy
• provide a picture of **in which direction is the economy moving** and helps to detect turning points in the development of the economy
• are useful, besides predicting troughs or peaks in the economic cycle, also as **explanatory variables** of GDP and its components
Flash estimates

• flash estimates of aggregate economic indicators provide a first picture about direction of the economy
• Eurostat releases first estimate of GDP for the whole EU and individual countries at t+45 days after the end of the reference quarter
• in SR the research in the creation and the use of modelling tools for flash estimates is, since 2004, in the competence of Institute of Informatics and Statistics (INFOSTAT), which is a research institute of the SO SR
• soft data are complementary information to quantitative data and both are used to construct forecasts and flash estimates of GDP and its components
Methodology for flash estimates

- for construction of a model framework for flash estimates of GDP, its major components, deflators, and total employment we use so-called bridge equations based on Error Correction Models (ECM) and cointegration principles
- we use the Engle-Granger algorithm consisting of two steps (Engle, Granger, 1987):
  1. we estimate the long-term equilibrium relation between the non-stationary variables: \[ Y_t = a + b \times X_t + u_t \]
  2. the econometric model in the form of ECM is estimated using the time series of residuals (delayed by one period) resulting from the long-term equilibrium relationship: \[ \Delta Y_t = c \Delta X_t - \lambda \times u_{t-1} + e_t \]

\( Y_t \) – dependent variable, \( X_t \) – independent variable, \( u_t \) and \( e_t \) are random variables with attributes of white noise, parameter \( \lambda \) of the so-called error correction term is the adjustment effect and shows how much of disequilibrium from the previous period is being corrected in this period.
Modelling of household consumption

- Economic theory in general suggests as key determinants of household consumption factors such as income, wealth, interest rates, or taxes (e.g. in Mankiw, 2010; Dornbusch, 2011)
- Household consumption depends not only on economic conditions, but also on consumer’s mood and their subjective conditions
- Already Keynes (1936) explains that consumer and investor sentiment might influence the real economy - “animal spirit” drives economic activity
- Some of the first publications reflecting this issue belong to Katona (1951, 1960, and 1975); he summarized that consumption depends not just on consumer ability, but also on her or his willingness to buy
- From more recent works that support usefulness of BCS we would like to mention Ludvigson (2004), according to him the consumer confidence indicator has a strong predictive power for the growth in consumption expenditures
Modelling of household consumption

- two econometric model relationships that use as explanatory variables **Consumer confidence indicator**, as well as a component of Retail trade confidence indicator – **Indicator of expected prices in retail trade** to explain the final consumption of households
- both indicators seem to have ability to answer questions about future development of household consumption, because they follow consumer confidence on one hand (the consumer’s financial situation and their intentions, especially the propensity to purchase or savings and expectations about the purchases) and the expectations of retailers on the other hand
- parameters of model relationships were estimated by OLS on the basis of quarterly time series for the period 2000Q1-2015Q1, i.e. for 61 quarterly observations
- the long-term equilibrium models are in a log-linear form (using logarithms instead of actual values means that estimated parameters represent long-term elasticities
- the short term models explain quarter on quarter (qoq) relative changes of the dependent variable
The list of variables

- **C00** - consumption of households at constant chained-linked prices 2010
- **CCI** – consumer confidence indicator
- **EXPR** – indicator of expected prices in retail trade
- **LD10** – employment in 10 subsectors of private sector
- **LDP** – employment in public sector
- **LD11 = LD10+LDP**
- **W10** – average nominal wage in 10 subsectors of private sector
- **WP** – average nominal monthly wage in public sector
- **W11** - average nominal monthly wage in private and public sectors
- **LD_REST** – total employment in ILO methodology minus the employment in eleven sectors (LD11)
- **LU** – number of unemployed persons in ILO methodology
- **CPI2000** – consumer price index, base year 2000
- **RTAXD** – goods and services general budget revenues
- **IM_F** – import of food
Model 1

- ADF test suggest that almost all the variables are integrated of first order - I(1); Johansen cointegration test 4-5 cointegration vectors

**Short-term relationship:**

\[
d\log(C00) = 0.2645 \times d\log \left( \frac{LD11 \times W11}{CPI2000} \right) + 0.1022 \times d\log \left( \frac{LD_{REST} \times W10}{CPI2000} \right) - 0.1228 \times d\log(LU) \\
+ 0.0801 \times d\log(CCI) - 0.3337 \times RESIDC00_{t-1} - 0.0112 \times d(SD2)
\]

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<tbody>
<tr>
<td>dlog(LD11*W11/CPI2000)</td>
<td>5.1151</td>
<td>0.0000</td>
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<tr>
<td>dlog(LD_REST*W10/CPI2000)</td>
<td>2.7591</td>
<td>0.0079</td>
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<tr>
<td>dlog(LU)</td>
<td>-1.9851</td>
<td>0.0522</td>
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<td>dlog(CCI)</td>
<td>2.0558</td>
<td>0.0446</td>
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<tr>
<td>RESIDC00_{t-1}</td>
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<td>d(SD2)</td>
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<table>
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<tr>
<th>R²</th>
<th>DW</th>
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<tr>
<td>0.7227</td>
<td>1.8527</td>
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Diagnostics of short-term relation - Statistics

- **dlog(LD11*W11/CPI2000)**: t-Statistic = 5.1151, Prob. = 0.0000
- **dlog(LD_REST*W10/CPI2000)**: t-Statistic = 2.7591, Prob. = 0.0079
- **dlog(LU)**: t-Statistic = -1.9851, Prob. = 0.0522
- **dlog(CCI)**: t-Statistic = 2.0558, Prob. = 0.0446
- **RESIDC00_{t-1}**: t-Statistic = -2.6161, Prob. = 0.0115
- **d(SD2)**: t-Statistic = -2.6150, Prob. = 0.0115

Residual, Actual, Fitted Graph
Model 2

- extended version of Model 1 as more explanatory variables (except for the number of unemployed persons) are included; DF test suggests that almost all the variables are I(1); Johansen cointegration test identifies 9 cointegration vectors in this group of variables

Short-term relationship:

\[
\text{dlog}(C00) = 0.4091 \times \text{dlog} \left( \frac{LD10 \times W10}{CPI2000} \right) + 0.1481 \times \text{dlog} \left( \frac{LD\_REST \times W10}{CPI2000} \right) + 0.0937 \times \text{dlog}(CCI_{t-1}) - 0.0637 \times \text{dlog}(EXPR) - 0.4056 \times RESIDC00_{t-1} - 0.0259 \times d(SD4)
\]

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Simulations

- static simulation for 1 quarter ahead, parameters are estimated only for the known period at the time of the forecast preparation

<table>
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<th>Household consumption</th>
<th>Model 1</th>
<th>Model 2</th>
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<td>2014q1</td>
<td>9.40</td>
<td>9.40</td>
<td>9.55</td>
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<td>2014q2</td>
<td>9.59</td>
<td>9.64</td>
<td>9.82</td>
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<td>2014q3</td>
<td>9.74</td>
<td>9.84</td>
<td>9.81</td>
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<tr>
<td>2014q4</td>
<td>9.73</td>
<td>10.21</td>
<td>10.04</td>
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<tr>
<td>2015q1</td>
<td>9.54</td>
<td>9.75</td>
<td>9.73</td>
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<tr>
<td>MAPE, %</td>
<td>1.74</td>
<td>1.96</td>
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Conclusions

• the results confirm that the BCS are a helpful source of information that can be used for short-term economic analysis
• models for flash estimates of household consumption have confirmed that consumer confidence indicator and also indicator of expected prices in retail trade are useful indicators for explaining long-term and also short-term fluctuations in household consumption in Slovakia and can be used for short-term predictions, e.g. flash estimates of household consumption
• in case of increasing consumer confidence the household consumption raises in the long run and also in the short run
• regarding the expected prices in retail, increasing prices are connected with decreasing consumption of households in the long run and also in the short run
References


Thank you for your attention

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