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Impact of trade on economic growth in the V4 countries

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Goal

- to find out whether international trade (both export and import) contributed to economic growth in the V4 countries after the fall of the communist regimes
- and to identify whether or not these countries can be regarded as examples of export-led and/or import-led growth

Contents

- 1. Economic theory
- 2. Development of trade
- 3. Econometric analysis
- 4. Conclusions

1. Economic theory

- trade contribution to ec. growth (eg. Balassa, 1978; Stancheva - Gigov and Poposka, 2014; and Tahir 2013)
 - increase long-run ability to grow via specialization and division of labour
 - improve products and technologies (eg Lucas, 1988)
 - positive impact on productivity (Alhahoj, 2007)
- numerous tested evidence about export-led growth
- import-led strategy
 - increasing competition on the inner market (eg. Pavcnik 2002)

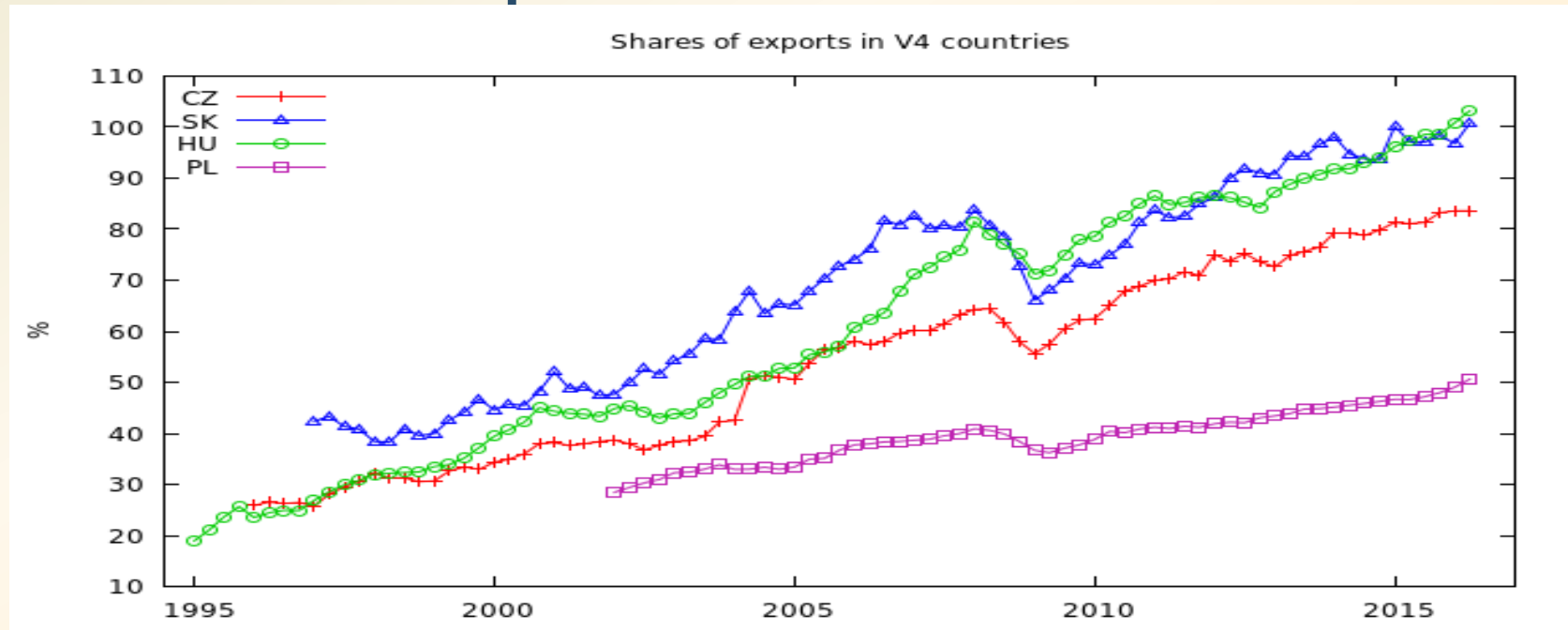
2. Development of trade

- Before 1989: closed economies, eastward orientated and planned economic trade
- After 1990: quick (brave) opening of the domestic markets to international competition, trade shifted towards western markets
- The Czech, Slovak and Hungarian economies became some of the most open in the world
- The Polish economy is less open but much larger

Development after 1989

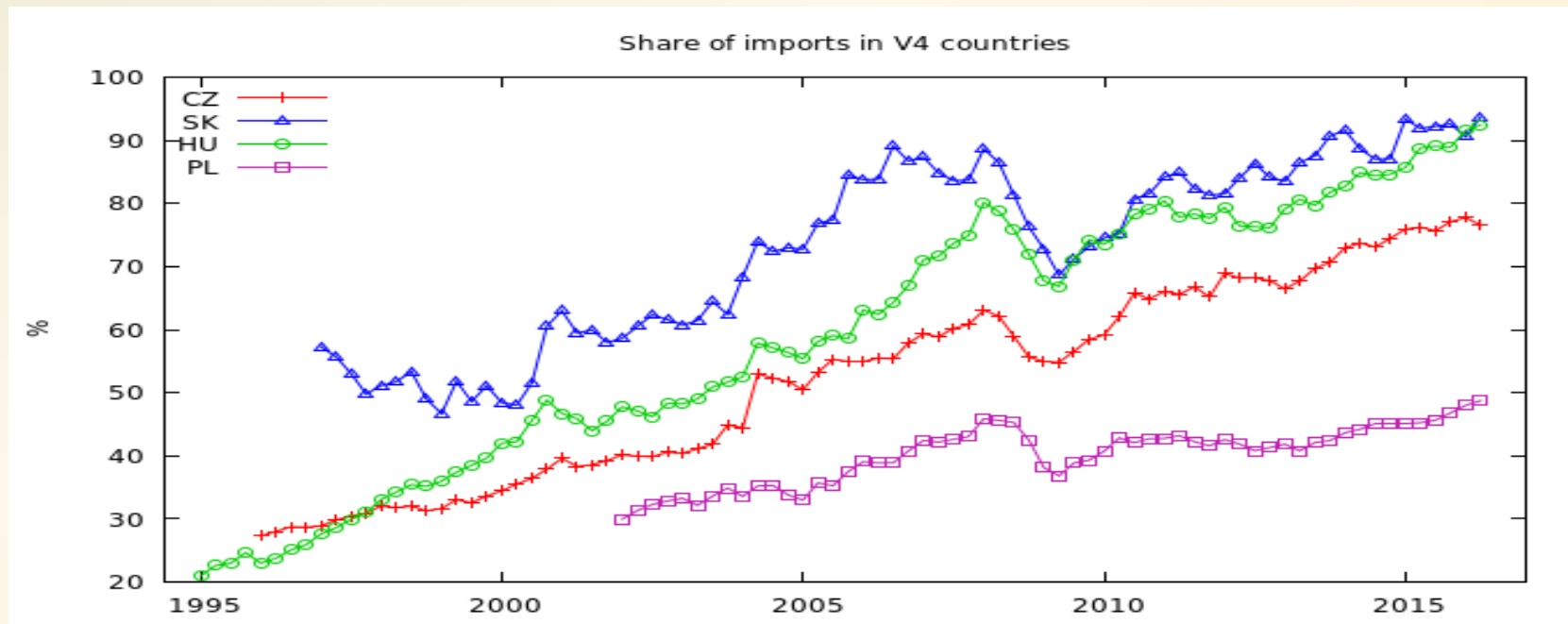
- Mostly liberal economic policy of low tariffs
 - small open economy, increase competition on the inner market
- Quick integration into world markets and orientation towards developed countries
- EU accession process played important role in the development of trade

Shares of exports on GDP



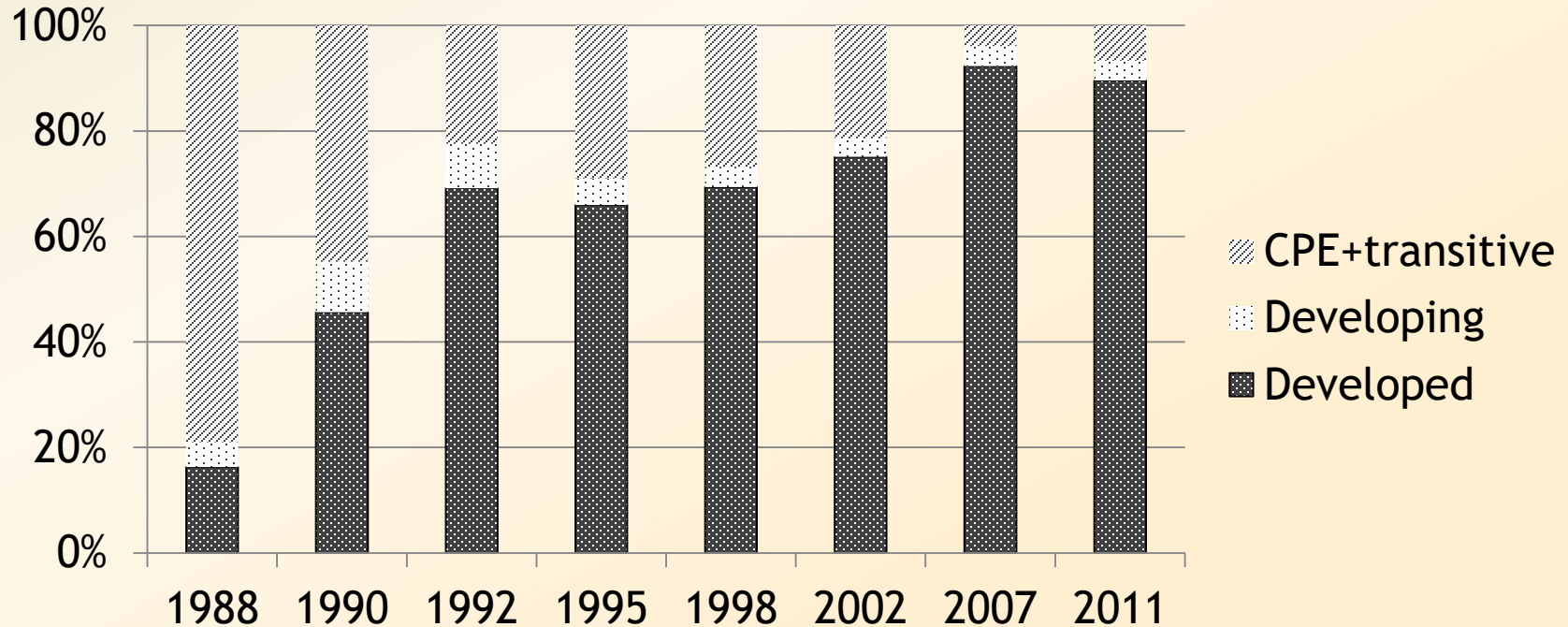
Source Eurostat + own computations

Shares of imports on GDP



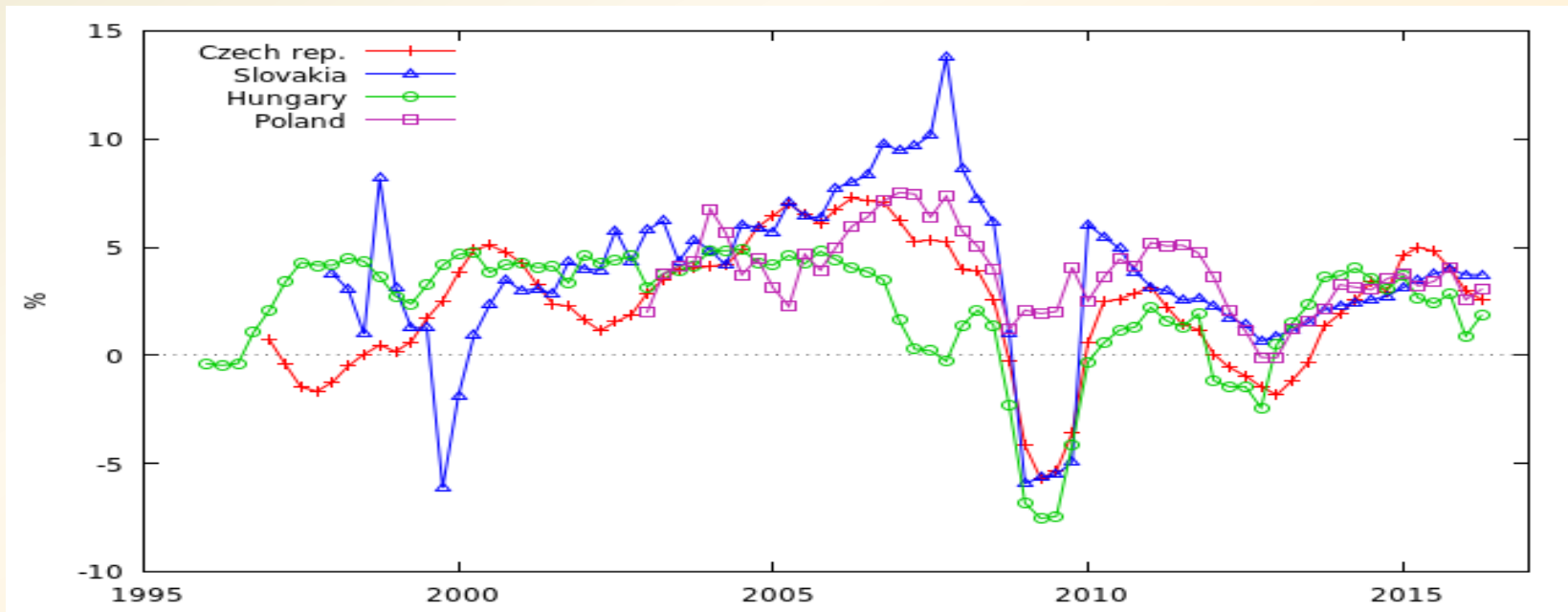
Source Eurostat + own computations

Territorial structure of exports (CZ + CS)



Economic growth in the V4

(quarterly data, in 2010 prices, year-to-year growth)



Source Eurostat + own computations

3. Econometric analysis

- Data
- Tests of stationarity
- VAR model
- Cointegration tests
- Granger causalities
- VEC model
- Results

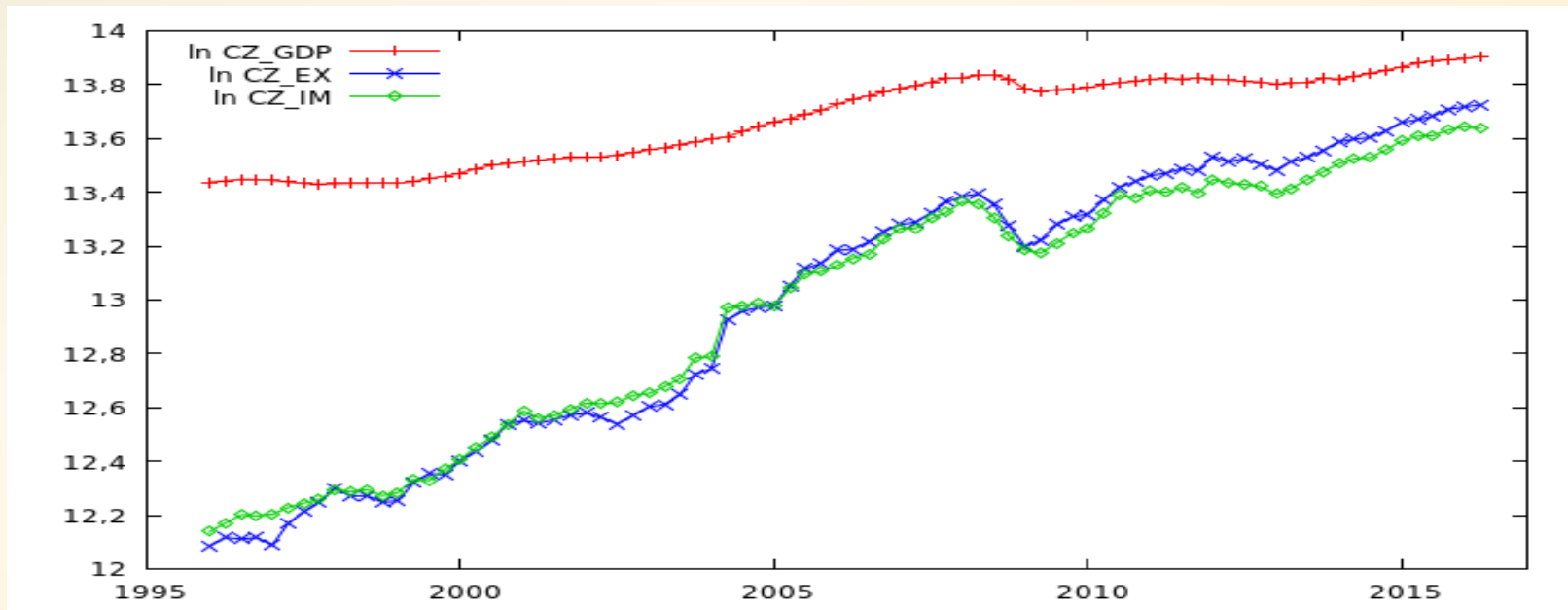
Data

- source: Eurostat
- quarterly seasonally adjusted data
- in constant prices (2010), in national currencies

| | | |
|----------------|-------------------|-----------|
| Hungary | 1995 Q1 - 2016 Q2 | (86 obs.) |
| Czech Republic | 1996 Q1 - 2016 Q2 | (82 obs.) |
| Slovakia | 1997 Q1 - 2016 Q2 | (78 obs.) |
| Poland | 2002 Q1 - 2016 Q2 | (56 obs.) |

Czech Data

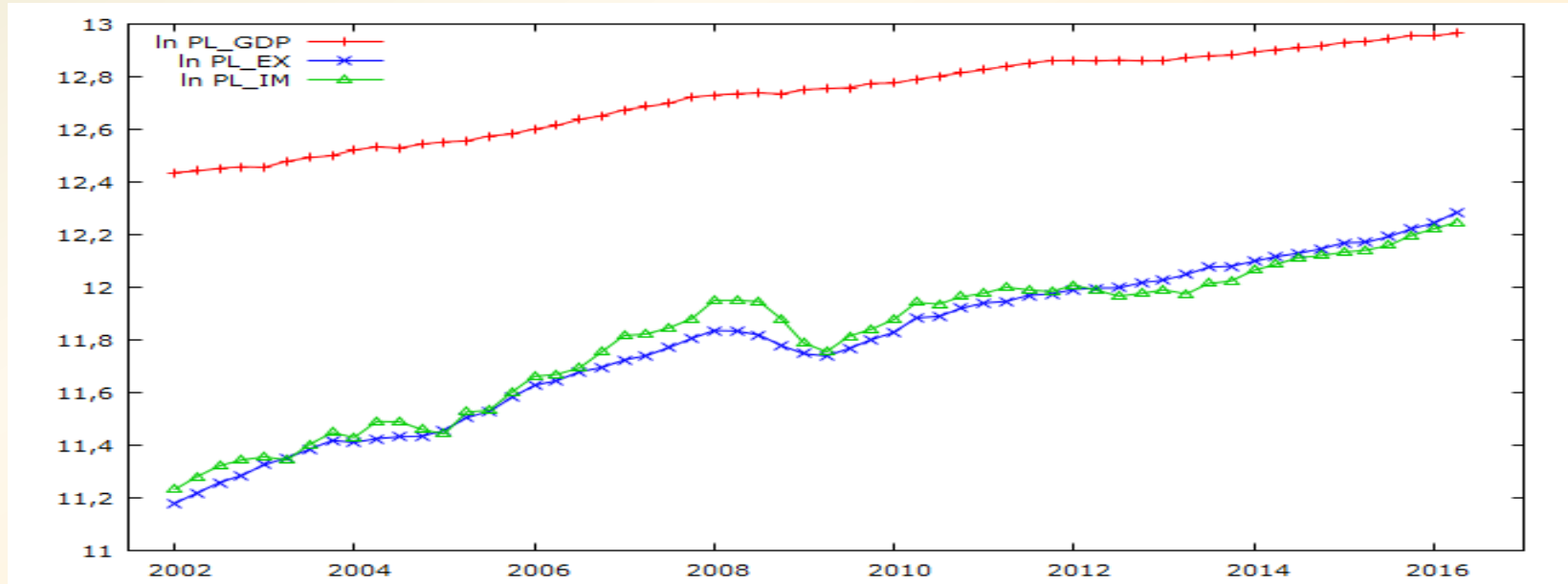
Logarithms of Czech GDP, exports and imports, in CZK billions, in 2010 prices



Source Eurostat + own computations

Polish data

Logarithms of Polish GDP, exports and imports, in PLN billions, in 2010 prices



Source Eurostat + own computations

Tests of stationarity

- Augmented Dickey-Fuller (ADF) test

$$\Delta Y_t = \beta + \alpha t + \delta Y_{t-1} + \gamma_1 \Delta Y_{t-1} + \dots + \gamma_p \Delta Y_{t-p} + v_t$$

$t = 1, \dots, T$

- $\alpha, \beta, \delta, \gamma_i$... estimated parameters ($i=1, \dots, p$)
- t ... deterministic trend (not compulsory)
- v ... white noise
- T ... number of observations

VAR model

- Vector Auto-Regression (VAR) = possibility to describe the dynamics of the system
- the structure of the system is not known
- useful way of summarizing empirical regularities and suggesting predominant channels
- every endogenous variable in the system is treated as a function of the lagged values of all endogenous variables in the system

Cointegration tests

- a long-term relationship between trade and GDP (Johansen and Juselius test)
- based on a maximum likelihood procedure
- matrix Π contains information about the long-run relationship among the variables in the vector Z

$$\Delta Z_t = \mu + \sum_{i=1}^{p-1} \Gamma_i \Delta Z_{t-i} + \Pi Z_{t-p} + \varepsilon_t \quad t = 1, \dots, T$$

Granger causalities

- whether prediction of the present value of one variable (y) is enhanced by using past values of the second variable (x)
- x is said to Granger-cause y
- variables are cointegrated \Rightarrow causal relation among the variables (one-sided or two-way direction)

VEC model

- distinguish between short-run and long-run causalities
- a form of VAR, applicable where the variables in the model are individually integrated of order 1
- contains estimation of the error correction terms (relate to the long-run relationship)

Results CZ I

| dependent variable | F-statistics (p-values in parentheses) | | | t-statistics (p-values in parentheses) | |
|---------------------------|--|--------------------------|--------------------------|--|---------------------|
| | $\Delta \log(\text{GDP})$ | $\Delta \log(\text{EX})$ | $\Delta \log(\text{IM})$ | ECT 1 | ECT 2 |
| $\Delta \log(\text{GDP})$ | 3.02*** (0.007) | 1.86* (0.085) | 1.90* (0.079) | -3,02*** (0.004) | -2,31*** (0.026) |
| $\Delta \log(\text{EX})$ | 1.22 (0.306) | 1.12 (0.368) | 1.3827 (0.229) | -2,08** (0.043) | -2,60** (0.013) |
| $\Delta \log(\text{IM})$ | 1.79* (0,098) | 0.82 (0.601) | 1.34 (0,246) | -2.58** (0.013) | -1,11 (0.271) |

P-values in parentheses, symbols *, **, *** imply that we can reject the null hypothesis about no causality (F-statistic) or no adjustment (error correction term ECT) at 10, 5 and 1% significance level, respectively. VECM(10,2).

Results CZ II

- the results support the hypothesis that export growth causes economic growth (export-led growth)
- opposite direction causality was not detected
- a two-way relationship between imports and GDP (import-led growth and growth-led imports)
- GDP growth persistent
- all in the SR as well as in the LR (5 from 6 EC terms significant)

Results SK I

| dependent variable | F-statistics (p-values in parentheses) | | | t-statistics (p-values in parentheses) |
|---------------------------|--|--------------------------|--------------------------|--|
| | $\Delta \log(\text{GDP})$ | $\Delta \log(\text{EX})$ | $\Delta \log(\text{IM})$ | ECT1 |
| $\Delta \log(\text{GDP})$ | 3.28** (0.044) | 3.75** (0.029) | 0.60 (0.55) | -2.62** (0.011) |
| $\Delta \log(\text{EX})$ | 0.32 (0.729) | 0.08 (0.928) | 0.40 (0.679) | 0.28 (0.783) |
| $\Delta \log(\text{IM})$ | 2.69* (0.076) | 1.31 (0.277) | 1.10 (0.339) | 2.80*** (0.007) |

P-values in parentheses, symbols *, **, *** imply that we can reject the null hypothesis about no causality (F-statistic) or no adjustment (error correction term ECT) at 10, 5 and 1% significance level, respectively. VECM(3,1).

Results SK II

- results support the hypothesis that export growth causes economic growth (export-led growth)
- opposite direction causality was not detected
- GDP growth persistent
- GDP growth stimulates growth of imports
- in the SR as well as in the LR (2 from 3 EC terms significant)

Results HU I

| dependent variable | F-statistics (p-values in parentheses) | | | t-statistics (p-values in parentheses) |
|---------------------------|--|--------------------------|--------------------------|--|
| | $\Delta \log(\text{GDP})$ | $\Delta \log(\text{EX})$ | $\Delta \log(\text{IM})$ | ECT1 |
| $\Delta \log(\text{GDP})$ | 3.72*** (0.005) | 1.68 (0.153) | 1.96* (0.098) | 1.25 (0.216) |
| $\Delta \log(\text{EX})$ | 1.43 (0.226) | 1.56 (0.183) | 0.54 (0.743) | 2.44*** (0.047) |
| $\Delta \log(\text{IM})$ | 2.58** (0.03) | 1,86 (0.115) | 1.03 (0.407) | 4.22*** (0.000) |

P-values in parentheses, symbols *, **, *** imply that we can reject the null hypothesis about no causality (F-statistic) or no adjustment (error correction term ECT) at 10, 5 and 1% significance level, respectively. VECM(6,1).

Results HU II

- a two-way relationship between imports and GDP (import-led growth and growth-led imports)
- GDP growth persistent
- in the SR as well as in the LR (2 from 3 EC terms significant)

Results PL I

| dependent variable | F-statistics (p-values in parentheses) | | | t-statistics (p-values in parentheses) |
|---------------------------|--|--------------------------|--------------------------|--|
| | $\Delta \log(\text{GDP})$ | $\Delta \log(\text{EX})$ | $\Delta \log(\text{IM})$ | ECT1 |
| $\Delta \log(\text{GDP})$ | 2.99** (0,042) | 0.05 (0.956) | 0.32 (0.808) | 2.10** (0.042) |
| $\Delta \log(\text{EX})$ | 0.73 (0.538) | 1.11 (0.357) | 1.29* (0.291) | 3.48*** (0.001) |
| $\Delta \log(\text{IM})$ | 3.76* (0.018) | 0.60 (0.620) | 1.20 (0.320) | 4.49*** (0.000) |

P-values in parentheses, symbols *, **, *** imply that we can reject the null hypothesis about no causality (F-statistic) or no adjustment (error correction term ECT) at 10, 5 and 1% significance level, respectively. VECM(4,1).

Results PL II

- GDP growth persistent
- GDP growth stimulates growth of imports
- in the SR as well as in the LR (all EC terms significant)

4. Conclusions

- intensive integration into the world economy, goods with high added value, orientation to EU countries
- important relationships between economic growth and trade in CZ, SK, HU
- CZ: export-led, import-led, growth-driven imports
- SK: export-led, growth-driven imports
- HU: import-led, growth-driven imports
- PL: growth-driven imports

Thank You for Your attention