Foreign and Domestic Growth Drivers in Eastern Europe

Enzo Weber

Universität Regensburg, OEI Regensburg, IAB Nürnberg

June 18, 2010

13th FIW-Workshop

Introduction

- Economic growth in Eastern Europe
- Transition to market economy
- Opening to world trade and finance
- Catching-up process
- Research questions:
    - What have been growth drivers in transition?
    - What are potential growth drivers?
    - Are there similarities or special patterns in Eastern Europe?
    - What changed during the crisis?

Agenda

Growth Drivers in Transition

- Macro approach
- Exports
- Foreign direct investment
- Capital formation
- cf. East Asian experience

Export-led growth

Potential growth effects of exports:

- Scale / specialisation (Feder 1982)
- Competition / incentives / efficiency / reallocation
  (Feder 1982, Helpman and Krugman 1985)
- Learning / knowledge
  (Grossman and Helpman 1991, Krueger 1985)

Investment

Potential growth effects of investment:

- Factor accumulation
- Technological progress (Romer 1986),
  embodied growth (Solow 1960)
- Interaction with "human resources" (Lucas 1987)

Foreign Direct Investment

Potential growth effects of FDI
(e.g., de Mello 1997):

- Diffusion of technology
- Management skills
- Competition (long run)

Modelling Economic Growth

- Growth effects are **delayed**.
  $\Rightarrow$ Model: Dynamic!

- GDP is driven by **permanent and transitory** impulses.
  (Mixture of growth and business cycles)
  $\Rightarrow$ Model: Potential long-run equilibria!

- Growth shocks are **not directly observed** / identified.
  $\Rightarrow$ Model: Structural! Theory-based assumptions needed!

Long Run?!

- Non-stationary variables (include persistent components)
- Long-run equilibria due to common persistent components (cointegration)
- Number of equilibria: $r = k-$ number of stochastic trends
- Cointegration testable (e.g. Johansen trace test)

Modelling Approach

Dynamic, long-run equilibria
$\Rightarrow$ Vector error correction model (VECM):

$$\Delta y_t = \alpha[\beta' y_{t-1} + c_1(t-1)] + c_0 + c_2 d_t + \sum_{i=1}^{q} A_i \Delta y_{t-i} + u_t$$

- y_t: Vector of k endogenous variables (EXP,INV,GDP)
- $\beta' y_{t-1}$: r cointegrating relations
- α: Adjustment coefficients
- $\sum_{i=1}^{q} A_i \Delta y_{t-i}$: Short-run dynamics
- u_t: Reduced-form residuals (correlated)

Short- and Long-Run Effects

- Unit impulse in u_{it}
- Responses of y_t through dynamic interaction
- Moving-average representation:

$$y_t = [\textit{deterministics}] + \Psi_0^* u_t + \Psi_1^* u_{t-1} + \Psi_2^* u_{t-2} + \ldots$$

- Ψ_j^*: Impulse responses

Structural VECM

- Interpretation of u_t shocks??
- Correlation modelled as linear combination: $u_t = B\varepsilon_t$
- ε_t: Uncorrelated structural shocks

$$y_t = [\textit{deterministics}] + \Psi_0\varepsilon_t + \Psi_1\varepsilon_{t-1} + \Psi_2\varepsilon_{t-2} + \ldots$$

- $\Psi_j = B\Psi_j^*$: Structural impulse responses

Identification Problem

- $k(k-1)$ unknown off-diagonal coefficients in B
- $k(k-1)/2$ measurable covariances between u_{it}
- $\Rightarrow k(k-1)/2$ assumptions needed.
- 3-variate case: $k(k-1)/2=3$

Identifying Assumptions: Long Run

- Cointegration $\rightarrow$ reduced number of persistent shocks
- One transitory shock (zero long-run impact)
- Interpretation: demand shock
- Restrictions on long-run impact matrix

$$\Xi = \begin{pmatrix} * & * & 0 \\ * & * & 0 \\ * & * & 0 \end{pmatrix}$$

with

$$\Xi = \beta_\perp (\alpha'_\perp (I_n - \sum_{i=1}^{q} A_i)\beta_\perp)^{-1} \alpha'_\perp$$

- Number of restrictions $= k - r$

Identifying Assumptions: Short Run

- Remaining restrictions on impact matrix B
- Disentangle permanent export and investment shocks!
- Shocks to investment unrestricted (business cycle forerunner)
- Exports in the short run determined by foreign demand
- $\rightarrow$ No contemporaneous impact of investment (and demand) shocks on exports

$$B = \begin{pmatrix} * & 0 & */0 \\ * & * & * \\ * & * & * \end{pmatrix}$$

Data I

- GDP, GCF, EXP, FDI
- 2002 per capita PPP US dollar
- Countries: CZE, EST, HUN, LAT, LIT, POL, RUS, SLO
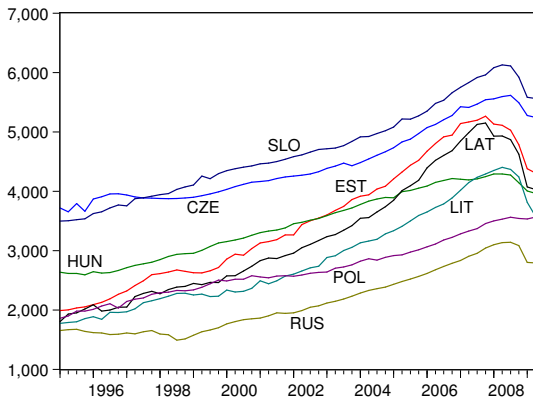- Sample period: 1993:1 / 94:1 / 95:1 - 2009:2

Data II

Figure: Seasonally adjusted real p.c. GDPs

Cointegration Tests

EXP,GCF,GDP model:

	CZE	EST	HUN	LAT	LIT	POL	SLO	RUS
$H_0 : r = 0$	**0.0**	**0.0**	**2.7**	**0.0**	**0.2**	**0.2**	**2.3**	**0.0**
$H_0 : r = 1$	**1.9**	64.3	44.9	**4.4**	81.9	20.5	35.2	22.0
Trace test p-values in %								

EXP,FDI,GDP model:

	CZE	EST	HUN	LAT	LIT	POL	SLO	RUS
$H_0 : r = 0$	**1.4**	**6.8**	–	**0.0**	**0.0**	**0.0**	**1.2**	**0.3**
$H_0 : r = 1$	**4.8**	79.2	–	**13.1**	47.3	19.9	7.4	25.1

$\Rightarrow$ **1 cointegrating relation (CZE, LAT: 2)**

Cointegrating Vectors

EXP,GCF,GDP model:

	CZE	EST	HUN	LAT	LIT	POL	SLO	RUS
EXP	1 | 0	1	1	1 | 0	1	1	1	1
GCF	0 | 1	5.63 (0.76)	22.2 (4.06)	0 | 1	3.44 (0.46)	1.95 (0.24)	2.94 (0.50)	5.12 (0.55)
GDP	-1.49 (0.20) | -0.32 (0.06)	-4.56 (0.52)	-6.14 (0.95)	-0.43 (0.09) | -0.53 (0.04)	-2.87 (0.28)	-1.92 (0.23)	-4.20 (0.43)	-1.94 (0.14)
standard errors in parentheses								

EXP,FDI,GDP model:

	CZE	EST	HUN	LAT	LIT	POL	SLO	RUS
EXP	1 | 0	1	–	1 | 0	1	1	1	1
FDI	0 | 1	35.7 (6.02)	–	0 | 1	10.5 (1.27)	3.48 (1.91)	15.0 (3.13)	10.9 (1.79)
GDP	-1.40 (0.05) | -0.10 (0.02)	-15.0 (3.87)	–	-0.46 (0.09) | -0.21 (0.02)	-1.95 (0.30)	-4.95 (0.48)	-1.97 (0.28)	-1.03 (0.14)

⇒ **Positive equilibria**

GDP Long-Run Effects of Structural Unit Shocks

EXP,GCF,GDP model:

	CZE	EST	HUN	LAT	LIT	POL	SLO	RUS
EXP	0.73 (0.19)	0.50 (0.11)	0.05 (0.11)	1.97 (0.54)	0.77 (0.20)	0.59 (0.20)	0.94 (0.27)	0.73 (0.28)
GCF	0.54 (2.35)	1.10 (0.22)	3.01 (0.49)	1.19 (0.37)	1.43 (0.26)	0.89 (0.14)	0.68 (0.27)	4.18 (2.81)
FEVD	99/1	44/56	0/100	66/34	55/45	15/85	85/15	21/79
bootstrapped standard errors in parentheses FEVD: long-run GDP variance decomposition								

EXP,FDI,GDP model:

	CZE	EST	HUN	LAT	LIT	POL	SLO	RUS
EXP	1.12 (0.41)	0.57 (0.16)	–	1.45 (0.56)	0.63 (0.26)	0.43 (0.12)	0.81 (0.26)	0.83 (0.35)
FDI	- 1.09 (1.92)	4.50 (4.35)	–	2.61 (0.61)	3.33 (0.57)	0.66 (0.16)	0.54 (0.60)	9.05 (3.76)
FEVD	96/4	59/41	–	36/64	44/56	25/75	92/8	27/73

Summing Up

- GDP rises with export dependence:
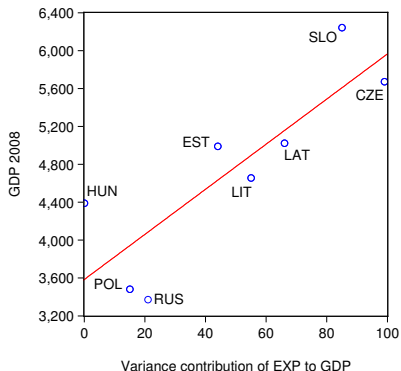
- High potential FDI impacts
- HUN, POL, RUS: Prevalent role of investment
- EST, LIT: non-manifested potential of GCF

Comparison to Asia Pacifc

- Weber (2009, *JJIE*): AUS, HK, IDN, JPN, KOR, MAL, NZL, PLP, SGP, THL, TWN
- Dependence on investment higher than on exports (except HK, SGP, THL)
- Investment effects higher than export effects, especially for industrialised countries
- Export effects relatively higher in developing countries
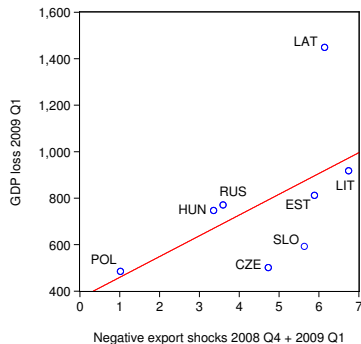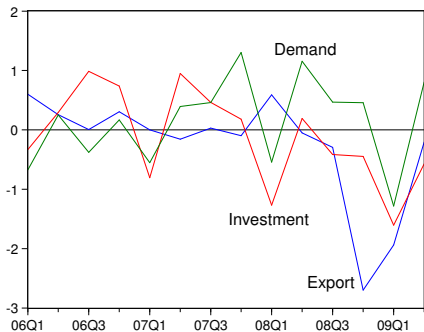
Exports and the Crisis

Figure: Structural shocks (mean) and GDP loss vs. export shocks

Summary

- Potential and historical growth drivers in Eastern European transition
- Large differences between countries
- Export orientation goes along with high GDP.
- High potential impacts of FDI
- Crisis effects through exports