Direct and Feedback Effects on Economic and Institutional Developments in Transition: A Path Analysis Approach

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Objective: Empirical investigation of the relative roles of initial conditions, reforms and institutions in explaining economic performance in the post – communist countries.

Two main sets of hypotheses

1. Initial conditions, economic reforms and institutions have different effects on activities in the state and in the private sector. Aggregate economic growth observed during transition is the net result of opposing developments in the state and the private sector:
    - collapse /reduction of state productive activities
    - expansion of the private sector

$\Rightarrow$ Decomposition of annual growth rates of GDP/cap into growth in value added in the private sector, and growth in value added in the state sector

Related Literature: Aghion and Blanchard(1994), Hernandez-Cata(1997), Berg, Borensztein et al(1999)

2. Analysis of interactions among (possible) determinants of private/state growth:
    - initial conditions
    - economic reforms
    - institutions
    - other factors

Related literature: De Melo et al(1996), Fisher, Sahay et al(1996), Christoffersen and Doyle(1998), De Melo et al(2001), Heybey and Murrell(1997), Johnson, Kaufmann et al(1997), Brunetti, Kisunko et al(1997), Havrylyshyn and Van Rooden(2000), Fidrmuc(2001), Abed and Davoodi(2000) etc.

$\Rightarrow$ Path analysis of a simultaneous equation model of transition with:
    - *interactions among various reforms*
    - *endogenous reforms*
    - *endogenous institutions*

Growth Accounting

GDP/Cap levels:

$$y(t) = y^P(t) + y^S(t)$$

GDP/Cap Growth Rates:

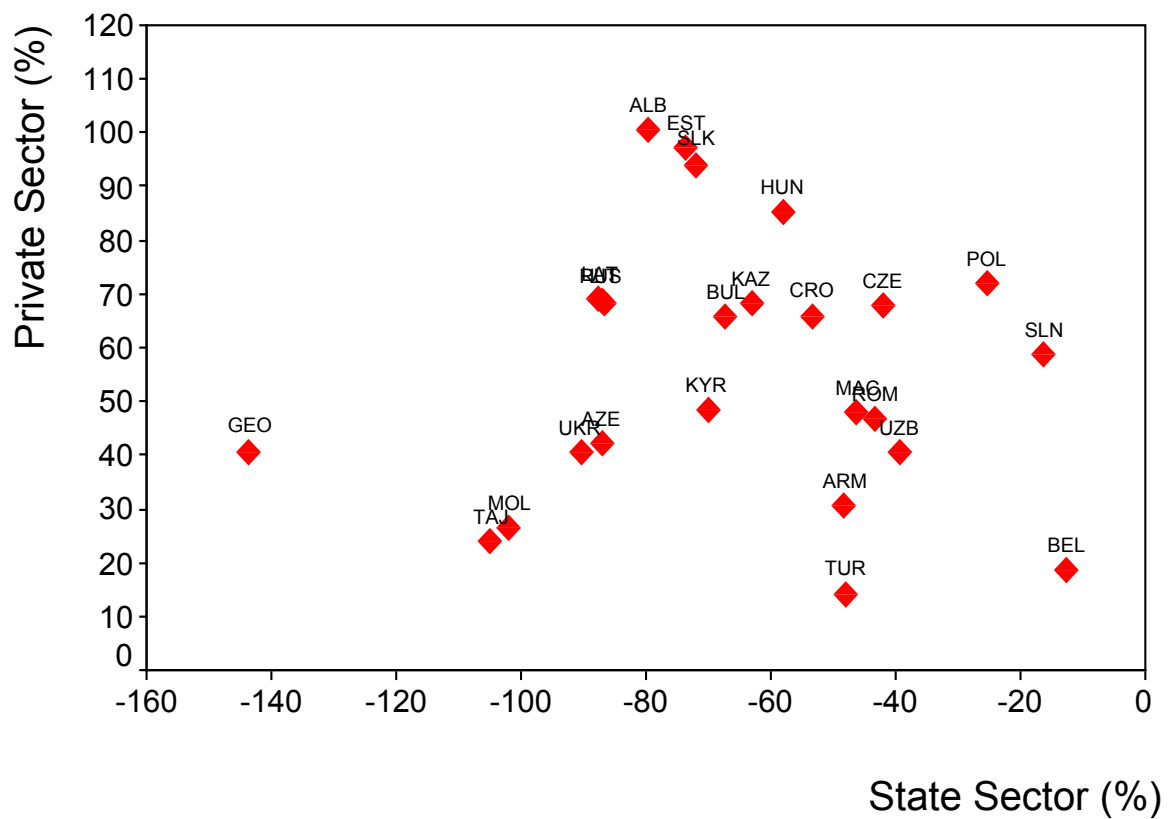$$\frac{d(\ln y(t))}{dt} = \alpha(t)\frac{d(\ln y^P(t))}{dt} + (1 - \alpha(t))\frac{d(\ln y^S(t))}{dt}$$

$\alpha(t) =$ share of value added in the private sector in total value added

$\dfrac{d(\ln y^P(t))}{dt} =$ growth rate in the private sector

$\dfrac{d(\ln y^S(t))}{dt} =$ growth rate in the state sector

$\alpha(t)\dfrac{d(\ln y^P(t))}{dt} =$ contribution of private sector growth to aggregate growth

$(1 - \alpha(t))\dfrac{d(\ln y^P(t))}{dt} =$ contribution of state sector growth to aggregate growth

Determinants of (Private/State) Sector Growth

Initial Conditions

- Initial Share of Private Sector (INSHARE) (source: EBRD)
- Initial Economic Liberalization (INLIB) (source: De Melo, Denizer et al(2001))
- Dependence on CMEA trade (CMEA) (source: De Melo, Denizer et al(2001))

Maintained hypothesis $\rightarrow$ Time-decaying effects of initial conditions:

$$IC_t = \frac{IC}{t^2}$$

Economic Reforms (annual changes)
- Price liberalization (source: EBRD)
    (annual changes (CPRICE), cumulative past changes (CCPRICE))
- Enterprise Reforms (privatization, competition policy, and imposition of hard budget constraints) (source: Piculescu(2002))
    (annual changes (CENTREF), cumulative past changes (CCENTREF))
- Financial Sector Reforms (liberalization of interest rates, government ownership of banks, foreign entry, non-bank financial institutions, directed credits, diversity of financial services, regulations and prudential supervision) (source: Piculescu(2002))
    (annual changes (CFINANCE), cumulative past changes (CCFINANCE))

Maintained hypothesis $\rightarrow$ Time-decaying effects of (distant) past changes in reforms:

R_1	ΔR_2	ΔR_3	ΔR_4	$\ldots$	ΔR_{t-1}	ΔR_t
Year1	*Year2*	*Year3*	*Year4*	*...*	*Year(t-1)*	*Year(t)*

$$C\Delta R_t = \frac{R_1}{t-1} + \frac{\Delta R_2}{t-2} + \frac{\Delta R_3}{t-3} + \frac{\Delta R_4}{t-4} + \ldots + \frac{\Delta R_{t-1}}{1} = \frac{R_1}{t-1} + \sum_{j=2}^{t-1} \frac{\Delta R_j}{t-j}$$

Institutions (annual changes)
- Political Environment (political participation, executive recruitment, constraints on the executive, civil rights) (source: Piculescu(2002))
    (annual changes (CPOLITIC), cumulative past changes (CCPOLITIC))
- Protection of Property Rights and Quality of Justice (CJUSTICE) (source: Heritage Foundation)
- Perceptions of Corruption (CORR) (source: Transparency International)

Other factors:
- annual changes in employment in private/state sector (CHEMSPRIV, CHEMPRIV)
- inflation (non-linear effect) (INF)
- dummy variable of War and Conflicts (WAR)

The Method of Path Analysis

Path Analysis → Part of the methodology of Structural Equation Modeling (also includes latent variable methods)

- Method used in political science, psychology, sociology
- The modern version of the SEM methodology comes with Jöreskog(1973) and Wiley(1973);
- SEM-dedicated software packages: LISREL, AMOS, EQS, MPlus
- Main SEM applications in economics: Goldberger (1972)

Two main defining features of path analysis:

1. The use of diagrams in building (empirical) simultaneous equation models
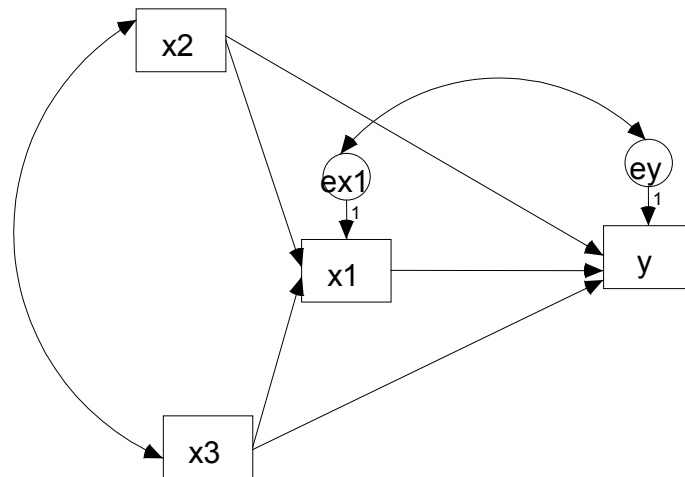
$$\begin{cases} y = \beta_1 \, x_1 + \beta_2 \, x_2 + \beta_3 \, x_3 + \varepsilon_y \\ x_1 = \gamma_2 x_2 + \gamma_3 x_3 + \varepsilon_{x1} \end{cases}$$

Advantages:
- awareness on the implicit assumptions in the model (covariances among exogenous and predetermined variables)
- possibility to impose restrictions on the covariance structure of the error terms ⇒ more flexibility in terms of degrees of freedom

2. Decomposition (and hypothesis testing) of the estimated effects into: direct, indirect and total effects

Example→ The effects of x_2 on y

Direct effect: β_2

Indirect effect: $\gamma_2 \beta_1$

Total effect: $\beta_2 + \gamma_2 \beta_1$

Model Building

STEP 1: Reallocation of labor and capital from state to private

Triggers of change: Initial Conditions, Macroeconomic Stabilization, Enterprise Sector Reforms

Final Specification in Step 1:

$$GRPRIV_t = \beta_{13}\,CHEMPRIV_t + \beta_{14}\,CHEMSTATE_t + \beta_{15}\,CENTREF_t + \gamma_{11}\,WAR_t + \gamma_{12}\,INSHARE_t$$
$$+\ \gamma_{14}\,CMEA_t + \zeta_{1t}$$

$$GRSTATE_t = \beta_{24}\,CHEMSTATE + \beta_{25}\,CENTREF_t + \beta_{26}\,INF_t + \gamma_{21}\,WAR_t + \gamma_{23}\,INLIB_t + \gamma_{24}\,CMEA_t$$
$$+\ \gamma_{25}\,CCENTREF_t + \zeta_{2t}$$

$$CHEMPRIV_t = \beta_{34}\,CHEMSTATE_t + \gamma_{33}\,INLIB_t + \gamma_{35}\,CCENTREF_t + \zeta_{3t}$$

$$CHEMSTATE_t = \gamma_{45}\,CCENTREF_t + \zeta_{4t}$$

$$CENTREF_t = \gamma_{51}\,WAR_t + \gamma_{55}\,CCENTREF_t + \zeta_{5t}$$

$$INF_t = \gamma_{64}\,CMEA_t + \gamma_{65}\,CCENTREF_t + \zeta_{6t}$$

STEP 2: Adding measures of changes with price, trade and foreign exchange liberalization

- direct effects on private/state sector growth
- indirect effects mediated by enterprise sector transformation

STEP 3: Adding changes in financial sector reforms
- direct effects on private/state sector growth
- indirect effects mediated by enterprise sector transformation
- effects of price liberalization on financial sector reforms

STEP 4: Introducing changes in the judicial system and protection of property rights
- direct effects on private /state sector growth
- effects of reforms on CJUSTICE
- effects of private sector development on justice and property rights protection

STEP 5: Introducing changes in the political environment
- direct effects on state/private growth
- reverse causality from growth to changes in the political environment
- interactions between changes in politics and the reform process
- effects of changes in politics on changes in justice and property rights protection

STEP 6: Adding changes in perceptions of corruption
- direct effects on private/state sector growth
- reverse causality from growth to perceptions of corruption
- corruption and reforms
- corruption, justice and politics

Model Estimation and Results

- Estimation Method: FIML for missing data
- Sample size: max 227 observations
  - 24 transition economies
  - period starting with the first year of transition and until year 2000)

Private Sector Growth

Table 4 Standardized estimates of direct effects on private sector growth

	Step_1	Step_2	Step_3	Step_4	Step_5	Step_6
War and Conflicts	-0.200 (-3.334)	-0.232 (-4.217)	-0.221 (-4.050)	-0.235 (-4.300)	-0.217 (-4.140)	-0.216 (-4.710)
INSHARE	0.095 (0.589)					
CMEA	-0.232 (-2.362)	-0.240 (-3.814)	-0.248 (-4.009)	-0.265 (-4.249)	-0.290 (-4.744)	-0.284 (-4.862)
CHEMPRIV	0.226 (2.921)	0.169 (2.141)	0.168 (2.171)	0.152 (1.963)	0.121 (1.645)	0.065 (0.850)
CHEMSTAT	-0.190 (-2.438)	-0.192 (-2.594)	-0.173 (-2.370)	-0.189 (-2.610)	-0.229 (-3.285)	-0.260 (-3.750)
CENTREF	0.353 (6.194)	0.273 (4.546)	0.185 (2.774)	0.181 (2.712)	0.182 (2.791)	0.165 (2.519)
CPRCE		**0.221 (3.210)**	0.176 (2.551)	0.145 (1.958)	0.068 (0.885)	
CFINANCE			**0.203 (2.805)**	0.194 (2.702)	0.300 (4.092)	0.340 (4.665)
CJUSTICE				**-0.120 (-1.713)**	-0.078 (-1.057)	-0.120 (-1.808)
CCPOLITIC					**-0.171 (-3.076)**	-0.162 (-2.950)
CORR						X
R-square	*0.325*	*0.396*	*0.420*	*0.430*	*0.494*	*0.502*

State Sector Growth

Table 5 Standardized estimates of direct effects on state sector growth

	Step_1	Step_2	Step_3	Step_4	Step_5	Step_6
War and Conflicts	-0.298 (-5.089)	-0.270 (-4.785)	-0.257 (-4.606)	-0.251 (-4.300)	-0.265 (-4.902)	-0.270 (-4.980)
INLIB	0.136 (2.190)	0.257 (3.433)	0.272 (3.680)	0.266 (3.570)	0.302 (4.127)	0.301 (4.088)
CMEA	-0.251 (-3.671)	-0.199 (-2.875)	-0.202 (-2.957)	-0.193 (-2.841)	-0.156 (-2.282)	-0.160 (-2.324)
CHEMSTAT	0.161 (2.433)	0.145 (2.135)	0.146 (2.176)	0.160 (2.426)	0.140 (2.146)	0.141 (2.150)
CENTREF	-0.386 (-6.962)	-0.328 (-5.615)	-0.268 (-4.195)	-0.251 (-4.152)	-0.208 (-3.405)	-0.226 (-3.696)
CCENTREF	-0.200 (-2.950)	-0.233 (-3.411)	-0.076 (-2.370)			
INF	-0.197 (-3.210)	-0.208 (-3.439)	-0.207 (-3.423)	-0.197 (-3.330)	-0.193 (-3.353)	-0.189 (-3.244)
CPRCE		**-0.273 (-3.398)**	-0.317 (-3.836)	-0.313 (-3.788)	-0.270 (-3-300)	-0.253 (-3.126)
CCFINANCE			**-0.216 (-2.131)**	-0.270 (-3.918)	-0.298 (-4.407)	-0.293 (-4.331)
CJUSTICE				**X**		
CPOLITIC					**-0.139 (-1.967)**	-0.144 (-2.022)
CORR						**X**
R-square	*0.325*	*0.397*	*0.419*	*0.419*	*0.445*	*0.441*

Interactions among Reforms

- Changes in financial sector reforms are significantly associated with changes in price liberalization (both contemporaneously and with a lag)
- Significant direct effects of (recent) past changes in price liberalization, of trade liberalization, and of financial sector reforms on enterprise sector transformation

Direct Effects of Institutional Change on Progress with Reforms

- Progress with price liberalization is positively associated with changes in the political environment (both contemporaneously and with a lag)
- Negative effect of corruption on trade liberalization; positive direct effects of changes in politics on trade liberalization
- Financial sector reforms are positively associated with changes in the political environment
- No direct effect estimated from institutional change on enterprise sector transformation

Interactions among Institutions

- Positive association between democratization and less discretionary political leadership and the quality of justice and protection of property rights
- Significant direct effect of improvements in the quality of justice on perceptions of (less) corruption

Endogenous Institutions

- Positive direct effect of private sector development on changes in the political environment
- Positive direct effects of developments in the state & private sectors on perceptions of less corruption

⇒ *Feedback effects run from private sector development to the process of reforms via changes in the institutional environment.*

Estimated Indirect and Total Effects

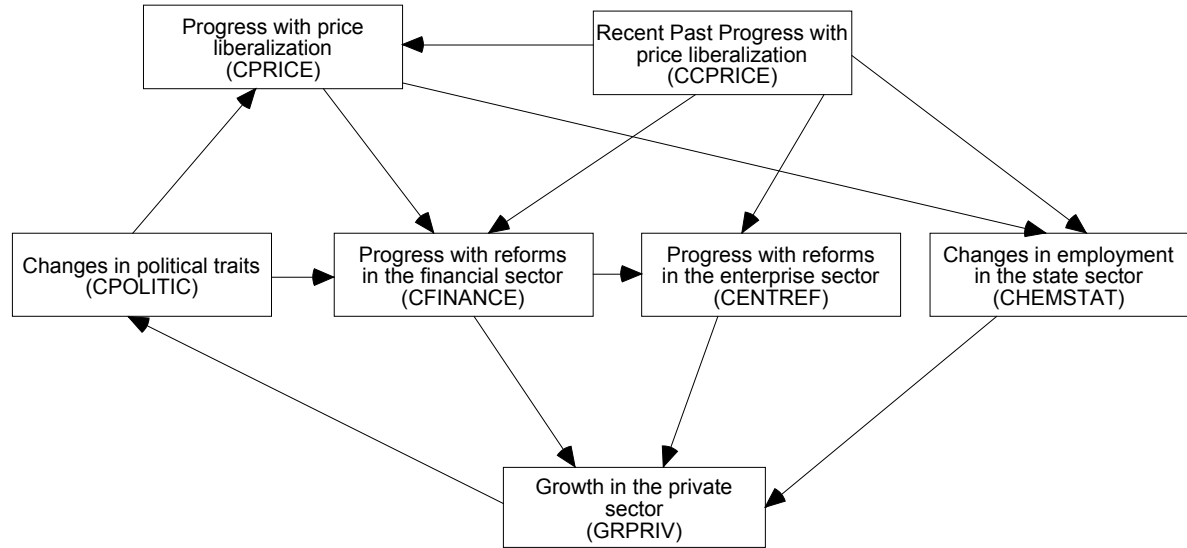Figure 4: Diagram of indirect/total effects of price liberalization

Table 16 Direct, Indirect and Total Effects on private and state economic performance

	Private Sector Growth			State Sector Growth		
	Direct	Indirect	Total	Direct	Indirect	Total
War and Conflicts	-0.216	-0.127	**-0.343**	-0.270	0.068	**-0.203**
Initial Share of Private Sector		0.140	**0.140**		-0.181	**-0.181**
Initial Economic Liberalization		0.330	**0.330**	0.301	-0.264	0.037
CMEA Dissolution	-0.284	0.011	**-0.274**	-0.160	-0.051	**-0.210**
Private Employment (changes)	0.065	0.004	0.068		-0.005	-0.005
State Employment (changes)	-0.260	-0.045	**-0.305**	0.141	0.022	**0.163**
Enterprise Reforms (changes)	0.165	0.018	**0.183**	-0.226	-0.012	**-0.238**
Cumulative Enterprise Reforms (lagged changes)		-0.027	-0.027		0.104	**0.104**
Inflation		0.081	0.081	-0.189	-0.019	**-0.208**
Price Liberalization (changes)		0.347	**0.347**	-0.253	-0.117	**-0.370**
Cumulative Price Liberalization (past changes)		0.225	**0.225**		-0.105	**-0.105**
Trade Liberalization (changes)		0.060	0.060		-0.079	-0.079
Financial Sector Reforms (changes)	0.340	0.076	**0.416**		-0.099	-0.099
Cumulative Financial Sector Reforms (lagged changes)		0.053	0.053	-0.293	-0.071	**-0.364**
Judicial System and Private Property Protection (changes)[1]	-0.120	-0.017	**-0.137**		0.016	0.016
Political Institutions (changes)		0.167	**0.167**	-0.144	-0.103	**-0.247**
Cumulative Changes in the Political Institutions (lagged)	-0.162	0.024	**-0.139**		-0.012	-0.012
Perception of Corruption (changes)		-0.036	-0.036		0.023	0.023

[1] Note the corresponding level indicator has an inverse scale, in that low values indicate a high quality of the judicial system and private property protection by the government.

Conclusions

- Pattern specific transition: private sector expansion and the collapse of state activities

- Private sector development: both objective and strategy for a successful transition

- Significant role of reforms: financial sector reforms have the largest effects on growth in both sector

    - Initial conditions are important mainly for the ability of the state sector to cope with initial shocks
    - Early progress with reforms is critical for subsequent developments

- Differential effects of initial conditions and reforms on sector growth:

    - Price liberalization: indirect effects on private growth and direct effects on developments in the state sector
    - Positive effects of reforms on developments in the private sector, and associated costs in terms of reductions of state sector activities
    - Differences in timing: contemporaneous effects of financial reforms on activities in the private sector, and lagged effects on activities in the state sector
    - Differences in magnitudes

- Path dependency in the reform process

    - Sequencing (price liberalization $\rightarrow$ enterprise reforms), and complementarity (enterprise reforms and financial sector reforms)

- Endogeneity of reforms

    - Mediated by institutional change (political environment)

- Endogeneity of institutions

    - The analysis supports political science arguments on institutional change with respect to private sector development
    - Economics arguments on the direct role of institutions $\rightarrow$ with respect to state sector activities
    - Direct effects of institutional change on the reform process

Missing elements in the analysis:

    - Failure to distinguish between start-ups and privatized enterprises
    - Investments
    - Unofficial sector activities