



Center for Social & Economic Research

**PATTERNS OF
GOVERNMENT
EXPENDITURE AND
TAXATION IN
TRANSITION VS. OECD
ECONOMIES**

by

Barbara Fakin

The Leuven Institute for Central and East European Studies,
Faculty of Economics, Catholic University of Leuven

Alain de Crombrughe

Department of Economics, University of Namur

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Editor:

CASE - Center for Social & Economic Research

00-585 Warszawa, Bagatela 14

tel/fax (48-2) 628 65 81; tel/fax (48-22) 29 43 83

A B S T R A C T

This study identifies systematic determinants of some key budgetary aggregates in transition and OECD economies. Because of the lack of theory on public expenditure, the study is empirical. We use three approaches: regression analysis, non-parametric efficiency analysis, and construction of a budget set and a preference set. The revealed empirical regularities help to explain a number of short-term difficulties of budgetary policy in transition countries, and thus tightens the still fragmentary definition of transition. The study also identifies some structural challenges for the long-term sustainability of budgetary and policy choices in transition economies.

JEL Classification numbers: H20, H50, P51.

Barbara Fakin - the Leuven Institute for Central and East European Studies, Faculty of Economics, Catholic University of Leuven, Blijde Inkomststraat 5, B-3000 LEUVEN, Belgium.

Alain de Crombrughe - Department of Economics, University of Namur (Facultés Universitaires Notre - Dame de la Paix), Rempart de la Vierge 8, B-5000 NAMUR, Belgium.

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comments are most welcome

INTRODUCTION

The study tries to identify patterns of government expenditure and taxation in OECD countries, comparing them with those in Central European countries. This comparison is made because the countries of Central Europe want to join the OECD and the European Union, and because these transition economies have a level of development and an economic structure more similar to the rest of Europe than to any other group of countries, despite their misleadingly low incomes per capita reported at current exchange rates.

The study is empirical, and reference is made to theoretical work wherever necessary. Our primary objective is to identify a number of similarities and problems in budgetary policy among countries. We will clarify several questions that are most relevant to the transition countries.

First, we compare specific data on the transition countries, such as share of state pensions and social security expenditures (Sachs, 1995), to those on the OECD countries. This comparison could help to piece together fragmentary definition on the transition. The data on budgetary policy at least is not complete, however. The legacy of communism can be identified in the poor performance of a small number of development indicators, such as large and subsidized state sector, little access to tertiary education, and low reliance on indirect taxes for the level of development reached.

We also want to identify systematic determinants of some key budgetary aggregates. These determinants may have different origins. Structural determinants relate to the age structure of the population, or income per capita, or income distribution. The specific determinants often represent the preferences of a country, be they for high pensions, early retirement, or many years of free and compulsory education. Systemic determinants define the type of economic system. We limited the choice to two: transition economy or OECD economy.

The links between variables that we find to be determinants of the budgetary aggregates and performances have some predictive power. For the OECD countries, they show the consequences of policy choices and possible avenues for reform or budgetary savings. For the transition countries, they serve as an indicator of what to expect as they near the level of development and of preferences of the OECD countries. The analysis also shows the transition countries where patience will be needed. For example, health expenditures may eventually rise in dollar terms (but not as a share of GDP) if transition countries do

not find more efficient systems than those in the OECD. Rising health expenditures should not be a policy priority as long as incomes per capita cannot support an increase and fulfilling income earning needs (such as human capital investment, employment opportunities, infrastructure investment) is more pressing.

We want to find the degrees of freedom of budgetary policy, or by how much countries can differ and still perform efficiently. First, we must identify the costs and benefits of some policies. For instance, the health status of an individual can be assessed by using appropriate social indicators.¹

Output indicators, such as infant mortality or life expectancy at birth, measure results, impacts, or outputs and can be used to determine the magnitude and the nature of health problems. Input and process indicators, on the other hand, can be used to identify major factors contributing to health problems. Input indicators, such as government expenditures on health, are variables that influence the availability of required resources. Process indicators, such as number of hospital beds and number of physicians, reflect the availability of needed social services for the satisfaction of health needs. For example, with a regression analysis, we can show that hospital beds are less productive than physicians, at least for the basic output indicators of health, while they are more expensive for the government budget. In the second step we identify countries that achieve better results with the same or lower amount of input indicators.

We wanted to study a few fiscal determinants of economic growth. Unfortunately, meaningful long-term growth rates are not available for transition countries because, the previous system was abandoned and the regime change was too recent. The study is static in that it does not directly identify possible sources of economic growth. A government may want to experiment. This study will help such a government identify how its policies differ from the most interesting preference set. We identify the budget constraint and refer to the literature on economic growth to help judge potential policy experiments.

The set of comparisons and empirical regularities that we present should help to explain a number of short term difficulties of budgetary policy in transition countries. It should also help to identify some structural issues concerning the long-term sustainability of budgetary and policy choices.

¹ Following Cornia (1987) these can be classified into outcome (output), input, and process indicators. This conceptual framework was applied to the poverty problems and corresponding social expenditure policies in Pleskovic & Sivitanides (1993).

METHODOLOGY

We have chosen three approaches to describe patterns of expenditure and taxation. The first is regression analysis, the second is non-parametric efficiency analysis, and the third is the construction of a budget set and a preference set.

1. The regression analysis

The regression analysis is organized around four types of explanatory variables. They represent different forms of control that the government or the economy exercises over the budgetary variables that we want to explain.

a. "Transition dummy"

The first type of variable distinguishes transition economies from other economies in our data set. Transition economies are identified by a dummy that takes a value of one for the four transition economies and zero otherwise. A significant coefficient on the dummy indicates a real difference in policy, given all the other characteristics affecting this aspect of budgetary policy.

We expect the transition-country variable to be significant more often when using pre-reform data than when using post-reform data. The comparison of the pre- and post-reform data will show what is the short- and long-term specificity of fiscal management in transition economies. In this version of the paper we use only 1992, post-socialist data.

Instead of using a dummy variable we could have analyzed the specificity of transition countries on the basis of a projected regression for OECD countries and a comparison of the projected and actual dependent variables. We found this approach less attractive than the dummy variable approach to identify transition-specific rather than country-specific effects.

When dummy variable is significant across a number of regressions, some explanatory power can be found in the repetition. Local policy-makers can identify areas where choices will have to be made and where negotiations may be difficult with international organizations. International donors may see where assistance or reform is more specifically needed.

b. "Systemic" variables

The second type of variable tries to identify the economic "system" chosen by the economy. The role of the state in economic activity can vary widely across

countries. The idea here is to find a variable that could substitute for the transition-country dummy and also apply to a number of OECD countries. Such a variable is difficult to identify. Nevertheless, the share of the state in manufacturing output, the share of public sector employment in total employment or the share of subsidies in value added, share of state pensions or social expenditures in GDP may work. Except for subsidies, such data are available for very few countries. Also, it is unclear how well such variables truly represent a choice on the organization of economic and social life, and not something else, like the capture of the government by some groups or the government's desire to buy loyalties (Sachs, 1995). In our classification, the variable would then become "policy-specific" and fall into the fourth group. It could be still interesting to observe significant coefficients for such a variable across a number of regressions. If such a variable performs better than the transition country dummy, it would tell us that transition countries do face systemic adjustment problems, but they are not unique to them.

c. "Structural" variables

The variables of the third type could be called structural or systematic. They represent characteristics that are beyond the control of governments at least in the short term. They are different from the first two groups because they do not represent a choice of economic system own to an area (the transition dummy) or to a type or organization of the economic life (systemic variables). A first group of variables of this structural type includes various demographic variables. A young population may require more education spending, while an older population may need more pensions and health care spending. The demographic variables seem pretty exogenous even if child allowances may have a marginal effect on birth rates and generous pensions and health care may lengthen life expectancy.

A second structural variable in the short run is GDP per capita. There is a significant positive relation between health spending as a share of GDP and income per capita across OECD countries. For such a regression, GDP per capita can be seen as exogenous, even if in the long run a healthy population should be more productive than an unhealthy one. Income per capita measures what a country can afford. It distinguishes necessities (goods whose share in expenditure declines with higher income) and luxuries (goods share rises). There is also a production aspect captured by this income variable, indicating that some services where productivity grows slowly tend to absorb a larger share of expenditures (especially through wages) in high-income (and high wage) countries than in low-income countries. Whether high expenditure share comes from consumption or the production side, the conclusion for poor countries is caution with the type of expenditures associated with high incomes.

The economic growth literature has found positive relations between the long-term growth rate and education, health, and infrastructure and other indicators of the stock of human or physical capital. The indicators are usually performance indicators (life expectancy, education rates) rather than expenditure in these areas (Barro 1991, Barro & Sala-i- Martin 1995). We relate the components of expenditure to the performance indicators in order to see which elements of expenditure are most likely to contribute indirectly to growth. As a complement to our warning about the expenditure type of high-income countries, this could help transition countries identify the savings that are the least harmful to health, education, or infrastructure performance.

We have included the degree of monetisation of the economy in the structural variables. Our liquidity variable measures the ratio of M2 to GDP (the inverse of velocity). Although this variable can be affected by specific policy choices, it can also be inherited from past monetary history. It is easy to induce a currency substitution. But when a monetary base is destroyed by inflation, it is hard to rebuild it as people have learned how to save on money and have lost confidence. In a number of advanced countries, the liquidity may depend upon technological advances like electronic money, which is quite independent of policies, but in others, the government has been able to use monetary repression to finance public deficits by forcing banks to maintain high reserve ratios.

Of the structural variables, the degree of inequality deserves special attention. Here too, various interpretations are possible. The variable that we found for our sample measures the income share of the highest income decile. This variable can be interpreted as an ex-post measure of inequality and thus represents the tolerance of a country for inequality.

Newbery (1993, 1994) has devoted special attention to the role of inequality in budgetary policy. Two of his four determinants of optimum taxation are related to inequality. The tolerance for inequality is represented in his simulations by a parameter of the social utility function. Ex-ante measure of skill differences (Newbery suggests the pre-tax wage dispersion) could be an input indicator of the ex-ante need (and room) for redistribution, other things remaining equal. For a regression analysis, we have serious doubts about the reliability (exogeneity) of a financial ex-ante indicator of skill differences, although it fits very well into Newbery's simulation. A financial indicator can turn out to be just an other ex-post output indicator of the acceptance of inequality or of the malfunctioning of the labour market. The last two determinants of Newbery's tax policy are discussed below, they are "specific" variables: the required government expenditure (for solvability reasons) and the substitution between taxed and non-taxed activities (for equity and efficiency reasons).

d. "Specific" variables

The fourth (and last) type of variables are "specific" variables. Such variables represent the country's policy choices and could include any variable not corresponding to the first three types. Such variables are used as regressors or as dependent variables depending upon the regression. A "policy-specific" variable is identified if it enters significantly in a regression. A "country-specific" policy is identified if the residual of a country is especially high (in a regression where this variable is the dependent variable).

We include here a group of variables that could easily form a fifth group: performance variables. These variables include such indicators as life expectancy (health), number of telephone lines (infrastructure), or number of patents registered. We include them here as they can also represent policy choices of a country. These variables are also used in the efficiency analysis as performance indicators.

e. Interpretation issues

Regression analysis is also useful for identifying the true meaning of a variable. The expected sign of the relation between two variables could be opposite or insignificant depending upon the definition of one of the variables as an input or output, a cause or consequence.

An example of such a variable is the inequality variable. A large share of national income going to the wealthiest 10 percent of the population could be seen as justifying redistributive taxation or as an indicator of the tolerance of society for inequality. If the variable measures after-tax income, it is likely to give the society's tolerance for inequality. This interpretation is confirmed by the fact that this share of income enters significantly and repeatedly with a negative sign in regressions trying to explain the level of taxation.

Another example is the number of hospital beds per 1000 inhabitants. This figure could be interpreted as an intermediate indicator of healthcare performance, or at least as an input to healthcare, or simply as a healthcare cost. The fact that hospital beds are positively correlated with health costs indicates that the cost interpretation is correct. The fact that they are negatively correlated with infant mortality indicates that the input interpretation is also correct. The fact that they are not correlated with life expectancy indicates that the process indicator interpretation is incorrect. The conclusion is that hospital bed expenditures have to be carefully targeted.

2. Efficiency analysis

We use a basic approach to efficiency. This approach compares a number of outputs (government services) with the input cost, which is represented by aggregate government expenditure. This non-parametric cost-efficiency analysis has been used in another budgetary context by Eeckaut, Tulkens, and Jamar (1993) in a study of Belgian municipalities.

The definition of the outputs is often controversial. For example crime rate is a desirable output of a well-managed society. Now some may claim that this rate is just a question of culture, or at least that some governments may inherit quieter populations than others. Is the size of the police force a good indicator of government services? It may be large because the government wants to fight crime or because it does not fight crime efficiently by other means (schooling, housing, and employment programs). In the end, the choice may be dictated by the availability of data, and caution will be needed in the interpretation.

The output indicators can find some grounding in the regression analysis. We have not looked for strong correlations between the output indicators and spending (input indicator), because we want to show that some countries can offer better value for money than others. We have nevertheless tried to find an output indicator for each of the major functional categories of spending we studied in the regression analysis. We have chosen indicators as close as possible to the final outcome performance (or need): old-age dependency ratio, inequality, life expectancy, infant mortality, university entry, patents, and telephone lines.

The cost-efficiency analysis is based on the concept of domination. Countries with similar per capita (or per GDP) expenditure are grouped. Their output indicators are compared. Dominated countries are countries with lower indicators for all outputs and equal or higher expenditure.

Our cost measure is the share of total public expenditure in GDP. Total public expenditure as a share of GDP is a disadvantage to transition economies. In the future, we should also try total public expenditure in dollars per capita. Transition countries have relatively high shares of spending as a share of GDP (Sachs, 1995), but they also inherited a general delay in development, which affects their performance, independently of their public spending. Even so, the analysis is interesting for transition countries. They can identify various Western countries that perform better but do not necessarily record the same performance in all

indicators.² This may result from different patterns of public finance development and targeting. But again, this should be confronted with the regression analysis to see how and when this can be reached.

3. Budget constraint and comparative preferences

The budget constraint and comparative preferences are captured in Figure 1. The space is spanned by two goods that the government can provide. The budget constraint is the line with a negative slope equal to the relative price of the two goods. The expansion path represents the choices made by other countries. It can either be a regression line or it can be an upper-limit line.

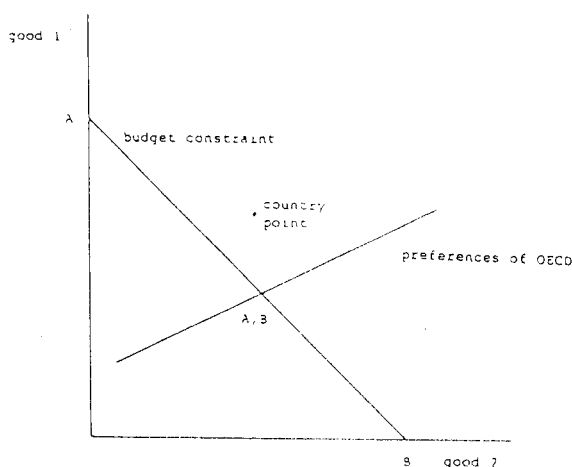


Figure 1. The Budget Constraint and Comparative Preferences

If a country simultaneously runs a budget deficit and finds itself above the expansion path, it should reduce spending on the good measured on the vertical axis. If a country runs a budget deficit but finds itself below the expansion line, it should reduce spending on the good measured on the horizontal axis.

The majority of our regressions are not run in two-goods space. We can nevertheless draw attention to the residuals. A positive residual for an expenditure item shows a potential saving for this country. A negative residual shows a potential saving for the other countries. If the performance of the country is excellent (it has the highest life expectancy with the lowest health expenditure), it identifies a need for savings elsewhere in this country if the performance is weak (life expectancy is low for the level of development reached).

² Sen (1993) for example found that China and Sri Lanka (before the civil war) provided extensive health care and educational services but spent very little on health and education. By contrast, many countries raised GDP quite rapidly but have not generated resources to advance health and education.

REGRESSION ANALYSIS

The regression analysis³ is divided into four main groups of dependent variables.

The four main groups are:

- Aggregates
- Taxes
- Expenditures
- Performances

Expenditures are further divided into six subgroups:

- Payrolls
- Pensions and social expenditures
- Health
- Education
- Investment
- Subsidies

The six groups of expenditure analyzed here cross the lines of the usual expenditure classifications. Payrolls clearly belong to the economic classification and run across the functional classification. Health and education clearly belong to the functional classification but include a large amount of wages and some investment.

The choice of these six items in government expenditure should, however, not be surprising. Each item is a major element of spending in its classification, and can possibly crowd out the others. Each item is also the object of much debate and represents well-defined policy options. Except possibly for payrolls and subsidies, performance indicators can be clearly identified. Finally, the items cover the distributional and the public good provision role of the government. The third classical role of a government in a market economy (according to Musgrave), providing stability, is covered in the analysis of the aggregates.

³ A NOTE ON THE REGRESSION TABLES

The tables always contain the following information:

Equations are in columns, when necessary the dependent variable is recalled on top of the column.

R^2 is the determination coefficient.

T-statistics are in parentheses, significance levels are indicated as follows ** < 1%, * < 5%, + < 10 percent.

Missing observations are explicitly named for transition countries only.

Residuals are given for transition countries when they exceed the one-standard-deviation band.

Taxes and expenditures can be normalized as comparable dollars per capita, share of GDP, or share of total public expenditure. We choose the last two, mainly for simplicity. There can be significant differences between the share of GDP and the share of total spending of a budgetary item. This difference mainly depends on the share of total spending in GDP. In addition, one can expect that the priorities of a country will be reflected more clearly in the analysis of the budgetary share of a spending item than in the GDP share.

1. Aggregates

The study of the aggregates revolves around the size of government redistribution (the share of expenditure or revenue in GDP), the financial management (budget deficits and debts) and the growth or income performance. The regression results are presented in Tables 1, 2 and 3.

a. The size of public redistribution

The size of the redistribution taking place in socialist countries seemed strikingly large before 1989. It has been reduced since then by large cuts in subsidies and budgeted transfers among state enterprises. The "systemic" dummy variable is expected to be significant before 1989 and to vanish after 1989. The inheritance from the past could still have been visible in the dummy variable once other determinants of the size of the governments are taken into account, but in our regressions presented in Table 1, the transition countries do not seem to spend more than OECD countries with similar shares of retirees or levels of income and inequality.

The in-significance of the transition dummy, despite a high share of expenditure in GDP, may be mainly due to the relatively egalitarian income distribution achieved by the transition countries. Of the OECD countries, the egalitarian countries are also the largest spenders.

A high income per capita (GDPHS) is expected to enable a country to raise taxes efficiently and maintain a big government. This is certainly true when one compares developing countries with OECD countries, but the relation seems weak (or non-linear) in our sample.

Table 1. The Size of Public Redistribution

Regression results

Dependent variable EXPGDP

Regressors:

transition:

DUMMY	-	-	-	-
structural:				
GDPHS (E-3)	-	-	0.87 (1.57)	-
INEQUAL	-1.15 (-2.49*)	-1.17 (-2.00+)	-2.23 (-3.64**)	-0.99 (-2.26*)
DDO	-	-	-	-
specific:				
GLABOUR	0.43 (2.08+)	0.91 (3.96**)	-	0.54 (2.69*)
ADRDDO	-	-	-	-
ADR	-	-	-	-
DEBTGDP	-	0.07 (1.95+)	-	-
GINVEXP	-1.23 (-3.67**)	-	-	-0.91 (-2.62*)
TTAXREV	-	-	0.98 (3.08**)	-
SOCWAGE	-	-	-	0.12 (1.90+)
R2	77.8	63.0	55.3	82.4
F	17.5	8.5	6.6	16.4
Observations	19	19	20	19
Missing	Czech R. n.a.	Czech R. n.a.	Czech R. n.a.	Czech R.
Residuals	Slovenia +5.8 Hungary -4.8	Slovenia +11.4	-	Hungary -5.3

Dependent variable REVGDP

Regressors:

structural:

LGDPHS	-	9.45 (2.04+)	-
GDPHS (E-3)	-	-	0.90 (1.80+)
INEQUAL	-1.29 (-2.65*)	-2.24 (-4.21**)	-2.22 (-4.04**)
specific:			
GLABOUR	0.63 (3.12**)	-	-
ADRDDO	-	-	-
ADR	-	-	-
DEBTGDP	-	-	-
GINVEXP	-	-	-
TTAXREV	-	0.72 (2.78*)	0.76 (2.67*)
R2	58.8	57.3	55.3
F	12.1	7.1	6.6
Observations	20	20	20
Missing	Czech R. n.a.	Czech R. n.a.	Czech R. n.a.
Residuals	Hungary -6.0 Slovenia +11.6	Slovenia +9.6	Slovenia +10.1

Table 2. The Financial Management: Budget Deficits and Debts

Dependent variable	BDGDP (Budget Deficit as a share of GDP)		or MISERY (Sum of Inflation and Unemployment)	
	BDGDP	BDGDP	MISERY	
Regressors:				
structural:				
LGDPHS	-	-	-27.07	(-6.66**)
LIQUID	12.02 (3.68**)	9.95 (2.77*)	-29.68	(-3.69**)
INEQUAL	-	-	1.60	(3.02**)
specific:				
GLABOUR	-	-0.13 (-1.27)	-	
ADR	-	-	-	
DEBTGDP	-0.047(-3.32**)	-0.049(-3.27**)	-	
R2	62.6	65.6	83.9	
F	15.9	10.8	26.2	
Observations	22	21	19	
Residuals	Slovenia +3.6	Slovenia +2.6	Slovenia +14.0	
Missing	-	-	Czech R. n.a.	

Table 3. The Growth or Income Performance

Dependent variable	GDPHS (Heston-Summers GDP at PPP)			
Regressors:				
structural				
INEQUAL	-	-	-	-
LIQUID	-	-	-	-
DDO	-	-	1039.91(2.11*)	-
performance:				
PATENTS	16.0 (3.66**)	14.13 (3.43**)	14.52 (3.28**)	-
TERTIARY	12.3 (3.11**)	-	-	-
UENTRY	-	-	-	78.42 (3.46**)
LIFE	-	764.83 (3.94**)	1024.15 (3.87**)	-
TELEPHONES	-	-	-	11.33 (2.95**)
specific:				
RADGDP (*100)	-	-	-	21.24 (3.50**)
GRADGDP	-	-	-	-
INVGDP	-	-276.78 (-2.60*)	-	-
GINVEXP	-	-	-1280.64 (-2.47*)	-
R2	71.9	74.9	75.1	87.8
F	23.0	20.8	14.3	47.8
Observations	21	25	24	24
Residuals	Slovenia+3520	-	Poland -2528	Slovenia +2908
Missing	-	-	-	Czech R. n.a. Hungary n.a.

A low old-age demographic dependency ratio (DDO: working age population divided by the number of people aged 65 and above), is expected to raise both pension and health expenditure needs, especially when the proportion of old people is high. A young population may require important education expenditures (DDY : young demographic dependency ratio or TDDO: total demographic dependency ratio). Good performance of the specific variable called actual dependency ratio (ADR: number of pensioners divided by the number of employees), which also includes early retirees, would indicate that early retirement could be one of the reasons for excess pension expenditures.

The variable measuring inequality (INEQUAL: share of income of the highest decile in total income) may indicate the tolerance of a country for inequality. If so, such tolerance is expected to have a negative effect on the size of the redistribution undertaken by the government. This is confirmed by our regressions (Table 1). The variable was also remarkably stable and significant in a number of non-reported regressions.

Some specific variables pulling expenditure upward could also be identified, either in the regression analysis or by looking at the residuals of a base regression. A policy-specific variable is identified if it enters significantly in the regression analysis of aggregate expenditure. A significant policy-specific variable is the share of government employment in total employment (GLABOUR): huge payrolls systematically drive expenditure upwards. Another important specific variable is pensions. The actual number of retirees per employee (ADR) seems to raise total expenditure. The ease of early retirement, measured by the number of retirees divided by the number of people aged 65 and above (ADRDDO) seems to raise expenditure as well. These results could indicate the additional burden on the budget of early retirement.

The positive relation of debt and total expenditure could be expected for two reasons. If expenditure includes debt service, a huge debt raises this part of expenditure. If the accumulated debt indicates the continuing inability of a country to master its spending, then the positive correlation can also be expected.

More surprising is the negative relation between the share of government investment in total spending (GINVEXP) and total spending as a share of GDP. The relation is consistent with other observations in Table 1. Government investment is associated with low income and deficit finance. Our hypothesis is that investment is of the "catch up" type and takes place in relatively poor countries that can avoid to overburdening their economies with high taxes, and which enjoy financial credibility.⁴

⁴ This was the case of the South-Korean development success.

We expected that countries that rely primarily on indirect taxes will be able to redistribute less income. We see below that in fact such countries tolerate more inequality. Apparently, the regressions show that indirect taxes, by boosting income, boost expenditure. They are thus a non-negligible source of revenue! Here we should nevertheless note that the revenue explanation of the size of the government turned out to perform poorly when combined with specific expenditure aspects.

The revenue regressions in Table 1 differ slightly from the expenditure ones. Theoretically, the difference is the budget deficit. This explanation may find some confirmation (investment regressions) in the link between government investment and deficit finance. Simultaneity need not be the case in all countries and some noise or lags may also affect the relations. The non-linear relation of revenue in GDP with GDP per capita should not be a surprise: it says that very rich countries will not redistribute 100 percent of GDP through government expenditure.

We tend to prefer the first and fourth expenditure regression (driven by specific items) and the second revenue regression (driven by the natural logarithm of GDP at purchasing power parity and by the share of indirect tax revenue in total public spending). We would like to draw the attention of policy makers to the risks that a large payroll and generous retirement policy represent for expenditure management. Marginal significance of the replacement rate (SOCWAGE: the share of social transfers from the government budget in wages) indicates that some pensions are most likely too high, rather than that there are too many pensioners. The demographic aspect (DDO) is not significant. Thus having an old population does not necessarily raise government expenditures. To draw a definite conclusion, we must also look at the pension and social transfers regressions.

Finally, the residuals indicate a tendency of Slovenia and Poland to overspend, while Hungary could possibly raise even more revenue by increasing indirect taxation.

b. Financial management (deficits and debts)

High budget deficits and external debts need not be a characteristic of socialist countries. The socialist experiences of Poland and Hungary or of Romania and Russia (all highly indebted) differ from the Czech Republic (low debt, low recent deficits). We do not expect our transition dummy to be significant. If we could find a good indicator of the degree of control of the central planner on the economy, it would probably be negatively correlated with the indebtedness of a socialist country, but it would be of little significance for comparison with OECD

countries. We then turn to structural and specific variables. Table 2 gives the regression results.

Of the structural variables, we used variables linked with the affordability of a borrowing policy: a high income per capita, relatively deep financial markets (proxied by LIQUID: the ratio of M2 to GDP). It turns out (see the first and second equation in Table 2) out that liquidity is the only structural variable with a significant effect on the budget deficit: a positive effect, as expected. Inequality (INEQUAL) was also expected to raise budget deficits, but this is not confirmed in our sample and using our methodology.⁵

Of the policy-specific variables, we expected that the government payroll and pensions would be hard to compress and to lead to recurrent deficits. For our data sample, the governments' share of employment (GLABOUR) is not significant, as illustrated by the second regression in Table 2. At least in its form of actual number of retirees per employed person, ADR also turned out to be insignificant. In the future it could be interesting to determine whether the quantities (ratio of effective to demographic dependency, share of government employment in total employment) are more or less significant than the volume variables (wage expenditure, pension expenditure).

Table 2 also shows the negative coefficient of the Debt/GDP ratio, indicating stronger deficit reduction efforts in highly indebted countries. This trend has also been observed by Martin & Oxley (1991) for the OECD countries.

We include a regression analysis of the "misery index" (MISERY: the sum of the unemployment and inflation rates). We find that liquidity and the natural logarithm of GDP at purchasing power parity were determinants of the misery index: financially stable and rich countries manage to have lower inflation and lower unemployment. Some inequality returns (in the third regression in Table 2): social conflict produces inflation and unemployment. The share of government employees in total employment is not too costly provided that the country is rich and financially credible otherwise.

We have not found that the debt-to-GDP ratio contributed significantly to the misery index. What we have found is that a country tries to go back to a more virtuous path by reducing its deficit.

⁵ A number of studies have already been conducted on budget deficits and social conflict. Roubini and Sachs (1989) have shown that coalition governments were more prone to deficits than homogenous governments. Berg and Sachs (1988) have identified a number of determinants of high indebtedness including the degree of inequality, income per capita, the trade regime, and regional variables. More recently, Alesina (1994) observed a negative correlation between successful stabilization attempts and the persistence of high social expenditures.

Table 2 also shows that liquidity is positive and significant in budget deficit regressions and negative and significant in misery regressions. A highly monetized economy can afford a larger deficit and a lower misery index because of its large borrowing possibilities (see also Sachs 1994, Sachs & Zini 1994).

c. GDP per capita

Our last aggregate variable is income per capita. We are aware of the existence of an extensive literature on comparisons of income per capita and growth rates across countries. Our purpose here is limited to analyzing elements of budgetary policy that are correlated with income per capita.

In the analysis of expenditure components like health and education, we will see that income per capita is a systematic determinant of the size of these labor intensive and costly services. In the analysis of GDP per capita, we want to see if one component of expenditure adds something to national income, given that the others are already in the regression.

We also expect the socialist system to have produced a relatively low income per capita given the other services it provided (such as high unemployment compensation and high state pensions). The dummy variable is expected to be significant in a regression based on dollar income rather than purchasing power parities (GDPHS), reflecting the anti-service and anti-trade bias of the former system. For the income at purchasing power parity, the dummy is insignificant. The socialist countries share with some of the poor OECD countries poor performance in services, health, and infrastructure provision which explains their low income per capita.⁶ This indirectly justifies the use of the Heston-Summers methodology to compute purchasing power parity incomes.

Our regressions are based on the level of income per capita rather than growth rates⁷. It is difficult to find meaningful growth rates for Central Europe and to

⁶ However, as illustrated by the case of Sweden, good performance in social service indicators does not lower GDP per capita.

⁷ The results of other studies of long-term growth rates for different sets of countries can be summarized as follows. The most significant variable seems to be the extent of primary or secondary education at the start of the reference period (Barro 1991, Barro & Sala-i-Martin 1995). Health is often significant too. The income level at the start of the reference period. This result is often negatively correlated with subsequent growth, provided other variables (education) are included in the regression. This result indicates that catch-up is possible if the right means are used. More debatable is the role of physical investment, although Delong and Summers (1991) have provided some evidence of its importance.

define a meaningful period of reference. Table 3 gives the growth or income performance regressions for our sample.

For our country sample INVGDP was negatively correlated with income per capita. This is demonstrated by the third regression in Table 3, but is to be interpreted with caution. The catch-up by poor countries may be attributable to large investments. Nevertheless, it is also possible that some of this investment is actually a waste of resources. Given the association of the share of government investment in public spending with low aggregate public spending (see aggregate expenditure regressions in Table 1) and with deficit finance (see investment regressions in Table 9), we favor the catch-up hypothesis.⁸

2. Taxes

We concentrate on the two types of taxes whose change in Eastern Europe has been most visible: Indirect and corporate taxes. Indirect taxes have been completely overhauled with the introduction of the VAT and the reform of the import tariffs. Corporate Income Taxes have seen their importance decline. Social Security Contributions have risen somewhat, and personal income taxes have been introduced to replace wage taxes and to cover more than labour income. Personal Income taxes are being considered as residual income once the analysis of indirect and corporate taxes is done and social security taxes are taken as given.

Advanced countries finance their spending mainly through direct and indirect taxes. Some developing countries rely heavily on import tariffs and possibly on royalties from natural resources. Burgess and Stern (1993) presented these taxation patterns in a triangle whose vertices are (from left to right) direct taxes, indirect taxes and trade taxes. It is probably more interesting for advanced countries to redefine the triangle. Trade taxes would be added to indirect taxes on the upper point, the left point would measure social security taxes, while the right point would be limited to the sum of personal and corporate income taxes. The Western tradition treats corporate income partly as personal income and uses progressivity primarily for personal income taxes. Social security contributions are (or were) levied at flat, if not regressive (in the United States), rates, justified by the return or insurance principle.

If we look at Figure 2 we can compare the Slovene country point with those for Transition and OECD country averages. Indirect taxes represent 33.4% of tax revenue in Slovenia, 6.5 percentage points less than the transition country average

⁸ We also found government investment (GINVEXP) to be negatively correlated with total expenditure in the first and the fourth regression in Table 1 and with income per capita in the the third regression in Table 3.

and 1.6 percentage points less than OECD country average. Social security contributions generate half of total tax income in Slovenia, while transition and OECD averages amount respectively to only 37.1% and 26.1%. Indirect taxes in Slovenia are low, with a share of 16.6% only, 6.4 percentage points less than transition country average and 22.1 percentage points less than OECD country average.

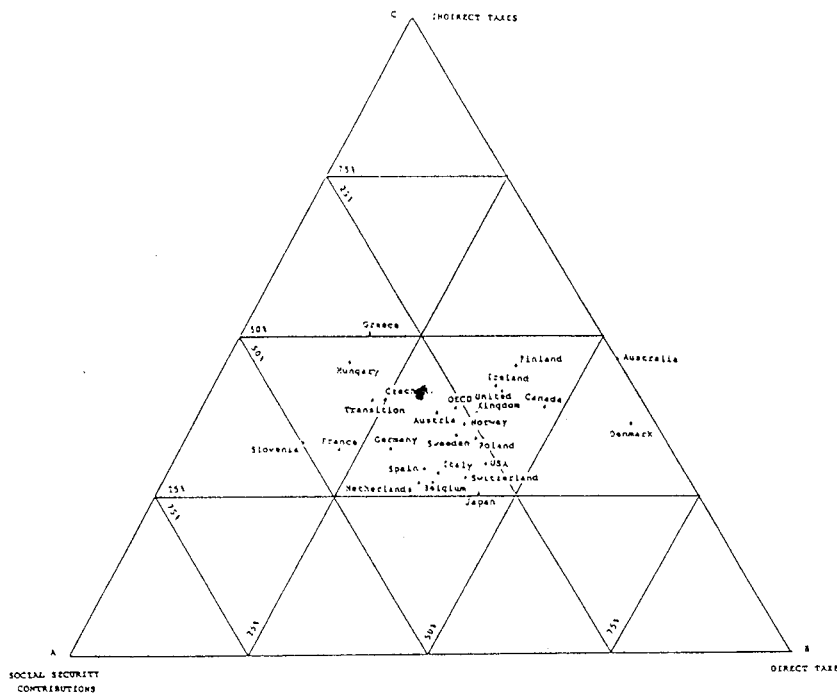


Figure 2. The Tax Triangle

a. Indirect taxes

As can be observed from Table 4, we didn't get significant results for the transition DUMMY, although we expected that Central European countries' indirect taxes were too low. This could be because there are still (after the VAT) unexploited possibilities of indirect taxation) or because (some of) transition countries finance high expenditures by increasing foreign debt rather than increasing taxes, or both.

Interestingly, as documented by the first regression, inequality explains only the share of indirect taxes in total taxes, not its share in GDP. Inequality, on the other hand, tends to reduce the total amount of taxes in GDP (see above, aggregate expenditure regressions in Table 1). The two observations are consistent. The dummy is insignificant. After the reform of turnover taxes and the introduction of the VAT, the transition effect seems to be fully captured by low GDP.

Table 4. Indirect Taxes

Dependent variable	TTAXGDP (Indirect taxes as a share of GDP)		or TTAXREV (Indirect taxes as a share of Revenue)	
	TTAXREV		TTAXGDP	
Regressors:				
systemic				
DUMMY	-		-	
structural:				
GDPHS (*10E-3)	-1.10	(-6.03**)	-0.48	(-4.92**)
LIQUID	-		-	
INEQUAL	1.04	(4.17**)	-	
specific:				
GLABOUR	0.66	(6.65**)	0.38	(6.17**)
TRANSFER (SOCEXP)	-		-	
DEBTGDP	-		-	
R2	82.7		73.5	
F	25.5		29.1	
Observations	20		24	
Residuals	Poland -4.1		Poland -3.0	
			Slovenia +4.1	
Missing	Czech R.		-	

Income per capita (GDPHS) reduces the share of indirect taxes to the benefit of direct taxes. It reduces social security contributions less often. Burgess and Stern (1993) have also noted the importance of direct taxes in rich countries. The rich countries of Western Europe are currently looking for ways to reduce social security contributions and to raise indirect taxes.

b. Corporate income taxes

As for indirect taxes, it is indeed useful to distinguish their share in GDP and their share in total taxes. Table 5 reports regressions for gross corporate taxes as a share of revenue.

The share of state enterprises in total output (STATEQ) has a positive effect on corporate taxes as a share of total taxes (CTAXREV). The role of the dummy is unclear: its negative sign probably compensates for the very high share of state firms in total output in transition countries. The negative residual in first regression shows that Slovenia has a very low share of corporate taxes in total public revenue.

Table 5. Gross Corporate Taxes

Dependent variable	CTAXREV (Gross Corporate taxes as a share of Revenue)					
Regressors:						
systemic						
DUMMY	-20.81	(-2.72*)	-17.52	(-1.84+)	-16.51	(-1.82+)
structural:						
GDPHS (*10E-3)	-		-		-	
LIQUID	-		-		-	
INEQUAL	-		-		-	
specific:						
SUBSIDY	-1.32	(-1.31)	-1.72	(-1.30)	-1.96	(-1.63)
SOCGDP	-		-0.21	(-1.06)	-	
SOCEXP	-		-		-0.15	(-1.34)
SATEQ	0.37	(3.16**)	0.35	(2.41*)	0.35	(2.54*)
R2	49.2		60.7		63.0	
F	3.8		3.8		4.2	
Observations	16		15		15	
Residuals	Slovenia -4.1		-		-	
Missing	-		-		-	

3. Expenditure

a. Labour expenditure and payrolls

Labour expenditure is an economic category, not a functional category. The variable is interesting to study. It is often feared that labour expenditure will crowd out goods and services, either in years where the government has to reduce its spending or because wages would be raised by a relative price effect not compensated by increased productivity.

The government's payroll swelled because of the number of people on it or because of the wages they earn. We examined each separately. The regression results are given in Table 6.

The large share of government employment in total employment (GLABOUR) seems hard to explain, possibly because it is usually small and may cover different parts of education and health across countries. Economies of scale seem to be the only clear factor: a larger population is correlated with a smaller number of people per capita on the government payroll (not reported in the tables). We also know from the aggregate government expenditure regressions (Table 1) that a higher share of government employment in total employment could explain higher

expenditures, but we know from the budget deficit regressions that this does not imply a larger deficit.

Table 6. State Employment and Labour Expenditure

Dependent variable	STATEL (State employment / total employment) or GLABOUR (Govt. services empl./ total empl.) or WAGESEXP (Share of wages in govt. expendit.)		
	STATEL	STATEL	WAGESEXP
Regresors:			
transition			
DUMMY	51.49 (16.30**)	60.86 (11.66**)	-
structural:			
GDPHS(*10E-3)	-1.11 (-4.32**)	-0.78 (-1.97+)	-
GDP\$WB(*10E-3)	-	-	-0.82 (-4.60**)
POPULATION	-	-	-
INEQUAL	-	-	-
specific:			
GINVGDP	-	2.01 (2.92*)	-
GINVEXP	-	-	-
TRANSFER	-	-	-0.24 (-3.74**)
R2	98.4	99.2	70.6
F	347.5	375.6	22.8
Observations	14	13	22
Residuals	-	-	Poland -6.9 Czech R.+7.0 Slovenia n.a.
Missing	Czech R. n.a. Slovenia n.a.	Czech R. n.a. Slovenia n.a.	

If we look at the third regression, wage expenditure as a share of total spending (WAGESEXP) is negatively correlated with GDP per capita in current dollars. For our data sample, the hypothesis of a "relative price effect" made by Martin and Oxley (1991) cannot be confirmed.

Would the negative correlation of wage expenditures with transfer expenditures indicate some substitution? Unfortunately we do not see the effect clearly.

A regression where wage expenditure seem to rise with the number of teachers in the total population (but less clearly with the ratio of teachers per student, it may then be an effect of the number of students) is not reported here. Our results on education below add little information, except a possible positive effect of income per capita.

We also study state employment, i.e. employment in state firms as a share of total employment (STATEL). The data come from Milanovic (1989) and are available for a limited number of countries. If we look at the first and second regression in Table 6 we note the negative relation with GDP and the positive relation with government investment (GINVGDP). The catch-up hypothesis is not rejected.

However, the contribution of state employment and of government investment to growth can be debated as the transition countries have chosen to rely more on the private sector. A shift of resources towards R&D and investments in human capital may be needed as the economy becomes more sophisticated and service-oriented (see GDP regressions in Table 3 and investment regressions in Table 9).

b. Pension expenditure, effective dependency ratios

We have also studied pension expenditure as a share of GDP (PENSION), social transfers in percent of GDP (SOCGDP), and actual dependency ratios (ADR). The regression results are presented in Table 7 below.

Demographics (DDO) are not significant in the pension regression (see also EXPGDP regressions in Table 1), confirming that having an old population does not necessarily raise pension expenditures. A highly significant DDO in the regression for social transfers as a share of GDP (SOCGDP) may be due to the high share of wages in GDP cost structure. It may help to substitute SOCGDP with the share of social transfers in total government expenditures.

The actual dependency ratio (ADR) is marginally significant or insignificant. It indicates that early retirement is not always a reason for excess pension expenditures.

In the SOCWAGE regression, the transition DUMMY is very significant, but this may be because of different data sources for transition and OECD countries.⁹

Poland and Slovenia have the highest replacement rate (SOCWAGE), i.e. 74% and 85% respective, in the sample. If we look at Table 7, the DUMMY and the residuals for Poland and Slovenia mean that given their very high replacement rates, the transition countries have less pensioners than the OECD countries would have. However, a negative DUMMY does not mean that there is room for a higher actual ratio of pensioners to employee (ADR) in transition countries. Certainly not as long as there is a budget deficit, underutilized indirect taxes, and underdeveloped tertiary education. We also found the old-age demographic ratio to be significant significant in ADR regressions.

⁹ We used Fox's (1994) data for Central Europe and national accounts data for the OECD.

Table 7. Pension Expenditure, Social Transfers
and Effective Dependency Ratios

Dependent variable	PENSION (Pension expend. as a share of GDP) or SOCGDP (Social transfers in % of GDP)			
	PENSION	SOCGDP	SOCEXP	SOCWAGE
Regressors:				
Transition DUMMY	-	-	-	31.98 (5.31**)
structural:				
LGDPHS	-	-	-	-
GDP\$WB(E-3)	-	-	-	-
DDO	-	-2.33 (-2.90**)	-3.23 (-1.51)	-
INEQUAL	-	-	-	-
performance:				
UNEMPLOY	-	-	-	0.58 (1.14)
specific:				
GLABOUR	0.13 (1.67)	-	-0.53 (-2.44*)	-
ADR	15.51 (2.45*)	-	-	-
SOCWAGE	0.10 (3.52**)	0.28 (8.53**)	0.38 (5.16**)	-
R2	61.5	78.4	62.62	64.0
F	5.3	36.8	10.0	17.7
Observations	14	23	22	23
Residuals	-	Czech R. -5.2 Poland -4.0	Czech R. -10.8 Poland -8.0 Slovenia +8.2	Hungary -15.6 Slovenia +18.8
Missing	-	-	-	-

Dependent variable ADR (Actual ratio Pensioners / employed)

Regressors:				
Transition DUMMY	-	-	-0.29 (-3.08**)	
structural				
DDO	-0.25 (-4.45**)	-0.25 (-3.97**)	-	-
INEQUAL	-	-	-	-
performance				
UNEMPLOY	0.03 (4.80**)	0.03 (4.84**)	0.02 (3.27**)	
specific:				
GLABOUR	-0.02 (-3.83**)	-0.02 (-3.57**)	-0.007 (-1.41)	
INVGDP	-	-	-	-
SOCGDP	-	-	-	-
SOCWAGE	-	-0.002 (-0.97)	-	-
R2	60.3	64.7	46.3	
F	10.1	7.7	5.7	
Observations	24	22	24	
Residuals	Slovenia -0.2 Poland -0.2	Czech R. +0.1 Poland -0.1	Czech R. +0.2 Poland -0.1	
Missing	-	-	-	-

c. Health expenditure

There is a strong positive correlation between health expenditure per capita and income per capita; the relation is well-documented for the OECD countries (OECD 1992). The explanation is that rich countries can afford more sophisticated health systems and that rich people are ready to pay more for healthcare. Moreover, health may be labour intensive and the relative price of labour is higher in rich countries (see also Martin & Oxley 1991).

The greater human capital may contribute positively to its income per capita or to its growth.¹⁰ We saw the positive link between life expectancy and the GDP level in our GDP regressions in Table 3 (although research and infrastructure mattered possibly even more). The health performance of a country, as measured by infant mortality, and to a lesser extent, life expectancy is related to its expenditures on health. There will then be voices to ask for more health expenditures as a way to grow faster. We want to identify the part of health expenditures that contribute most to health as measured by life expectancy and those that contribute most to health spending.

In health systems there are three main variables that could be more relevant than a dummy: national health services (centralized insurance and provision, as in Britain, with low cost and low performance), social pooling (centralized or compulsory insurance, but more or less free provision as in Holland, Germany, and France with medium cost and good performance), private market systems (as in the United States, with high cost and unequal performance, depending upon people's purchasing power). A transition dummy, as expected, does not explain the share of GDP or expenditures going to health, even if most transition countries have systems closer to the British type and plan to move away from it.

The systematic determinant of health expenditures is GDP per capita (see the first regression in Table 8). Nevertheless, demographics could also play a role: older populations may need more health services.

We can identify a number of specific determinants of health expenditures: doctors, personnel, and hospital beds. Health performance, especially infant mortality, may be affected by the level of education of the population.¹¹ It would be interesting to test this hypothesis for the advanced countries in our sample.

¹⁰ There is some evidence of it in Barro and Sala-i-Martin (1995).

¹¹ Forward (output) linkages between education and life expectancy exists in developing countries. (Pleskovic and Sivitanides, 1993).

Table 8. Health Expenditure

Dependent variable	HEALTHGD (Health expend. as a share of GDP)	HEALTHEXP (Health spending in % of spending)
	HEALTHGD	HEALTHEXP
Regressors:		
structural:		
GDPHS (E-3)	0.37 (6.9**)	-
GDP\$WB (E-3)	-	-
DDO	-	-
INEQUAL	-	0.65 (3.7**)
Performance		
UNEMPLOY	-	0.38 (2.86*)
specific:		
GLABOUR	-	-
ADR	-	-
RETIREES (E-5)	1.87 (1.35)	-
STUDENTS	0.02 (2.30*)	-
DOCTORS	-	0.86 (1.49)
HBEDS	-	0.35 (1.90+)
R2	76.9	52.7
F	22.2	4.2
Observations	24	14
Residuals	Slovenia +1.5	Hungary -3.1
Missing	Czech R.	Czech R.

The share of health expenditures in GDP is positively correlated with any measure of GDP per capita (there may be a demand and a relative price effect working in the same direction). This is a stronger result than the one in OECD (1992), where the positive correlation was between PPP dollars of health expenditure per capita and income per capita.

The positive relation with GDP per capita disappears for health expenditure as a share of total expenditure (HEALTHEX). The second regression in Table 8 shows a positive correlation with inequality, while there is a negative correlation between total expenditure and inequality (see Table 1). Does this suggest that government health expenditures mainly help the rich? There is also a positive relation with unemployment (UNEMPLOY) which would suggest the opposite. This issue remains unresolved. The number of doctors (DOCTORS) doesn't affect the share of health spending in the budget, but the number of hospital beds (HBEDS) does. Old-age dependency was also insignificant in the regression, while we would have expected that a larger number of old people would require more medical attention.

d. Education

In the regressions we found nothing significant, except possibly a slight positive correlation between the share of education expenditures in total expenditures and the income per capita. This would indicate that the demand or the relative price of education tends to rise with GDP.

For education, as for health, an analysis of costs and performance could be useful. The relation between education and economic growth is probably even stronger than the relation between health and economic growth. The relation between education expenditures and income per capita may be a bit weaker than the relation between health expenditures and income per capita. If this is true, poor countries, if they want to overspend, would be better advised to do it on education than on health, so because seems to be a positive relation between primary education and health. Education and health are labour intensive and may record less productivity gains than health, so it may absorb a larger income share in rich countries. Education is sometimes seen as a luxury in that longer studies in rich countries only marginally contribute to labour productivity, but higher education may also be used as a signal to screen entrants to the labour market and thus produce indirect productivity gains.

We proceed for education as for health and look at costs and performance. Unfortunately, it is harder to identify a good performance indicator for education. We tried entry at the university as a performance indicator of the primary and secondary systems. We tried R&D and patents as an indicator of higher educational performance.

Systemic variables are the usual dummies for transition countries. We expect transition countries to have a lower rate of university entry than they could have. If this is true and if university education is really "productive", it indicates an area where foreign assistance would be well advised to concentrate, possibly also European Union assistance in the framework of European Union integration.

e. Investment

If we look at the first and second regression in the table 9, it follows that the budget deficit (BDGDP) is positively correlated with the share of government investment in total spending (GINVEXP) and negatively correlated with the share of expenditure (EXPGDP). This confirms the catch-up hypothesis (see also interpretations of Tables 1 and 3).

The different behaviour of the GINV and the GRAD variables confirms the fact that the GINV variables are correlated with poor countries, and GRAD variables with rich countries. There could thus be a progressive shift from the first to the second in government expenditure as the country grows and to help it grow.

Table 9. Investment

Dependent variable	GINVEXP (Gov. investment/gov.spending)	GINVEXP (Gov. investment/GDP)	GRADGDP (Gov. R&D spending/GDP)
	GINVEXP	GINVEXP	GRADGDP
Regressors:			
transition			
DUMMY	-	-	-
structural:			
DDY	-	2.46 (1.25+)	-
GDPHS (E-3)	-	-	0.04 (3.2**)
INEQUAL	-	-0.61 (-2.49*)	-
specific:			
BDGDP	0.44 (3.1**)	-	-
EXPGDP	-0.21 (-3.4**)	-0.07 (-5.6**)	-
REVGDP	-	-	0.01 (1.82+)
TRANSFER	-	-	0.01 (2.16*)
R2	63.6	70.3	59.1
F	18.4	11.8	8.2
Observations	24	19	21
Residuals	-	Hungary -3.4	
Missing	-	Czech R. n.a.	Czech R. n.a. Hungary n.a.

f. Subsidies

A strong correlation between subsidies and the share of output produced by state enterprises can be observed. The T- statistic is 5.38, and the R^2 is 67.4 on 16 observations, including the 4 transition countries.

Given very high state employment, transition countries have relatively low corporate tax revenue. This is especially true for Slovenia. Transition economies certainly had to reform tax systems if they want to privatize. It seems that the state employment doesn't produce much for the owner (see negative DUMMY in CTAXREV regressions in Table 5); hopefully it produces something for society.

4. Performances

a. Patents

Regressions for patents are inconclusive. Variables that show potential performance are RADGDP, RESEARCH (number of researchers per worker), and GDP itself. Regression results are given in Table 10 below.

Table 10. Expenditures on R&D

Dependent variable	RADGDP (Gross domestic R&D expenditure /GDP)		or RADPC (Gross domestic R&D expenditure in PPP dollars)	
	RADGDP		RADPC	
Regressors:				
transition				
DUMMY	0.94 (2.58 *)		-	-
structural:				
GDP\$WB(E-0.5)	9.93 (3.7**)		-	-
GDPHS	-		0.03 (4.8**)	0.03 (4.4**)
GDP92	-		-0.00 (-1.68)	-
specific:				
RESEARCH	0.02 (1.84+)		3.10 (2.96*)	3.59 (3.4**)
GINVEXP	-		-	-
EDUGDP	-		-49.64 (-2.12+)	-
R2	78.8		83.4	80.7
F	24.8		16.3	42.0
Observations	24		18	23
Residuals	-		-	-
Missing	Czech R. n.a.		Czech R. n.a.	Czech R. n.a.
	Hungary n.a.		Hungary n.a.	Hungary n.a.
			Poland n.a.	Poland n.a.

Table 11. Tertiary Education

Dependent variable	TERTIARY (Share of age-group entering)		or RADPC (Gross domestic R&D expenditure in PPP dollars)	
	TERTIARY		RADPC	
Regressors:				
transition				
DUMMY	-147.64 (-2.08+)		-38.34 (-0.40)	
structural:				
GDP\$WB(E-0.5)	-		-	
GDPHS	0.02 (2.9**)		0.02 (4.25**)	
specific:				
RESEARCH	-		3.39 (2.90**)	
GINVEXP	-		-	
EDUGDP	-		-	
R2	60.4		80.9	
F	13.7		26.8	
Observations	21		23	
Residuals	-		-	
Missing	-		Czech. R	
			Hungary	
			Poland	

The RADGDP regression is interesting if we can show a positive correlation with patents or another indicator of performance.

It seems that education expenditure is negatively correlated with research expenditure. The question is whether this a desirable substitution.

b. Tertiary Education

Our regressions (see Table 11) confirm that the transition countries have underprovided access to higher education, even when we take their relatively low GDP per capita into account.

c. Infrastructure

Infrastructure regressions are inconclusive.

d. Life expectancy and other output indicators of health performance

Once per capita income is taken into account, health spending as a share of total expenditure is significant for life expectancy (see the first and second regression in Table 12). The number of doctors is marginally significant. The hospital beds turn out to be insignificant.

Table 12. Life Expectancy and Infant Mortality

Dependent variable	LIFE (Life expectancy at birth) or INFANTM (Infant Mortality per 1000 of live births)		
	LIFE	LIFE	INFANTM
Regressors:			
transition			
DUMMY	-	-3.18 (-3.06**)	-
structural:			
GDP\$WB(E-3)	0.06 (6.8**)	-	-0.27 (-3.3**)
GDPHS(E-3)	-	0.31 (3.25**)	-
specific:			
DOCTORS	0.72 (1.72+)	0.84 (2.03+)	-0.32 (-0.58)
HBEDS	-	0.14 (1.31)	-0.14 (-1.07)
HEALTHGDP	-	-	-
HEALTHEXP	-	-	-0.35 (-1.95+)
R2	70.5	73.4	51.1
F	27.5	14.5	5.0
Observations	26	26	24
Residuals	-	-	Hungary +3.0 Poland +3.8 Czech R. n.a.
Missing	-	-	

For infant mortality (third regression in Table 12), the main determinant may well be GDP in dollars, showing that it is much harder to reduce the risks there. The respective role of health expenditures and number of doctors per capita is harder to determine. Medical infrastructure may indeed play a larger role once its performances increases to the point where the smallest gains become very costly.

EFFICIENCY ANALYSIS

We followed the cost-efficiency approach of Vanden Eeckaut, Tulkens and Jamar (1993). We first ranked all countries in the sample according to the share of their public expenditures in GDP; this is our cost indicator.

Next, we choose six output or performance indicators.

- **Patents.** The number of patent applications per 100.000 inhabitants, as a measure of technological advancement. The division by the number of inhabitants makes it an acceptable indicator for small countries too. Source: *OECD in Figures, Supplement to the OECD Observer, No.188, June/July 1994, pp.56-57, and National Statistical Yearbooks for Czech Republic, Hungary and Poland, Ministry of Science and Technology for Slovenia.*

- **University entry.** Percentage of the age group beginning tertiary education, as a measure of the performance of the primary and secondary education and as a measure of the effort to accumulate human capital. Source: *World Development Report, The World Bank 1994, pp.216-217.*

- **Infant mortality per 1000 live births.** This is an output indicator of the performance of the health system. For advanced countries it is a more demanding measure than life expectancy. Source: *World Development Report, The World Bank 1994, pp.214- 215.*

- **Life expectancy at birth.** This is also an output indicator of the performance of the health system. It is strongly correlated with the infant mortality rate. It is often used as a measure of human development (United Nations). Source: *World Development Report, The World Bank 1994, pp.162- 163.*

- **Old Age Demographic Dependency Ratio** is defined as a ratio of the working age population (15-64 incl.) to the number of old people (65 and older). This indicator measures the burden of pensions and health care for the elderly, which is usually supported by some form of state intervention. We did not want to use the actual dependency ratio, as this is a self-inflicted burden.

- **Telephone main lines per 1000 persons.** This appeared to us as a good indicator of modern infrastructure. We know from our regressions that public investment is not necessarily positively correlated with GDP per capita, while telephones are. Infrastructure is partly a state responsibility insofar as it includes important positive externalities. Source: *World Development Report, The World Bank 1994, pp.224-225.*

Thus, of our six performance indicators, two are actually substitutes: infant mortality and life expectancy both measure health performance. This redundancy has very little effect on the analysis.

Cost efficiency is reached if it is impossible to find a country that spends less and performs better or as well in all performance indicators.

Cost inefficiency exists, if there is a country that spends less and performs better or as well in all indicators. The better performing country is called by Tulkens (1993) "dominating". If many countries perform better, the "most dominating" country is the one that has the lowest expenditure.

The degree of inefficiency is measured as the ratio of the expenditure of the dominating country to the expenditure of the inefficient country.

It is interesting to compare an inefficient country with a dominating country to see where performance could be improved. If there are many dominating countries, various options of performance improvement may be available. The dominating countries which are in turn dominated by other countries should be eliminated as comparators. The "most dominating" country is not necessarily the reference that an inefficient country should choose. The "most dominating" country is determined only in terms of costs. Some countries that spend more but are still efficient may offer a more attractive performance mix.

In table 13 we list of inefficient countries, their expenditure, and the degree of inefficiency with each of the "dominating" countries.

We will not dwell on Belgium, Italy, Greece and Portugal, which are all members of the European Union. Belgium, Italy, and Greece are well-known overspenders, whose deficit problems are linked to political problems. Greece and Portugal are notoriously poor. The domination of Belgium by Norway is only marginal, and one can argue that Norway is an homogenous country, unlike Belgium, blessed with oil revenues, which make tax perception less distortionary, and thus enables Norway to perform better with marginally less spending. For Italy we do not seem to have a reliable number of patents, but the fact that Austria outperforms countries

like France, Canada, and Spain in patents may well place it above Italy in this respect too.

Table 13. Efficiency Analysis

Inefficient	Expenditure	Degree	Comparator
BELGIUM	55.2	95.8	Norway
HUNGARY	54.5	64.2	Switzerland
		70.3	Spain
		72.8	United Kingdom
		81.5	Germany
		83.9	Austria
		89.0	France
		97.1	Norway
ITALY	51.3	89.1	Austria
POLAND	50.7	50.1	Japan
		69.0	Switzerland
		71.8	USA
		72.2	Australia
		73.2	New-Zealand
		75.5	Spain
		(77.5	Portugal)
		78.3	United Kingdom
		82.6	Ireland
		87.6	Germany
		90.1	Austria
		(92.9	Greece)
		94.5	Canada
		95.7	France
		(97.4	Slovenia)
SLOVENIA	49.4	51.4	Japan
		70.9	Switzerland
		74.9	Australia
		75.1	New-Zealand
		80.4	United Kingdom
		84.8	Ireland
		89.9	Germany
		92.5	Austria
		97.0	Canada
		98.2	France
CZECH REP.	48.5	72.2	Switzerland
		75.1	USA
		79.0	Spain
		81.9	United Kingdom
		91.5	Germany
		94.2	Austria
		100.0	France
GREECE	47.1	74.3	Switzerland
		97.0	Austria
PORTUGAL	39.3	89.1	Switzerland

The situation of Turkey, a member of the OECD, is peculiar. It underperforms all countries in all indicators, except telephones where Poland and Hungary fare worse. Turkey, however, has the lowest expenditure share of GDP, which places it among the cost-efficient countries.

The situation of the transition countries is disappointing. On the expenditure side, one can claim that the GDP is understated, thus overstating expenditure. In addition, one can claim that a comparison of dollars per capita expenditure instead of expenditure share of GDP would be more favourable to the transition countries (they would seem to spend less).

For patents, from worst to best, we find Poland, Portugal, the Czech Republic, Greece, Hungary, Spain, and Slovenia (leaving out Turkey and Italy, for which we do not have observations).

For tertiary education, Hungary is at the bottom with Turkey at 15 percent enrollment followed by the Czech Republic (16 percent), Poland (22), and Portugal, Greece, and Slovenia (27 percent).

For telephones, Poland is at the bottom, followed by Hungary, Turkey, Portugal, Slovenia (which has 3 times as many lines per inhabitant as Poland), Ireland, and the Czech Republic.

The situation for life expectancy is also dramatic. Turkey is the lowest at 67 years, followed by Hungary (69), Poland (70), The Czech Republic (72), and Slovenia (73). Infant mortality is a bit less disappointing for Slovenia (8, less than several OECD countries) while the others (except Turkey) have poorer performances.

A major difference appears in the old-age dependency ratios. Poland and Slovenia have very young populations, while the Czech Republic ranks 10th and Hungary 12th. The Netherlands is younger, Finland older, and the USA in between. Contrary to common wisdom (Kolodko, G., *Rzeczpospolita*, 23.may, 1994), the problems with pension spending in Slovenia and Poland seem largely because of high average pension/wage replacement rates, and not primarily to the excessive number of early retirees (see regression analysis of pensions).

It is likely that the addition of other performance criteria could change some of the comparisons. An additional indicator could be inequality. The variable used in our regressions appears more as an indicator of the preferences of a country - less taxation if inequality is high - than as an objective - more redistribution if inequality is high. Nevertheless we suspect that the position of the four transition countries would be improved: their high expenditure shares could help maintain a more egalitarian

society.

In egalitarianism, Hungary and Poland are topped only by Sweden. But they have equal amounts of poverty. Belgium is also bouted against Norway when we look at the share of income of the poorest 40 percent, but not when we look at the richest 10 percent (which is less important). The jury is out for the Czech Republic, Greece, and Portugal for which we do not have data. Not-too-egalitarian Italy cannot be compared with Austria, which data is missing. Slovenia seems to help its poorest 40 percent but gives more to its richest 10 percent than Japan, Australia, Germany, Canada, and France.

Another additional indicator could be unemployment rate. We do not think, however, that a low rate is necessarily consequence of judicious public spending or that a high rate requires more spending. We see the unemployment rate as mainly determined by labour market institutions. Introducing this indicator would have helped the Czech Republic, but it would still be dominated by Switzerland. Spain would no longer dominate any country.

We would still like to consider two performance criteria. One would measure the quality of the environment, and the second would measure the number of people below the poverty line. But we have not get found appropriate data.

Our analysis can be distinguished from the Human Development Index computed in the "Human Development Report" of the United Nations Development Programme, in two respects: we do not weigh the indicators, but we compare performance against its costs. We intend to reproduce our cost efficiency analysis on the performance indicators of the Human Development Index.

Among the dominating countries that could raise limited enthusiasm in Central Europe, are a number of non-European, low-spending, young-population countries. Our data show a high infant mortality in the United States (9 per 1000 live births) compared with Slovenia (8). Life expectancy in the United States is only slightly above average (77). The United States does not dominate Hungary because of its younger population.

The poor performance of Spain in patents and telephones and (outside our list) employment makes it an unattractive comparator in the long run. The Scandinavian countries are not dominating because they all spend more, as do Belgium and the Netherlands, and because they have old populations. The socialist management of all these countries is currently under reform or criticism: this has proved to be extremely expensive and has produced very slow growth.

It is not surprising that Germany and Austria have attracted so many immigrants given our cost-efficiency analysis. We are not sure, however, that Central Europe

can reproduce the civil organization and social consensus that made these countries successful. We are also not sure that corporate pressures and extremism will not threaten Germany's and Austria's performance. Switzerland is also a consensus-country, but it has a decentralized structure, much lower taxes, and higher standards of living. France and USA could be attractive to Poland attraction for cultural and historical reasons.

CONCLUSIONS

If were to draw a convergence path for the transition economies it would appear as follows:

- State ownership should continue to be reduced, and possibly state-firm employment (if productivity is low). We would call for increased infrastructure equipment, which would allow for increased investment in R&D. Simultaneously, enrollment in higher education would have to be increased.
- Pensions would have to be kept low and received late. Dispersion of retirement ages and benefits should be reduced for pensions financed by the government on a pay-as-you-go basis. Similarly, health costs should be kept in check, especially by being cautious with health equipment. If anything, physicians should be given priority. A rise in health expenditure should be expected.
- Deficit finance should be limited to part of the infrastructure equipment. Inflation should be reduced to raise the liquidity and lending capacity of the economy. Indirect taxes should finance spending as much as possible. In general, taxes should be spread as evenly as possible, but the aggregate tax cannot be raised. The transition countries still redistribute too much of their GDP through the government.
- Rapid efficiency gains from infrastructure improvements, higher education, financial development, and international openness should be expected. The gains could easily translate into fiscal revenue if the appropriate tax system is in place and is correctly enforced. Transition countries must make sure that increased demand from a richer population for health and pensions is kept in check and safely financed with contributions and savings.

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