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Inequality, Growth and Public Spending in Central, East and Southeast Europe

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Mario Holzner

Inequality, Growth and Public Spending in Central, East and Southeast Europe

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Mario Holzner

Inequality, Growth and Public Spending in Central, East and Southeast Europe

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Inequality, Growth and Public Spending in Central, East and Southeast Europe

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Abstract

The article analyses the joint determinants of inequality and growth with a special emphasis on public spending structures in transition. The mutual benefit of low real interest rates, to both equity and economic development is a major result of this paper. In terms of public spending items we find a positive correlation with equity and a negative with growth as several of the government expenditure items seem to act counter-cyclically. In the late 1990's and early 2000's the European integration process allowed most of the transition economies to aim for the best of both worlds: equity and economic development.

Keywords:
Inequality, Government Expenditures, Economic Growth, Transition
JEL-Classification:
D63, H5, O4, P2

1. Introduction

The aim of this research[1] is to analyse empirically the relationship between economic inequality and public spending in a transition context. Moreover, the specific repercussions of inequality and public expenditures on economic growth are being studied. Our heuristic model of political economy, public spending, inequality and growth assumes that exogenous processes of the political economy sphere determine the level of public spending, which in turn influences both the level of inequality and the growth rate of the economy. Certainly, there are other factors determining inequality and growth too. Depending on the level and the types of public spending different outcomes are possible: a world with high public spending and both low inequality and high economic growth as well as its opposite and all the variations in between. Here we will look at the outcomes for a set of 28 transition economies from Central, East and Southeast Europe for the period of 1989 to 2006. In the next section we will give an overview of the empirical literature regarding inequality, growth, and public spending. Chapter 3 will develop the models that

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will be tested econometrically. Chapter 4 describes the data and its sources. The results of our econometric analysis will be presented in Chapter 5. The last chapter provides some conclusions.

2. Literature

The literature on the issues of inequality, growth and public spending is vast. Here we deliberately want to focus on some of the more recent empirical literature. Several articles that deal with the relationship between public spending and inequality specifically look at public expenditures for education. Bergh and Fink (2008) analyse data for 35 countries in a cross country regression on the change of the Gini coefficient (as a measure of economic inequality) between 1980 and 2000 and find weak evidence for a positive effect of public education expenditure on equality. Another more puzzling finding of this paper is that public subsidies to higher education do not increase enrollment. Similarly, Sylwester (2002) does a cross country Ordinary Least Squares (OLS) regression on the change of the Gini coefficient between 1970 and 1990 for a set of 50 countries. He finds public education expenditures to be associated with a decline in income inequality. This result is robust to the inclusion of various control variables and appears to be larger in high income nations.

Zhang (2008) controls for different types of education spending. In simple cross country regressions for about 50 countries over different periods between 1970 and 2000 he finds evidence of higher inequality being associated with more public spending on tertiary education and less spending on secondary education. From these stylised facts he develops a political economy model of income distribution dynamics, where persistent inequality is caused by persistent lobbying efforts of the wealthy that lead to an allocation of public education spending more biased towards them.

A paper that looks at social spending (de Mello and Tiongson, 2008) wants to test whether more unequal societies spend more on income redistribution or vice versa. Data on government transfers and social security and welfare expenditures, both as a share of GDP, are regressed on GDP per capita and the Gini coefficient in a cross-country setting for about 40 countries with averages of different periods between 1970 and 1998. The authors also included non-linearities and used in addition a Two-Stage Least Squares (2SLS) procedure with a few more control variables and instruments for capital markets imperfections. It is shown that more unequal societies do spend less on redistribution.

Castronova (2001) is testing whether inequality reduces income per capita because it induces social spending and whether inequality leads to more volatility of per capita income and may therefore reduce the level of per capita income. However, using a panel of 13 OECD countries over the period 1962-1991, the results of OLS and 2SLS panel estimators suggest that inequality does not seem to induce social spending and social spending does not seem to lower per capita incomes. Also, income volatility has little measurable impact on either per capita income or social spending.

Another strand of research deals with the relationship between inequality and economic growth. Here, more prominent researchers have made use of more sophisticated regression techniques. Barro (2000) uses a panel of a maximum of 100 countries with three decade averages between 1965 and 1995. The estimator is Three-Stage Least Squares (3SLS) with random effects and instruments which are mainly the lagged values of the regressors. Both growth and inequality are modeled, using a set of control and dummy variables. As a result the panel shows only little relation between income inequality and growth rates. Nevertheless, higher inequality tends to retard growth in poor countries and encourage growth in rich places. These results are in

support of the Kuznets curve theory, whereby inequality first increases and later decreases during the process of economic development.

An article by Mo (2000) finds a significant negative effect of inequality on growth. Various transmission channels are analysed, such as the socio-political instability channel, the distorting social transfers channel and the human capital channel with its low-education trap. Though all the three channels are being confirmed, with the transfers channel being the most important one, the direct impact of income inequality on the rate of productivity growth accounts for more than half of its overall effect on the growth rate. This is opening space for new theories on the channels of transmission. The author is using a panel of countries over the period of 1970 to 1985 with five year sub-periods. The growth regressions use 2SLS with mostly dummy variables as instruments.

A paper relying mostly on non-parametric methods was written by Banerjee and Duflo (2003). The paper describes the correlations between inequality and growth rates in cross country data in the period between 1965 and 1995. They find that changes in inequality (in any direction) are associated with lower future growth rates. This inverted U-curve is consistent with a simple political economy model but it could also reflect the nature of measurement errors. On the more fundamental question of whether inequality is bad for growth, their data has little to say.

Lundberg and Squire (2003) want to overcome the independent causal explanation of either growth or inequality and offer a simultaneous examination of both, looking for joint explanatory variables. The research draws on a relatively small sub-sample out of a set of about 130 countries for the years since 1960. The estimators used are pairs of Seemingly Unrelated Regression (SUR) OLS as well as two different types of 3SLS. Instruments used are among others the variables' initial values, various demographic and dummy variables. Base, structural and quasi-reduced-form models are being estimated. One of the results shows that two variables are both independently and jointly significant. These are a trade policy openness index and a civil liberties index. The former promoting growth at the cost of equality and the latter improving the income distribution but disturbing growth. The authors suggest that using combinations of these and other policy variables one can achieve almost any desired outcome in the growth-distribution space. A government expenditure variable doesn't show any significant result.

We develop our own research based on the approach of Lundberg and Squire (2003), but improving it with slightly different estimators and the use of more explanatory variables, especially relevant for the set of transition countries we want to analyse. Moreover, the use of an aggregate government expenditure figure is unsatisfactory. Therefore it will be one of our main contributions to this type of research to include a broad range of different kinds of general government expenditures in our analysis of inequality, growth and public spending.

3. Econometric Models

In following the approach as developed by Lundberg and Squire (2003) we define the standard models of growth (Δy) and inequality ($Gini$) to take the simple form:

$$\Delta y_{it} = S'_{it}\alpha + X'_{it}\beta + u_{it} \tag{1}$$

$$Gini_{it} = S'_{it}\omega + Z'_{it}\psi + e_{it}, \tag{2}$$

where X is a vector of growth explaining variables, Z is a vector of inequality explaining variables, as defined in the literature, and S is a vector of variables common to both models for

countries i in time periods t. For a detailed definition of the error terms u and e see Lundberg and Squire (2003). A second set of models allows growth to enter the inequality equation and vice versa:

$$\Delta y_{it} = S'_{it}\alpha + X'_{it}\beta + \lambda Gini_{it} + u_{it} \tag{3}$$

$$Gini_{it} = S'_{it}\omega + Z'_{it}\psi + \zeta\Delta y_{it} + e_{it}. \tag{4}$$

However, the estimates in these equations allow for a preliminary assessment but are biased by endogeneity and multicollinearity, at least to the extent that vector S is correlated with the outcomes. Solving the above equations for the final quasi-reduced forms yields:

$$\Delta y_{it} = M'_{it}\beta^* + u^*_{it} \tag{5}$$

$$Gini_{it} = M'_{it}\psi^* + e^*_{it}, \tag{6}$$

where $M = [S, X, Z]$ is the combined matrix of all the explanatory variables.

The choice of explanatory variables for growth and inequality will rely on the literature as described above as well as on research of the specific determinants of inequality in transition as in Leitner and Holzner (2008). From this research we also use the methodology to develop our base models as defined in the equations (1) and (2) with a Generalised Least Squares (GLS) estimator correcting for heteroskedasticity and panel specific autocorrelation and applying a general to specific (GETS) variable selection approach. This approach involves the inclusion of all the explanatory variables and the step-wise elimination of the least significant variable of each estimation.

The choice of a GLS estimator over a seemingly more appropriate estimator such as the System-Generalized method of moments (System-GMM) estimator suggested by Blundell and Bond (1998), that could deliberately deal with the issues of endogeneity, has the following reason. Due to the fact that detailed government expenditure data is not available for all the transition countries and only for a few years we end up with a panel data set with an N of 14 and an average T of 6. This does not allow for a proper use of instruments in the System-GMM estimator. Moreover, Biorn and Krishnakumar (2008) in following Matyas and Lovrics (1990) argue that for a very small N and T the OLS estimator is favored over the G2SLS estimator by Balestra and Varadharajan-Krishnakumar (1987), although biased, due to its stability. However, for an N>15 and a T>5 they recommend the G2SLS estimator. Thus it seems that we deal with a border case. More recently Baltagi and Liu (2009) have argued that for small samples the EC2SLS estimator by Baltagi (1981) is more appropriate than the G2SLS estimator. Thus, our strategy is to apply both, the EC2SLS estimator as well as an OLS type of estimator. Here, due to heteroskedasticity and autocorrelation in the data we opt for the GLS estimator.

Apart from the GLS estimator we will also make use of a pooled SUR model, which is based on OLS too, to additionally estimate the base models as defined in the equations (1) and (2) and the structural models as defined in the equations (3) and (4). Here, the advantage is that the the error terms are assumed to be correlated across the equations. Finally, the quasi-reduced-form models as defined in equations (5) and (6) will be estimated by an EC2SLS estimator. This is differing from the 3SLS approach in Lundberg and Squire (2003). However, Baltagi (2002) notes that though 3SLS is more efficient than 2SLS, it may well be that one of the equations is improperly specified and then a system estimator like 3SLS will be contaminated by this

misspecification whereas a single equation estimator like 2SLS will be correct at least for one of the equations. Thus, overall, this approach should give us a pretty good picture of which variables in the end are important for both economic growth and inequality in transition and whether public spending indicators (as part of vector S) have an important role to play.

4. Data

We defined our sample to include data for 28 transition economies[2] over the period of 1989 to 2006, due to data availability. Our chosen indicator for income inequality is the Gini index, taken from the World Institute for Development Economics Research (WIDER) database (for a detailed description of all the variables and their sources see Appendix A). For almost all the transition economies data is only available up to the year 2006. Our indicator for economic growth is the annual percentage growth rate of GDP per capita based on constant local currency from the World Development Indicators (WDI) database.

The following group of 9 variables are public spending indicators of different type. This includes general government expenditures as a share of GDP for: General public services; Defense; Public order and safety; Economic affairs; Housing and community amenities; Health; Recreation, culture and religion; Education; Social protection. We expect most of these public spending indicators to be mostly positively correlated with inequality and rather negatively with growth. This is based on the idea of a trade-off between efficiency and equity. In order not to further diminish the sample we did not include the expenditure category environmental protection as this item was not available for all the countries and years as for the others.

With regard to transitional change variables we used the following European Bank for Recovery and Development (EBRD) indicators on Large-scale privatisation; Price liberalisation; Trade and foreign exchange system; Infrastructure reform), which is rather an indicator of public utilities liberalisation. We could not use all of the available indicators as many of them are highly correlated. We expect these four liberalisation indicators to be rather positively correlated with inequality and growth. Again, this is based on the idea of a trade-off between efficiency and equity during the process of reallocation of resources in transition. However, it is theoretically possible that reallocation can coexist with different distributions.

In the field of structural change we have found typical control variables. Most of this data is from the WDI database and some from the EBRD. Traditional growth explaining variables include the initial GDP (in our case we take the year 1990) according to the conditional convergence theory as well as the share of gross fixed capital formation in GDP, which is our proxy for physical capital. The first variable is expected to be negatively related to growth and the second positively. Other structural indicators include FDI inflow, change in labour productivity in industry, and manufacturing value added in percent of GDP. The first two indicator can be assumed to be associated with a rise in inequality and growth given the efficiency-equity trade-off, while the latter rather with a fall in inequality since the manufacturing sector tends to have a higher degree of trade union density than other sectors while its effect on growth seems to be ambiguous. By contrast, the variable of agricultural value added should be positively correlated with inequality

[2]This includes eight countries from Central and Eastern Europe (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia), seven countries from Southeast Europe (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia and Montenegro), 12 former Soviet Union countries (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan) and Mongolia.

and negatively with growth given that agriculture in transition is to a high degree of a subsistence type. The unemployment variable should have a similar effect.

A set of education indicators consists of secondary and tertiary school enrollment rates as well as research and development expenditures. These should be associated with rising wage disparities and therefore increasing inequality but positive growth effects. We also included the variable exports of goods and services (in percent of GDP). If one believes globalisation to increase inequality then a high trade share should be related to a high Gini index. Though one might believe that transition economies' workforce might actually gain from more trade openness given the countries' relatively stronger labour intensity. Trade openness is typically associated with positive growth effects. However, one type of exports, namely fuel exports, is deemed to be negatively related to growth, based on the dutch disease theory. Countries with strong resource exports are also expected to be rather less equal. The share of non-performing loans in total loans might be assumed to be correlated negatively with growth and the Gini index, as financial crises tend to hurt owners of income from capital in the first place. The effects of inflation and real interest rates on growth and inequality are somewhat unclear. However, it might rather be assumed that both tend to hurt economic growth as well as an equal income distribution. Finally, the effects of age dependency might be associated with higher inequality. Its effect on growth is unclear and thus we will exclude this variable from the growth regression.

5. Results

First we estimate a base model explaining inequality in transition using the GLS estimator and applying a GETS approach for variable selection. We start with 27 out of the 29 explanatory variables described above and eliminate step-wise the least significant variable of each estimation. We do not use the initial 1990 GDP and gross fixed capital formation which are variables specific to the growth regression. We end up with 12 explanatory variables as described in the upper left part of Table 1, where all the estimated coefficients are at least significant at the five percent significance level. One coefficient (social protection expenditures) is though only slightly above the five percent significance level but was still left in the regression. Its exclusion doesn't change the other results a lot. Due to many holes in the dataset the number of countries in the present regression shrinks to 14 countries[3] with an average of 6 years[4] per country. This makes a total of 84 observations in our regression.

The number of significant explanatory variables remained quite high and thus we want to focus on the public spending and the transitional change variables. Unsurprisingly we find government expenditures for social protection, health and economic affairs to be negatively correlated with inequality. The last category of expenditures includes for instance expenditures on grants, loans or subsidies to enterprises, which appear to be associated with a more equal income distribution. It is also interesting to have a look at the coefficients of the remaining transitional change indicators where one would expect rather positive correlation with inequality due to a efficiency trade off. This is true for the indicator of large scale privatisation, which was connected with huge labour shake outs during transition. However, liberalised trade and foreign exchange systems seem to have reduced inequality. Thus it seems that globalisation has left the

[3]The sample includes now still all the eight countries from Central and Eastern Europe (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia), only two countries from Southeast Europe (Bulgaria, Croatia) and only four former Soviet Union countries (Belarus, Georgia, Russian Federation, Ukraine).

[4]The sample includes now only data from the maximum period of 1996 to 2005.

average transition country with less inequality. This is most probably due to the relatively more labour intensive structure of the transition economies' industry as compared to its Western trade partners.

In a second step we estimate the base model explaining economic growth using the same procedure as above. We start with 28 out of the 29 explanatory variables described above and eliminate step-wise the least significant variable of each estimation. We do not use the age dependency variable as we do not feel to be able to interpret it properly in a growth context. We end up with 9 explanatory variables as described in the lower left part of Table 1, where all the estimated coefficients are at least significant at the five percent significance level. Again, due to many holes in the dataset the number of countries in the present regression shrinks to 15 countries[5] with an average of 7 years[6] per country. This makes a total of 105 observations in our regression.

Table 1: Base models

	GLS		SUR	
Variable	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**
Gini equation				
Economic affairs	-0.687**	(0.110)	-0.904**	(0.227)
Health	-0.469**	(0.118)	-0.495	(0.304)
Social protection	-0.142†	(0.073)	0.087	(0.105)
Large scale privatisation	3.546**	(0.445)	4.384**	(0.730)
Trade and foreign exchange system	-6.825**	(0.475)	-8.162**	(1.043)
Agricultural value added	0.355**	(0.051)	0.310**	(0.067)
Manufacturing value added	-0.798**	(0.057)	-0.762**	(0.099)
Secondary school enrolment	-0.069*	(0.031)	-0.034	(0.055)
Tertiary school enrolment	0.070**	(0.019)	0.102**	(0.034)
Research and development	5.124**	(0.857)	3.606**	(1.106)
Fuel exports	0.080**	(0.029)	0.105**	(0.031)
Real interest rate	0.061**	(0.012)	0.092**	(0.023)
Growth equation				
Economic affairs	-0.236**	(0.076)	-0.476**	(0.132)
Housing	-1.921**	(0.312)	-1.779**	(0.499)
Education	-0.721**	(0.118)	-0.816**	(0.190)
Trade and foreign exchange system	-2.588**	(0.341)	-3.047**	(0.529)
Real interest rate	-0.148**	(0.016)	-0.140**	(0.022)
Inflation	-0.021**	(0.002)	-0.022**	(0.003)
Non-performing loans	-0.090**	(0.022)	-0.103**	(0.030)
Initial GDP	-0.000**	(0.000)	-0.000**	(0.000)
Investment	0.286**	(0.033)	0.207**	(0.048)

Significance levels : † : 10% * : 5% ** : 1%

Again we want to focus on the more policy relevant variables. Here we find the economic affairs, housing and education expenditures to be negatively correlated with GDP growth. This does not come as a surprise, as the share of government expenditures is typically increased during times of low or even negative growth. At first sight it appears to be puzzling that the coefficient of the trade and exchange rate liberalisation indicator is negatively correlated with growth. However, most of the Central European economies had liberalised trade by the mid 1990s already, when the EU Association Agreements came into force. By contrast, the former Soviet Union

[5]The sample includes now still all the eight countries from Central and Eastern Europe (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia), only two countries from Southeast Europe (Bulgaria, Croatia) and only five former Soviet Union countries (Belarus, Georgia, Moldova, Russian Federation, Ukraine).

[6]The sample includes data from the maximum period of 1993 to 2006

countries in our sample have liberalised only little but have experienced an above average growth in the first half of the 2000's when the world commodity prices started to rise strongly. This is also the period where most of our sample is focused on.

Using the more sophisticated SUR estimator for analyzing a system of multiple equations with correlated error terms for both equations simultaneously weeds out some of the statistical significance across the estimated coefficients. The Gini equation (see upper right part of Table 1) is left with the following significant policy coefficients: Economic affairs expenditures, large scale privatisation and trade and foreign exchange system liberalisation. In the growth equation (see lower right part of Table 1) all the policy coefficients remain significant.

Table 2: Structural models

	GLS		SUR	
Variable	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**
Gini equation				
Growth	0.037	(0.041)	-0.325**	(0.099)
Economic affairs	-0.771**	(0.115)	-1.178**	(0.232)
Health	-0.531**	(0.127)	-0.614*	(0.293)
Social protection	-0.150†	(0.080)	-0.024	(0.110)
Large scale privatisation	3.756**	(0.519)	4.388**	(0.697)
Trade and foreign exchange system	-6.244**	(0.587)	-9.872**	(1.105)
Agricultural value added	0.278**	(0.052)	0.238**	(0.068)
Manufacturing value added	-0.703**	(0.059)	-0.778**	(0.095)
Secondary school enrolment	-0.100**	(0.030)	-0.015	(0.053)
Tertiary school enrolment	0.074**	(0.020)	0.080*	(0.033)
Research and development	3.983**	(0.886)	3.687**	(1.061)
Fuel exports	0.117**	(0.020)	0.068*	(0.032)
Real interest rate	0.057**	(0.012)	0.084**	(0.022)
Growth equation				
Gini	0.018	(0.033)	-0.123**	(0.046)
Economic affairs	-0.227**	(0.087)	-0.716**	(0.160)
Housing	-1.871**	(0.333)	-2.222**	(0.510)
Education	-0.684**	(0.145)	-1.055**	(0.204)
Trade and foreign exchange system	-2.404**	(0.461)	-3.981**	(0.628)
Real interest rate	-0.147**	(0.016)	-0.139**	(0.022)
Inflation	-0.021**	(0.002)	-0.022**	(0.003)
Non-performing loans	-0.091**	(0.022)	-0.117**	(0.029)
Initial GDP	-0.000**	(0.000)	-0.000**	(0.000)
Investment	0.284**	(0.034)	0.195**	(0.046)

Significance levels : $\dagger$: 10% $*$: 5% $**$: 1%

The estimation results of the structural models, where we included growth as explanatory variable in the Gini equation and vice versa, are presented in Table 2. Here we immediately want to focus on the SUR results in the right part of Table 2. Economic affairs and government health expenditures remain significant and negatively related to inequality. Large scale privatisation and trade and foreign exchange system indicators remain significant too. From the significant structural change indicators we find agricultural value added to be positively correlated with inequality and manufacturing value added to be negatively correlated. This might refer to unequal countries with a large subsistence farming sector versus highly industrialised and unionised countries that have a more equal income distribution. Tertiary school enrolment is positively correlated with inequality. This seems to confirm earlier results from Zhang (2008). Similarly, expenditures on Research and Development are positively correlated with inequality too. This is also true for the share of fuel exports. Indicating an unequal distribution of receipts from fossil energy exports. It is also interesting to note that the real interest rate is positively correlated with inequality. This

indicates that income distribution in the transition countries improved in the wake of European integration with its trade liberalisation and macro-economic stabilisation. In the growth equation the policy relevant coefficients remain significant. Regarding the structural change indicators it can be observed that the real interest rate, inflation and the share of non-performing loans are negatively correlated. Both traditional growth explaining variables (initial GDP and the investment share) are significant and have the expected sign.

Interestingly enough both the growth coefficient in the Gini equation and the Gini coefficient in the growth equation are significant and negative. However these results allow only for a preliminary assessment as they might be biased by endogeneity and multicollinearity.

Table 3: Quasi-reduced-form models

	Gini equation 2SLS		Growth equation 2SLS	
Variable	**Coefficient**	**(Std. Err.)**	**Coefficient**	**(Std. Err.)**
Growth	-0.202†	(0.122)	.	.
Gini	.	.	-0.109	(0.079)
Economic affairs	-0.473†	(0.256)	-0.698**	(0.228)
Housing	.	.	-1.695*	(0.663)
Health	-0.367	(0.275)	.	.
Education	.	.	-1.272**	(0.334)
Social protection	-0.336*	(0.168)	.	.
Large scale privatisation	2.968**	(1.059)	.	.
Trade and foreign exchange system	-5.126**	(1.685)	-3.597**	(0.938)
Agricultural value added	0.101	(0.167)	.	.
Manufacturing value added	-0.417**	(0.137)	.	.
Secondary school enrolment	0.003	(0.052)	.	.
Tertiary school enrolment	0.073**	(0.028)	.	.
Research and development	1.293	(1.965)	.	.
Fuel exports	0.099	(0.071)	.	.
Real interest rate	0.042*	(0.019)	-0.132**	(0.021)
Inflation	.	.	-0.019**	(0.003)
Non-performing loans	.	.	-0.128**	(0.032)
Initial GDP	.	.	-0.000**	(0.000)
Investment	.	.	0.223**	(0.073)

Significance levels : $\dagger$: 10% $*$: 5% $**$: 1%

Finally, we want to estimate the quasi-reduced-form models and compare them to the previous, potentially biased models. Here we use the EC2SLS estimator and add to the Gini explaining variables the growth variable instrumented by those variables that explain growth and vice versa (see Table 3). This leaves the government expenditures on economic affairs and social protection significant (though the former only at the 10 percent significance level). Again the large scale privatisation and trade and foreign exchange systems coefficients remain significant. We also find the manufacturing sector, higher education and the real interest rate to remain significant. Again, almost all of the growth explaining variables remain robust.

Taking the Gini and the growth equations together, there are two policy variables that are independently correlated with both outcomes: The general government expenditure on economic affairs and the trade and exchange rate liberalisation indicator. Here we find economic affairs expenditures such as subsidies to ailing industries associated with lower growth rates but also with less income inequality. Similarly trade liberalisation reduced inequality but also the growth rate. The specific reasons for this refer to the fact that in our sample unequal former Soviet Union countries have not liberalised trade as much as their peers in Central Europe but experienced high growth in the period under observation when the world commodity prices increased strongly. From the other explanatory variables we only find the real interest rate to be both significant in

the Gini as well as in the growth equation. This variable correlates in a win win situation. Lower real interest rates reduced inequality and increased economic growth. Finally, while the growth variable remains significant in the Gini equation this is not the case vice versa.

6. Conclusions

This paper focused on the joint determinants of inequality and growth with a special emphasis on public spending in transition. The main results of our econometric exercise are very much driven by the general conditions in the Central, East and Southeast European transition economies of the late 1990's and early 2000's. When in the second half of the 1990's several countries experienced a banking crisis with a large share of non-performing loans and an economic growth dip the share of government expenditures, especially on economic affairs (i.e. subsidies) was high and helped to decrease economic inequality. The subsequent economic growth period further decreased inequality. In the countries that were involved in the European enlargement process, trade and foreign exchange liberalisation contributed to lower inequality. Also low real interest rates were correlated with both higher growth and lower inequality. In the East European countries the specialisation in fuel exports was connected with higher levels of inequality as compared to its Central European peers. This is probably true because of the monopolistic character of the fuel export industry.

Looking specifically at the significant government expenditure items we find, apart from expenditures on economic affairs which are negatively correlated with both inequality and growth, two additional items correlated with either inequality or growth respectively. Expenditures for health and social protection are both negatively correlated with inequality, which does not come as a surprise. The latter result also confirms earlier research on this topic (see e.g., de Mello and Tiongson, 2008). Regarding growth we find government expenditures on housing and education to be negatively correlated. It can be assumed that both items tend to increase as a share of GDP in periods of lower or even negative growth. Either they might be used as an anti cyclical instrument (housing) or will be the least cut in a downswing (education). Both might have a positive effect on growth with a certain lag, though.

While not significantly contributing to growth, large scale privatisation and a higher share in tertiary enrolment were significantly correlated with inequality in the countries of interest. The latter result appears to be comparable to the outcome of earlier research on education and inequality (see e.g., Zhang, 2008). It is interesting to note that transition countries that have specialised in manufacturing tend to have a lower level of inequality. This might be related to the fact that unionisation in manufacturing is higher than in agriculture or services.

Finally, in two out of three specifications we find economic growth by itself being significant and negatively correlated with inequality. The result for the Gini coefficient in the growth regressions is less robust. In only one out of three specifications we find inequality to be significant and negatively correlated with growth. This rather comes as a surprise as we find the opposite correlation signs for both variables in the article by Lundberg and Squire (2003) that we partly follow in methodology. Similarly and contrary to our results a trade openness index shows positive signs in both the inequality and the growth regression. This might be due to the different samples and sample periods used. On the one hand Lundberg and Squire (2003) use data on 38 countries of the world where most probably the focus is on developed countries. They also analyse the period from the 1960's to the early 1990's. Contrary to that we analyse mostly transition economies in the European integration process over the period from the late 1990's to the early 2000's. On the one hand these countries' industry has a relatively more labour intensive

structure as compared to its western trade partners which might have resulted in a reduction of inequality in the wake of a trade based economic growth period. On the other hand a smaller number of former Soviet Union member countries in our sample were not included in the trade liberalisation process of the EU integration but still experienced higher growth rates due to the commodities bubble of the early 2000's. This fuel based growth has left them with an above average level of inequality due to the monopolistic character of the fuel industry. Most likely these processes were not observable in the sample analysed by Lundberg and Squire (2003).

From the above described observations follow our policy recommendations. For developing countries that aim for the best of both worlds: equity and economic development, it can be desirable to integrate with a group of capital abundant developed countries. They would profit from a trade and low real interest rate based economic growth that has also the potential to reduce inequality. However, those countries that have not specialised in manufacturing but in monopolistic extraction industries such as the fuel industry should publicly hoard the receipts from extraction in order to smooth the effects of commodity prices' boom and bust cycles as well as distribute the profits evenly. In any case, high government expenditures, especially in the field of economic affairs, such as for instance subsidies for public transport, can on the one hand reduce inequality and on the other hand act as anti cyclic buffers in periods of sluggish economic growth.

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Appendix A. List of variables

Inequality

Gini: The Gini coefficients for the respective countries and years were taken from different surveys. Only surveys that analysed income and in a very few cases consumption were used. Missing values of up to three years were interpolated. Source: United Nations University – World Institute for Development Economics Research (UNU-WIDER) World Inequality Database Version 2.0b (WIID 2b)

Economic Growth

Growth: Annual percentage growth rate of GDP per capita based on constant local currency. GDP per capita is gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Source: World Development Indicators 2008 (WDI 2008)

Public spending

General public services: General government expenditures Classification of the functions of the government (COFOG) group 1 includes expenditures on: Executive and legislative organs, financial and fiscal affairs, external affairs; Foreign economic aid; General services; Basic research; R & D general public services; General public services n.e.c; Public debt transactions; Transfers of a general character between different levels of government. Source: Eurostat and IMF Government Finance Statistics (GFS).

Defence: Defence expenditures Classification of the functions of the government (COFOG) group 2 includes expenditures on: Military defence; Civil defence; Foreign military aid; R & D defence; Defence n.e.c. Source: Eurostat and IMF Government Finance Statistics (GFS).

Public order and safety: Public order and safety expenditures Classification of the functions of the government (COFOG) group 3 includes expenditures on: Police services; Fire-protection services; Law courts; Prisons; R & D public order and safety; Public order and safety n.e.c. Source: Eurostat and IMF Government Finance Statistics (GFS).

Economic affairs: Economic affairs expenditures Classification of the functions of the government (COFOG) group 4 includes expenditures on: General economic, commercial and labour affairs; Agriculture, forestry, fishing and hunting; Fuel and energy; Mining, manufacturing and construction; Transport; Communication; Other industries; R & D economic affairs; Economic affairs n.e.c. Source: Eurostat and IMF Government Finance Statistics (GFS).

Housing and community amenities: Housing and community amenities Classification of the functions of the government (COFOG) group 6 includes expenditures on: Housing development; Community development; Water supply; Street lighting; R & D housing and community amenities; Housing and community amenities n.e.c. Source: Eurostat and IMF Government Finance Statistics (GFS).

Health: Health expenditures Classification of the functions of the government (COFOG) group 7 includes expenditures on: Medical products, appliances and equipment; Outpatient services; Hospital services; Public health services; R & D health; Health n.e.c. Source: Eurostat and IMF Government Finance Statistics (GFS).

Recreation, culture and religion: Recreation, culture and religion expenditures Classification of the functions of the government (COFOG) group 8 includes expenditures on: Recreational and

sporting services; Cultural services; Broadcasting and publishing services; Religious and other community services; R & D recreation, culture and religion; Recreation, culture and religion n.e.c. Source: Eurostat and IMF Government Finance Statistics (GFS).

Education: Education expenditures Classification of the functions of the government (COFOG) group 9 includes expenditures on: Pre-primary and primary education; Secondary education; Post-secondary non-tertiary education; Tertiary education; Education not definable by level; Subsidiary services to education; R & D education; Education n.e.c. Source: Eurostat and IMF Government Finance Statistics (GFS).

Social protection: Social protection expenditures Classification of the functions of the government (COFOG) group 10 includes expenditures on: Sickness and disability; Old age; Survivors; Family and children; Unemployment; Housing; Social exclusion n.e.c.; R & D social protection; Social protection n.e.c. Source: Eurostat and IMF Government Finance Statistics (GFS).

Transitional change

Large-scale privatisation: The EBRD Large-scale privatisation indicator is one of the EBRD's overall transition indicators. It ranges from 1 (little private ownership) to 4.33 (standards and performances typical of advanced industrial economies: more than 75 percent of enterprise assets in private ownership with effective corporate governance.). Source: The European Bank for Reconstruction and Development (EBRD)

Price liberalisation: The EBRD price liberalisation indicator is one of the EBRD's overall transition indicators. It ranges from 1 (most prices formally controlled by the government) to 4.33 (standards and performance typical of advanced industrial economies: complete price liberalisation with no price control outside housing, transport and natural monopolies). Source: The European Bank for Reconstruction and Development (EBRD)

Trade and foreign exchange system: The EBRD Trade and foreign exchange system indicator is one of the EBRD's overall transition indicators. It ranges from 1 (widespread import and/or export controls or very limited legitimate access to foreign exchange) to 4.33 (standards and performance norms of advanced industrial economies: removal of most tariff barriers; membership in WTO). Source: The European Bank for Reconstruction and Development (EBRD)

Infrastructure reform: The EBRD Infrastructure reform indicator is the EBRD's overall infrastructure transition indicator. The ratings are calculated as the average of five infrastructure reform indicators covering electric power, railways, roads, telecommunications, water and waste water. Source: The European Bank for Reconstruction and Development (EBRD)

Structural change

GDP in 1990: GDP per capita based on purchasing power parity (PPP) for the year 1990. PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2005 international dollars. Source: World Development Indicators 2008 (WDI 2008)

Gross fixed capital formation: Gross fixed capital formation is calculated in percent of GDP. Gross fixed capital formation (formerly gross domestic fixed investment) includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the

construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation. Source: World Development Indicators 2008 (WDI 2008)

FDI inflow: Foreign direct investment is calculated as FDI net inflows in percent of GDP. Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows in the reporting economy and is divided by GDP. Source: World Development Indicators 2008 (WDI 2008)

Labour productivity in industry: The change in labour productivity in industry in percent is provided. Labour productivity is calculated as the ratio of industrial production to industrial employment. Changes in productivity are calculated on the basis of annual averages. Source: The European Bank for Reconstruction and Development (EBRD)

Agricultural value added: Agricultural value added is calculated in percent of GDP. Agriculture corresponds to ISIC divisions 1-5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Note: For VAB countries, gross value added at factor cost is used as the denominator. Source: World Development Indicators 2008 (WDI 2008)

Manufacturing value added: Manufacturing value added is calculated as a share in GDP. Manufacturing refers to industries belonging to ISIC divisions 15-37. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Source: World Development Indicators 2008 (WDI 2008)

Unemployment: Unemployment is calculated using end-year unemployment data as a share of total labour force. For most countries, data reflect official employment records from the labour registries. In many countries, small enterprises are not recorded by official data. A number of countries have moved towards ILO-consistent labour force surveys in recording changes in labour force, employment and unemployment. Where available these data are presented. Source: The European Bank for Reconstruction and Development (EBRD)

Secondary school enrollment: Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers. Source: World Development Indicators 2008 (WDI 2008)

Tertiary school enrollment: Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level. Source: World Development Indicators 2008 (WDI 2008)

Research and development: Research and development is calculated as R&D expenditure in percent of GDP. Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development. Source: World Development Indicators 2008 (WDI 2008)

Exports of goods and services: Exports of goods and services are calculated in percent of GDP. Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude labor and property income (formerly called factor services) as well as transfer payments. Source: World Development Indicators 2008 (WDI 2008)

Fuel exports: Fuel exports are calculated in percent of merchandise exports. Fuels comprise SITC section 3 (mineral fuels). Source: World Development Indicators 2008 (WDI 2008)

Real interest rate: Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator. Source: World Development Indicators 2008 (WDI 2008)

Inflation: Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. Source: World Development Indicators 2008 (WDI 2008)

Non-performing loans: Non-performing loans are calculated in per cent of total loans. Non-performing loans include sub-standard, doubtful and loss classification categories of loans, but excludes loans transferred to a state rehabilitation agency or consolidation bank, end-of-year. Source: The European Bank for Reconstruction and Development (EBRD)

Age dependency ratio: Age dependency ratio is the ratio of dependents–people younger than 15 or older than 64–to the working-age population–those ages 15-64. For example, 0.7 means there are 7 dependents for every 10 working-age people. Source: World Development Indicators 2008 (WDI 2008)

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