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# LIS

## Working Paper Series

No. 643

### **A Note on Income Inequality in East Europe**

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## A NOTE ON INCOME INEQUALITY IN EAST EUROPE

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### *Abstract*

This short essay examines the proposition that the transition process to a capitalist economic system in Eastern and Central European nations has introduced greater income inequality than in long-time capitalist nations at similar stages of development. In the empirical analysis I use comparable inequality data from the Luxembourg Income Study, hold constant a number of general causal determinants of inequality, and show that such inequality in Eastern and Central Europe is significantly less than in nations where capitalism has long held sway.

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## A NOTE ON INCOME INEQUALITY IN EAST AND CENTRAL EUROPE

The popular media have presented many colorful stories of the vast fortunes made by individuals in East and Central Europe as a result of the privatization program accompanying the transition to a capitalist economic system. Based on these anecdotes and data on the large income inequality in China, it is often assumed that the distribution of income in these transition nations has been more unequal than in countries that have been capitalist for many decades. But is it?

The purpose of this short essay is to compare income inequality in various European countries, holding constant a number of other possible determinants of such inequality. I use comparable measures of inequality of disposable income drawn from the Luxembourg Income Study to show that the nations of Eastern and Central Europe have significantly less income inequality than Western nations at comparable levels of economic development, other factors unrelated to economic system held constant. This result parallels a tentative finding in the Slavic Review four decades ago when these Eastern and Central nations had communist governments (Pryor 1972).<sup>1</sup>

Section A outlines a series of hypotheses about the determinants of overall income inequality unrelated to economic system so that my comparisons using a regression analysis of East and West do not conflate the impact of systemic transition with other causal factors. Section B briefly discusses my data, with a longer discussion of these matters placed in the Appendix. Section C

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1. Due to scarcity of income data of East European nations during the communist period, this conclusion has not been universally held. Atkinson and Micklewright (1991, Chapter 2), however, cite several studies reporting greater inequality in the communist than comparable capitalist nations. There are a number of studies of the distribution of income in East and Central Europe during their transition to a market economy, and some are listed in Part B of the Appendix. Those that carry out statistical analyses look at changes in inequality over time or the linkages of institutional changes with the levels of inequality, so as to distinguish one country in transition from another.

presents the results of the statistical analysis and finally, Section D briefly summarizes the results and places them in context.

The core of the discussion is in Section C, where I use a regression analysis to explore the determinants of four measures of the inequality of income in a sample of 32 countries in East and West. The results show that around 2000, the countries in transition to a market economy had lower income inequality than OECD nations, holding other causal variables constant. This means that up to now the nations in transition have maintained in this respect continuity with the past.

#### **A. Hypotheses about the Determinants of Income Inequality**

In a survey of 27 cross-country studies Atkinson and Brandolini (2006: 402-13) list a number of determinants found by various scholars to be statistically significant determinants of income inequality. Drawing from their list, I chose the following variables to hold constant so that the impact of the systemic transition could be isolated in my regression analysis.

1. Per capita GDP: According to the well-known Kuznets hypothesis, per capita GDP should lead to a low degree of economic inequality in economically undeveloped and agricultural nations and should then rise as countries begin to industrialize since the average income differences between agricultural and non-agricultural sectors increase. However, after a certain point as the modern sector grows and the agricultural sector decreases in relative importance in the GDP, income inequality should begin to fall. The empirical support of this hypothesis is mixed (Angeles 2010), and for the countries in my sample, the facts do not consistently support this hypothesis. For the regressions reported below, the calculated coefficients of per capita GDP and its square are

statistically significant, income inequality rises after a point as per capita GDP increases.<sup>2</sup>

2. Governmental expenditures on social protection: Although governments transfers to the low-income population are designed to equalize income in a nation, the actual outcome of such expenditures depends in part on the efficiency of the system (Afonso, Schuknecht, and Tanzi 2010), which cannot be determined with the data at hand. I measure these transfers by the ratio of governmental social protection expenditures to the GDP and find, as expected, that inequality is lower where such expenditures are higher.

3. Trade openness: The ratio of exports and imports to GDP can have two opposite impacts on income inequality. By providing more competition for domestic producers, economic rents from trade protection are lower and, as a result, economic inequality is lower. On the other hand, a country's trade with nations having lower wages can have a negative impact on domestic wages and can increase income inequality in the importing higher-income nation. I calculate this openness variable as an average for the years 1990 through 2000 and it proves a significant determinant in some of the reported regressions.

4. Transition economy: This is measured by a dummy variable and the regressions are calculated both with and without it. The eight transition countries covered in the calculations are the Czech Republic, Estonia, Hungary, Poland, Romania, Russia, the Slovak Republic, and Slovenia.

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<sup>2</sup> Regressions using the logarithm of GDP/capita and the square of this variable yield a somewhat lower coefficient of determination than if these variables were used without transformation.

I also tested several other possible determinants of income inequality, but found no significant relationships and therefore dropped them from the final regressions. These included national attitudes toward income inequality, two macro variables for the period 1900-2000, educational quality, spatial segregation of ethnic, language, and religious groups, land area and population density.<sup>3</sup>

## **B. The Data**

The analysis below focuses on disposable household income (that is, after taxes and transfers), where income includes both cash and non-monetary income other than imputed household rents, government expenditures affecting the entire population (such as police or education), and capital gains (Smeeding 2002). The income data refer to the years around 2000 and are “equivalized.” That is, family income is adjusted to take into account economies of scale in family living by divided total family income with the square root of the number of family members.

The data are drawn from the Luxembourg Income Study (LIS) calculations, whose researchers took household survey data from various nations and adjusted them so that the income and other definitions would be precisely comparable.<sup>4</sup> Although it is difficult to assess the relative accuracy of these efforts, they appear to be the most comparable inequality data available. Unfortunately, their sample is also limited to 32 nations.

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3. The attitudes variable came from a principal component analysis of eleven values concerning income inequality from Inglehart et al. (2004). The macro variables were per capita GDP and the GDP price index. The educational quality data were drawn from PISA assessment scores for 2000 and data on spatial segregation came from Alesina and Shuravskaya (2011).

4 A detailed description of the LIS procedures is by Forster and Vleminckx (2004).

Since different measures of inequality sometimes lead to different conclusions, I present several different measures: the well-known Gini coefficient, which runs from 0 (perfect income equality) to 1 (designating perfect inequality where one person receives all of the income)<sup>5</sup>; the Atkinson index,<sup>6</sup> and the proportion of the population with incomes less than half of the median income (also a measure of poverty). For all these measures, an increasing value represents greater inequality. Table 1 presents the inequality data used in the regressions below.

Table 1 about here.

### C. Statistical Results

Table 2 about here.

Table 2 presents a correlation matrix for the variables under examination, where 0.00 indicates no correlation and 1.00 shows a perfect correlation. As we would expect, the measures of

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5 . The formula for the gini coefficient (G) of the income (Y) of a population ranging from 1 to n is:

$$G = \frac{2\sum_{i=1}^n iy_i}{n\sum_{i=1}^n y_i} - \frac{n+1}{n}$$

6 The Atkinson index (A) is based on a social welfare function indicating the amount of redistribution necessary to have the same level of welfare. It depends, of course, on the degree to which we are adverse to low inequality, a parameter given by “e”. Using u = mean income, N = number of cases, and Y = income, the Atkinson index is calculated by:

$$1 - 1/u \left[ (1/N) \sum_{i=1}^N Y_i^{(1-e)} \right]^{1/(1-e)} \text{ when } e \neq 1 \text{ and}$$

$$1 - 1/u \left[ \prod_{i=1}^N Y_i \right]^{1/N} \text{ when } e = 1.$$

income distribution are highly related, even though they focus on different parts of the income distribution. More noteworthy, all of the determinants posited below, except for the dummy variable for nations in systemic transition, have relatively high correlations with the inequality measures. Since the focus of this exercise is on the impact of systemic transition, this should not prove to be a problem.

Table 3 about here.

Table 3 presents eight ordinary least squares regressions using the explanatory variables of adjusted income discussed above. Four of the regressions have a dummy variable indicating whether the nation is undergoing transition to a capitalist economic system, four omit this variable. For all regressions 50 to 71 percent of the variation in inequality can be explained by the independent variables. It is noteworthy that adding the variable indicating transition to a capitalist system raises the degree of explanatory power (measured by the coefficient of determination) of inequality by at least twenty percentage points.

The calculated coefficients for the variable “transition nations” present the key results: all four of the income inequality measures are significantly negative with the other determinants of inequality explaining the other variation in inequality. This means that overall income inequality around 2000 in the East and Central European nations of the sample was lower than such inequality in capitalist nations, other factors held constant. In brief, despite the high incomes of a small minority of entrepreneurs and the high unemployment rates in several of these East and Central European nations undergoing systemic transformation, overall income inequality remains significantly below that of long-term capitalist countries, other things equal. While it would have

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been useful to include a variable indicating the extent of transition, two problems would have arisen: the extent of transition is very difficult to measure and the sample of transition nations (eight) would have been too small for any results to be meaningful.

Why might we obtain such results? During the years when these East and Central European nations had communist governments, wages appeared (although we cannot be positive) more evenly distributed than in the West (Pryor 1972). Moreover, personal incomes from profits were very low (or nonexistent) so these did not contribute to inequality in these nations. Their lower income inequality around 2000 shown in the regressions may simply reflect this historical inheritance. Or it might reflect a lower social acceptance of income inequality. Until more years have passed, we cannot determine whether their income inequality will approach Western levels or whether it will remain lower.

Since the various measures of inequality focus on different parts of the income distribution, we would expect the coefficients of the various causal variables to be different. Nevertheless, most show a U shaped relationship with per capita income (falling at lower levels of per capita GDP and then rising with increasing economic development), a decrease in inequality as governmental social protection expenditures rise, and a declining inequality as trade openness increases. But two problems arise in interpreting these calculated coefficients of the other posited determinants of inequality. The first is that there may be two-way causation between per capita GDP and inequality; the second is the multicollinearity of the other variables (the relatedness between the various explanatory variables (other than the economic transition variable)). Since the major focus of these regressions is on the systemic transformation variable, rather than the other determinants of inequality, these problems do not invalidate the results.

#### **D. Final Remarks**

Around 2000 the nations in transition to capitalism had, in contrast to media reports, more equal income distributions than comparable nations in the West when other factors influencing income inequality are held constant. It might be argued that this is merely a temporary situation, that these transition nations had more equal distributions of income when they were under communist governments, and that inequality will increase as capitalism takes firmer hold,

Much more study of the income distribution in the central and eastern European nations needs to be carried out. At the time of writing, it was unfortunate that for most of these nations comparable inequality data past 2000 were not yet available. If the nations in transition are also found to have greater income equality in more recent years than countries with more established capitalist systems, then these transition nations may have important lessons to teach the traditional capitalist world about growth with equity.

## DATA APPENDIX

The data used in this study can be found on my website:

<[www.swarthmore.edu/SocSci/Economics/fpryor1](http://www.swarthmore.edu/SocSci/Economics/fpryor1)>.

1. Inequality coefficients: These data come from the “key figures” of the Luxembourg Income Study (2011) and were chosen from the wave closest to 2000.

2. Per capita GDP: These are World Bank (2011) estimates of per capita GDP in 2000 in U.S. dollars of the same year. The Taiwan data are estimates, based on 1990 dollar estimates by Maddison (2005), updated to dollars of 2000. All dollar estimates used in the regressions are in thousand-dollar units.

3. Social protection: Most of the data on government social protection as a percent of GDP come from the OECD (2007), supplemented for non-OECD nations by the International Monetary Fund (2003). The data for Estonia are an estimate, based on the assumption that intergovernmental transfers were minimal. For other countries (Brazil, Canada, Colombia, Guatemala, Mexico, Peru, and Switzerland), I estimated social protection expenditures with a regression using data on social protection expenditures from the United Nations (2007) data on “social benefits except in-kind” for those countries for which data are available for both series. The GDP denominator comes from United Nation national accounts data base <<http://unstats.un.org/unsd/snaama/dnlList.asp>> (accessed December 2011). For Taiwan I obtained data from the Taiwanese Directorate-General of Budget, Accounting, and Statistics (accessed 2011). For all estimates I use data for 2000 or the closest year.

4. Trade openness: These data, except for Taiwan, come from the World Bank and represent the average ratio for 1990 through 2000 of  $(\text{exports} + \text{imports}) / (2 \times \text{GDP})$ . For Taiwan I obtained data from the Taiwanese Directorate-General of Budget, Accounting, and Statistics (accessed 2011).

**Table 1: Inequality Data**

	Year	Gini Coefficient	Atkinson Coefficient (epsilon=0.5)	Atkinson Coefficient (epsilon=1)	Relative poverty rates: Total population (50%)
Australia	1995	0.317	0.085	0.176	13.01
Austria	1994	0.257	0.056	0.115	7.736
Belgium	2000	0.279	0.068	0.129	8.078
Brazil	2005	0.486	0.192	0.345	20.414
Canada	1994	0.315	0.085	0.172	12.37
Columbia	2004	0.506	0.209	0.376	21.332
Czech Rep.	1996	0.256	0.055	0.104	5.148
Denmark	2000	0.225	0.043	0.087	5.385
Estonia	2000	0.361	0.108	0.211	12.496
Finland	2000	0.25	0.054	0.102	5.305
France	2000	0.278	0.064	0.124	7.308
Germany	2000	0.266	0.06	0.116	7.63
Greece	2000	0.333	0.092	0.184	14.253
Guatemala	2006	0.49	0.196	0.36	30.447
Hungary	1994	0.292	0.071	0.134	6.773
Ireland	1996	0.313	0.083	0.164	16.153
Israel	1997	0.346	0.098	0.191	15.555
Italy	1998	0.334	0.094	0.186	12.705
Mexico	1998	0.485	0.191	0.344	21.305
Netherlands	1999	0.231	0.045	0.093	4.906
Norway	2000	0.25	0.059	0.116	6.447
Peru	2004	0.502	0.208	0.389	26.631
Poland	1999	0.286	0.072	0.148	9.089
Romania	1997	0.28	0.067	0.127	8.465
Russia	2000	0.408	0.139	0.268	16.506
Slovakia	1996	0.25	0.056	0.12	7.666
Slovenia	1997	0.232	0.045	0.092	7.496
Spain	1995	0.336	0.094	0.185	14.157
Sweden	2000	0.252	0.056	0.112	6.611
Switzerland	2000	0.28	0.068	0.136	7.477
Taiwan	2000	0.273	0.061	0.116	6.773
UK	1999	0.346	0.1	0.197	13.185
USA	2000	0.342	0.099	0.192	13.193
Unweighted averages:					
Former communist nations	0.296	0.077	0.151	9.205	
OECD nations	0.332	0.098	0.188	12.735	

Note: The data come from the Luxembourg Income Study . The relative poverty rate is the share of the population with less than 50 percent of the median income. <[www.lisdatacenter.org](http://www.lisdatacenter.org)> (accessed November 2011).

**Table 2: Correlation matrix<sup>a</sup>**

	<b>Gini coefficient</b>	<b>Atkinson coefficient (<math>\varepsilon=0.5</math>)</b>	<b>Atkinson coefficient (<math>\varepsilon=1.0</math>)</b>	<b>Percentage with less than 50%</b>	<b>GDP per capita</b>	<b>GDP per capita squared</b>	<b>Government social protection expend</b>	<b>Trade openness</b>	<b>Systemic transformation</b>
Gini	1.0000								
Atkinson (0.5)	0.9939	1.0000							
Atkinson (1.0)	0.9950	0.9971	1.0000						
Percentage of low income	0.9226	0.9128	0.9209	1.0000					
Y/capita	0.5150	-0.5182	-0.5186	-0.4290	1.0000				
(Y/capita) <sup>2</sup>	-0.4401	-0.4332	-0.4369	-0.3765	0.9629	1.0000			
Social protection	-0.6042	-0.5814	-0.5827	-0.6166	0.3203	0.2342	1.0000		
Trade openness	-0.4902	-0.4895	-0.5014	-0.4298	0.0181	-0.0257	0.1062	1.0000	
System transition	-0.1437	-0.1479	-0.1402	-0.2185	-0.6361	-0.5554	-0.0439	0.3871	1.0000

<sup>a</sup> Social protection expenditures are calculated as a percentage of GDP. Sources of data are given in the Appendix A. For all correlations the full sample of 32 nations is used.

**Table 3: Determinants of Income Inequalities<sup>a</sup>**

Inequality Measures	Gini coefficient		Atkinson coefficient				Percentage of population with income less than 50% median income	
			$\varepsilon=0.5$		$\varepsilon=1.0$			
Constant	0.5667	0.5273	0.2376	0.2120	0.4330	0.3908	0.2870	0.2562
	(0.0230)*	(0.0308)*	(0.0123)*	(0.0184)*	(0.0232)*	(0.0320)*	(0.0205)*	(0.0258)*
Per capita GDP	-0.01340	-0.00308	-0.00931	-0.00261	-0.01520	-0.00418	-0.00820	-0.00012
	(0.00297)*	(0.00317)	(0.00160)*	(0.00190)	(0.00299)*	(0.00330)	(0.00266)*	(0.00266)
Per capita GDP squared	0.00205	0.00013	0.00153	0.00029	0.00244	0.00039	0.00113	-0.00037
	(0.00072)*	(0.00087)	(0.00038)*	(0.00052)	(0.00072)*	(0.00091)	0.00064	0.00073
Social protection/GDP	-0.3713	-0.6204	-0.1675	-0.3289	-0.3219	-0.5883	-0.3481	-0.5424
	(0.1317)*	(0.1744)*	(0.0708)*	(0.1042)*	(0.1328)*	(0.1815)*	(0.1178)*	(0.1460)*
Trade openness	-0.0582	-0.2189	-0.0227	-0.1268	-0.0596	-0.2314	-0.0176	-0.1429
	(0.0501)	(0.0566)*	(0.0269)	(0.0338)*	(0.0505)	(0.0589)*	(0.0448)	(0.0474)*
Systemic transition	-0.1346		-0.0872		-0.1439		-0.1050	
	(0.0253)*		(0.0136)*		(0.0255)*		(0.0227)*	
$R^2$	0.8108	0.6201	0.8403	0.6039	0.8203	0.6157	0.7266	0.5192
Sample Size	32	32	32	32	32	32	32	32

<sup>a</sup> Per capita GDP is measured in thousand 2000 dollars. Trade openness is 0.5 x (exports + imports) divided by GDP. Standard errors are placed in parentheses and the asterisks denote statistical significance at the 0.05 level of the particular explanatory variable. The data sources are listed in Appendix A.

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