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The Human Development Impact of the Global Crisis in Central, Eastern and Southern Europe, and the CIS

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Abstract

We examine recent historical experience over the period of transition in countries in Central, Eastern and Southern Europe, and the CIS. We quantify the impact of changes in income (per capita PPP GDP) on key HD indicators covering demographics, crime, epidemiology, unemployment, and poverty. To this end, allowing for lags, we estimate empirical elasticities with respect to income using several approaches. These include full, sub-period and sub-regional panel data estimates, as well as average elasticity measures based on simple peak-to-bottom percentage changes. Having a range of estimated elasticities, we proceed to analyze the results and compare them across sub-regions and variables.

Based on the latest published GDP growth projections from the IMF, we then project the likely impact on the HD indicators in coming years for the countries in the region. The results suggest that the adverse impact of the global economic crisis on poverty, unemployment, public health, mortality, and suicide and homicide rates is likely to be considerable, long-lasting, and to disproportionately affect the poorest.

The paper's primary purpose is to provide a sound empirical and analytical basis for critical policy decisions in the human development area, rather than break new ground in theory or in the understanding of trends in human development. Based on our results, we argue that prompt policy action is needed given the looming substantial backslide in human development indicators. Comparisons of the relative magnitudes of the impact estimates in sub-regions and across human development indicators point to areas of particular vulnerability, helping prioritize policies. We conclude by providing some strategic considerations for a policy response commensurate with the challenge posed by the crisis, as well as specific proposals for elements of this response.

JEL Keywords

O15: Economic Development: Human Development; Income Distribution; Migration

O12: Microeconomic Analyses of Economic Development

C23: Models with Panel Data

G01: Financial Crises

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Introduction and Summary of Main Results

This paper seeks to answer a single question: what is the likely human development impact of the global economic and financial crisis in UNDP's Europe and CIS region? It bases the answer on historically observed empirical co-movements of income and a set of human development indicators during the past two decades in the region.² The quantified associations between income and these variables are applied to the IMF's latest publicly available GDP projections to obtain a foretaste of the likely path of key human development indicators. Simple peak-to-bottom estimates calculated at individual country level provide complementary information. We seek to find statistically significant and robust associations to gauge the empirical behavior of human development indicators in the face of changes in income growth. In short, we seek to identify stylized facts.³ This approach has several shortcomings. The associations we find are not—and not meant to be—well-fitting models embodying clear, uni-directional causal relationships derived from first principles. They also rely on a dataset that remains sparse even after significant patches and hence they cannot be estimated with a convincingly strong fit for each individual country. But for the region as a whole, the overall thrust of the message that emerges is unambiguous.

This message is that the human development indicators vary strongly with the economic cycle, often with significant lags. The large recent declines in GDP in most countries of the region therefore imply that the unfolding impact of the global crisis will be substantial and lasting. The crisis is likely to cause a substantial backslide in progress towards improving human development indicators, suggesting that the impact might be particularly adverse for disadvantaged regions and social groups. Income poverty, in particular, is likely to worsen markedly across the entire region for at least the coming few years. In fact, meeting MDG1 (substantially reducing poverty by 2015) would require double-digit levels of per capita GDP growth in many countries during 2011-2015 without a worsening of income distribution—an unlikely prospect. The conclusion is similarly worrisome for the future path of life expectancy (particularly for males), mortality and crime rates, the unemployment rate, and the health status of the population.

The lag with which the impact of a marked reduction in growth of per capita income statistically significantly affects human development indicators differs across indicators. While this lag is quite short for the unemployment rate, young male suicide rates, and for

² Human development is about expanding the choices people have to lead lives that they value. Fundamental for this is building human capabilities, i.e., the range of things that people can do or be in life: to lead long and healthy lives, to be knowledgeable, to have access to the resources needed for a good standard of living and for participating in the life of the community. These areas can be monitored through a variety of human development indicators. A subset of these indicators—for which statistically useful data are available for countries in the region—is in the focus of this paper (Appendix A provides a list).

³ We acknowledge that measuring the relationship between income growth and human development indicators faces formidable challenges, most notably stemming from the high potential for spurious regressions owing to the likely presence of unit roots in GDP and human development indicators. Apart from using the first difference form of income and proportional measures from human development indicators, we have made extensive efforts—documented in Appendix B—to ensure that this risk is minimized in the econometric specifications we use.

life expectancy, it is longer for infant mortality, crime rates and incidences of various diseases. Income poverty rates also react to changes in income growth with a lag of up to three years.

Some relatively homogeneous groups of countries have emerged from running sub-regional regressions. These groups are the Central and Eastern European countries (including the Baltic States), the CIS-3 (Belarus, Ukraine and Russia), Western Balkans, and to a somewhat lesser extent, Central Asia.

These results provide empirical evidence needed for prompt, specific and effective policy changes to improve human development outcomes. We do not claim to have precise estimates of the crisis impact on individual countries, or individual human development indicators. But with a range of estimates across countries and human development indicators showing marked adverse effects, there is essentially no uncertainty left about the need for such policy action. Clearly, action needs to be tailored to the needs of the each country, and to take into account that the crisis limits the room for policy maneuver. This is especially true for fiscal policy since fiscal space in many countries is curtailed by falling revenues as output declines, while the need for social and labor market spending increases. Spending is also raised by the fiscal stimulus applied in many countries in 2008-09. Thus, across-the-board increases in budgetary spending are ruled out, and careful targeting is required to ensure effective mitigation of human development loss.

The final section of the paper discusses the types of policies that can be expected to help address the crisis-induced worsening of the human development picture. It stresses the importance of basing the social policy response to the crisis in the region—among the hardest-hit areas in the world—on sound empirical information, and placing the challenges posed by the crisis in context. Such context is framed by the confluence of short- and long-term shocks that all require policy action now. The section outlines strategic considerations, as well as a set of ideas that could be useful as building blocks of appropriate policy responses at both central and local levels of government (which have complementary roles). This section stresses that for the majority of countries in the region the crisis not only makes reforms inevitable by elevating the importance of raising financial, social, and environmental sustainability, but also creates opportunities to implement them. It suggests that governments update their macroeconomic and social policy frameworks—and where available, their Poverty Reduction Strategies—as the basis for assisting poor and vulnerable members of their societies.

Literature Survey

OVERVIEW

The literature on the impact of economic crises on human development most frequently focuses on indicators of public health (infant and under-five mortality rates, life expectancy, suicide rates); crime (registered criminal cases, homicides); and education (primary school enrolment rate, secondary school enrolment rate, literacy rate). A separate strand of the literature examines poverty and the distributional impact of growth.

At the aggregate level and over the long run, the literature finds a distinct positive correlation between GDP per capita and human development indicators. In this regard, several authors stress that growth and human development indicators are interlinked and that the direction of causality may run both ways. Economic growth helps generate the resources needed for advancing human development, but improved human development also enables higher sustained growth. Ranis and Stewart (2006), Ranis (2004), Boozer et al (2003), and Ranis and Stewart (2001) stress the role of human development in shaping growth trajectories, and argue that economic growth not accompanied by human development improvements may prove to be ultimately unsustainable.

Conceicao, Kim, Mendoza and Zhang (2009) and UNDP (2009) provide very useful surveys of the empirical literature on the topic. Empirical papers so far have focused more on Latin America, Southeast Asia and Africa than on transition countries in Europe and the CIS. Researchers have found that the human development impact differs in periods of growth accelerations and decelerations; and that it lingers for a long period after an economic shock. Empirical results for several indicators, notably education outcomes, are ambiguous since the nature and magnitude of the crisis impact generally depends on several additional variables, notably the country's level of development. These papers also find that the negative impact of an economic shock is greater for poorer countries. They document that the average levels of all human development indicators are statistically significantly worse during episodes of growth decelerations than in other times, and point to the adverse effect of growth volatility on these indicators.

POVERTY AND INCOME DISTRIBUTION

Lokshin and Ravallion (2000) compare changes in welfare indicators in Russia based on a nationally representative survey in the two years before and shortly after the 1998 financial crisis. The expenditure-poverty rate soared by almost 50 percent, whereas income poverty rose by much less. A key finding was the predominance of the newly poor among those in poverty: over 60 percent of the poor in the aftermath of the crisis had not been poor two years earlier. The survey found that a remarkable 20 percent of the 1996 population fell into poverty. The paper also found lower mean outlays on the public safety net, but with somewhat better targeting. The changes in the safety net reduced the overall impact of the crisis on poverty by helping some previously poor families escape poverty, even as it failed to prevent people who were vulnerable falling into poverty. Ex post calculations show that avoiding a decline in social safety net spending would have helped avoid the immediate increase in income poverty.

Ravallion (2001) emphasizes that in contrast with other regions, in Eastern Europe and the CIS, growth rates from survey-based measures of living standards and those from the national accounts show limited correlation.

Fallon and Lucas (2002) found that while the incidence of income poverty generally rose significantly during financial crises, no simple association was found between falling

GDP and rising poverty in East Asian countries—perhaps owing to the different portions of households just above the poverty line before the crisis. The low regional correlation between pre-crisis poverty and additional poverty made targeting the new poor difficult.

IMF (2008) examined the regional dimension of poverty in Armenia in 1999-2006 using elasticities calculated by dividing the percentage decline in poverty in a period of growth by the percentage increase in GDP. It found that economic growth has helped reduce the ranks of the poor by more than the ranks of the very poor. In addition, the income growth elasticity of poverty was seen to decline as the GDP growth rate increased.

Hasan, Magsombol and Cain (2009) project income poverty incidence in 2009 and 2010 for 25 Asian developing countries based on a regression of the log of the poverty rate on GDP per capita. They find the resulting growth elasticity in Central and West Asia (Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan) to be considerably higher than in other sub-regions. They conclude that a 1-3 percentage point reduction in the growth rate of GDP per capita from its 2007 rate would result in almost 100 million additional poor in 2010.

Dollar and Kray (2002) find that average incomes of the poorest fifth of society rise proportionately with average incomes in a large panel sample of 92 countries over the past four decades. Their results show no evidence that the share of income that goes to the poorest quintile systematically changes during periods of negative or positive growth.

DEMOGRAPHIC, PUBLIC HEALTH AND OTHER INDICATORS

Arbache and Page (2007) present similar results for Sub-Saharan African countries. They roundly reject the hypothesis of non-neutrality of growth volatility and find that the impact of growth accelerations on human development indicators—notably for life expectancy and mortality indicators—is smaller in magnitude than that of growth decelerations. Baird, Friedman and Schady (2007) demonstrate a different kind of asymmetric effect in 59 developing countries (including Armenia, Kazakhstan, Kyrgyzstan and Uzbekistan) for the period 1975-2004. They find that the infant mortality of boys rose by markedly more during periods of declining income than that of girls. Brainerd (2001) investigates suicide rates in the Former Soviet Union in the 1990s. She finds that male suicide rates are strongly negatively correlated with economic growth, but female suicide rates are relatively insensitive to economic conditions.

Based on a structural econometric model for a large sample of developing countries including most countries from Eastern, Southern Europe and the CIS, Sharmistha and Grabowski (2006) argue that the 1997-98 Asian financial crisis had a lasting and significant negative impact on human development despite the quick subsequent recovery. Knowles, Pernia and Racelis (1999) on the other hand found that for Indonesia, South Korea, Laos, Malaysia, Philippines, and Thailand, the social impact of the Asian financial crisis was smaller than anticipated. However, they identified differences among regions as well as between rural and urban areas within regions. WHO (2009) also uses evidence from the Asian crisis, and projects higher post-crisis demand for public services.

CONTRIBUTION OF THIS PAPER

Against this broad backdrop, this paper provides an empirical analysis on the impact of the ongoing global financial and economic crisis on human development indicators for Eastern Europe and CIS, a region that appears to be underrepresented in recent empirical work in this area. The importance of such analysis is raised by the fact that this region is one of the hardest hit in the world. Another contribution comes from the quantification of the impact using econometric and other methods, together with a quantification of the lags, based on information in the data. This allows us to better trace out the future path of HD indicators, helping substantiate an important finding of the paper: that even once the crisis is over, the lingering effect on human development will remain with us for years. Finally, the paper discusses policy options from a strategic angle as well as from a specific, micro-level point of view, based on the experience of what has worked in the region and what has not during the past two decades of transition.

A Look at the Data

The econometric and analytical parts of this paper rely on a comprehensive database compiled for the region, with human development data obtained from national statistical data sources, the World Bank's WDI, UNICEF's TransMONEE databases, from the IMF's public website, from country-specific Poverty Reduction Strategy Papers and from Poverty Assessments. We have compiled annual data covering the entire transition period spanning 1990-2008 for 29 countries (Appendix A), albeit with some significant remaining gaps.

The results for *income poverty* are an important component of this paper. Unfortunately, in interpreting these results, we have faced binding data constraints and serious data comparability issues. The latter was particularly true for the absolute poverty data on national definitions: serious puzzles arise when comparing the level of poverty on this definition across countries. For example, comparing 2007 data implies that the poverty level was lower in Moldova than in Romania; or in the early 2000s, Ukraine's poverty level was over double the level in Russia and Belarus, and markedly higher than in Tajikistan, Georgia, and Kyrgyzstan.

Four major definitional non-uniformities explain the bulk of these apparent puzzles: (i) the different welfare metrics (consumption, expenditure, formally measured or estimated incomes) used; (ii) the inclusion of unmeasured components like remittances and the value of own production, and their estimation methods; (iii) the use of an absolute poverty definition by most countries and a relative one by others; and (iv) the approach used to set the poverty line (subsistence minimum, basic needs for survival in the society, etc.). However, the time path of the poverty data on national definition within individual countries is generally quite intuitive, if somewhat erratic.

The second problem—inadequate availability of poverty data—has led us to employ various approaches to augmenting the dataset. We have obtained proprietary, internationally comparable data from the World Bank.⁴ This has added considerably to the publicly available data on income poverty, which, on its own, would not have been sufficient for econometric analysis. We refer to this poverty dataset as the core data. However, it, too, is severely deficient for purposes of analyzing longer stretches of poverty outcomes, and in particular, developments in earlier and most recent years.

This prompted us to explore further ways to cast an even broader net. Given the need for more robust econometric estimation, we have decided to augment the poverty data further by using the dynamics of those on national definition to augment internationally comparable data. The precondition we have set for ourselves in so doing was that the correlation in a given country between the internationally comparable time series and national data had to be reasonably close and stable. In a number of cases we have found that this condition was satisfied, and have therefore used splicing techniques—together with utilizing the dynamics of past data series across countries that in earlier years used to be in the same country (e.g., the Slovak and Czech Republics in Eastern Europe).⁵

Our full panel would in theory contain 6,612 datapoints (12 reported variables x 29 countries x 19 years). In fact, the dataset we were able to compile from primary and secondary statistical sources contains only 4,631 datapoints owing to the large gaps in data availability, and the dropping of some series owing to unit root issues (see Appendix B for details). This works out to an average of 386 observations for each variable (70 percent of a full panel), ranging from 123 for extreme poverty data all the way to 520 for life expectancy and GDP data. Reported results are based on this final dataset.

The methodology of deriving quantitative elasticity estimates

We use per capita PPP GDP as the income measure. This is not ideal for our purpose, since changes in the income distribution—substantial during transition—are likely to have markedly affected HD indicators, most notably poverty, over the sample period. Converting GDP values from national currencies into PPP Dollars also adds some biases related to changes in price structures or asset possession that are reflected with delay owing to the periodic updating of the commodity and services baskets used in the international comparison. However, PPP conversion-related biases are unlikely to have introduced systematic errors for the growth rates used for countries in our region.

⁴ We are obliged not to disclose these data to others.

⁵ The extrapolation, both backward and forward, of data series for internationally comparable absolute income poverty rates (share of those living under \$5 and \$2.5 per day in constant prices at PPP exchange rates) was performed on the basis of percentage changes for nationally defined absolute poverty measures that were closely correlated with the internationally comparable measures in periods when both were available. Such operations to bridge short gaps (of at most 4 years) were performed for Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, the FYR of Macedonia, Moldova, Poland, Romania, Russia, Serbia, Tajikistan, Turkey, Ukraine, and Uzbekistan. For the Czech Republic, Slovak rates of change were used backwards for 1992 only; and for Tajikistan, Kyrgyz rates of change were used for 1994-97.

Unfortunately, the lack of data precluded using more direct measures of the actual income of the poorest segment of the population. Of these, we have explored (without success) the possibility of obtaining the bottom decile figures for all countries; or per capita GDP adjusted by changes in the Gini coefficient to obtain an income index more closely correlated with the income of the poorest. A similar problem was encountered when deciding what human development indicators to cover in our investigation. The set of indicators in the paper represent a balance struck between theoretical considerations and broad regional availability of comparable data.

We began by estimating panel regressions to calculate the elasticity of selected human development indicators (always expressed as shares, e.g., percentages) with respect to changes in per capita PPP GDP (referred to as income hereafter). Having tested a number of possible specifications, we decided to use the dynamic Arellano-Bond (AB) panel estimation method—a workhorse model that helps address potential simultaneity problems and is also thought to perform well in the types of panels we have (characterized by a smaller time dimension than cross-sectional dimension). Moreover, it is consistent with the intuitively appealing relationship in terms of growth rates of both dependent and explanatory variables, but allows for greater flexibility than that specification. A related advantage is that estimating an AB equation can arguably help address problems of autocorrelation in the dependent variable. In fact, all human development variables exhibited medium to strong levels of autocorrelation. The estimated coefficients on lagged indicators ranged from one-third to half for suicide and homicide rates to two-thirds to three-quarters for life expectancy rates.⁶ The AB specification yielded statistically significant estimates of the right sign, generally with quite good, and in other cases at least reasonable, levels of goodness of fit. Results from standard panel data estimation were not strikingly dissimilar, although more mixed and statistically weaker than AB estimates.

We have employed three additional approaches. Whenever statistically possible, we ran regressions for sub-periods for all countries to test whether the elasticities were different in periods of falling and rising incomes. To this end, we use the best-performing full panel specification for separate subpanels covering periods of decline separately from periods of upswings. These periods are defined on the basis of average income levels, i.e., are identical for all countries. We have also calculated—on an individual country basis—Peak-To-Bottom (PTB) estimates of average income elasticities of the various human development indicators by dividing the percentage change in the indicator by the percentage change in the level of PPP GDP per capita during the same period.⁷ PTB estimates of average elasticity generally cover longer periods and therefore are akin to including a greater number of lagged values. They are particularly valuable, because they

⁶ The incidence of diseases has a very broad range of coefficients on lagged values—one tentative observation was that those for viral diseases tended to be lower than for other diseases.

⁷ In most cases the peak and bottom years were chosen on the basis of the level of per capita PPP GDP; however, in cases where this resulted in patently counterintuitive average elasticity estimates (either because of missing data for HD indicators in critical periods, multiple inflection points in their path, or because lags were likely involved), we chose the peak or bottom years based on the development of the HD indicator. In most cases the deviation of resulting extreme points was no more than two years.

are the only instance of results based on country-specific calculations (available upon request), since econometric estimates for individual countries have faced insurmountable degrees-of-freedom constraints. On the downside, PTB elasticities are not econometric estimates and hence do not have associated statistical goodness-of-fit indicators or confidence intervals.

The results

The results of this statistical inquiry for the full panel and for panels covering sub-periods, as well as the PTB estimates are presented in Table 1, and interpreted below. The full-panel estimates allow for country-specific intercepts, improving the fit relative to the more rigid specification restricting the intercept to be the same for all countries,⁸ as well as allowing—on this specific metric—the quantification of country-specific variation in the estimated relationship. This can shed some light on the “distance” of individual countries from others and from the sample mean (Box 1).

Box 1. A Glimpse of Cross-Country Differences

The country-specific intercepts (constant terms) in the panel regressions modify the estimated change in a human development indicator associated with a change in the income growth rate. In contrast to the specification when all coefficients are same for all countries, this specification allows the intercept to vary to pick up differences among countries (while keeping the slope parameter the same for all countries owing to binding data constraints). We ranked countries by the size of their estimated intercepts, and report countries with the lowest and highest levels of these intercepts. The change in the human development indicator associated with a unit change in income growth differs from the average estimated for the overall panel the most for these outlier groups: it is the smallest for the group of countries in the “lowest” category and largest for those in the “highest” category. While some clear anomalies surface in this table (such as Tajikistan being at opposite extremes for infant and under-five mortality), there seems to be some logic in the results for several human development indicators.

Table 1. Extremes for estimated country-specific intercepts

	Lowest three			Highest three		
Life expectancy at birth, total	KAZ	RUS	TJK	CZE	SVN	CYP
Life expectancy at birth, male	RUS	KAZ	BLR	MNE	SVN	CYP
Infant mortality rate	CZE	SVN	HUN	GEO	KGZ	TJK
Under-five mortality rate	TJK	CZE	SVN	GEO	BIH	KGZ
Suicide rates, male aged 15-19	AZE	ARM	GEO	LTU	KAZ	RUS
Homicide rates	SVK	CZE	ROM	LTU	KAZ	EST
Incidence of hepatitis	SVN	HVR	HUN	TJK	KGZ	UZB
Incidence of STDs	TJK	MKD	CZE	BLR	RUS	KAZ
Incidence of STDs for ages 15-19	TJK	GEO	MKD	LVA	BLR	RUS
Unemployment rate	TJK	BLR	CYP	MNE	ARM	MKD
Poverty rate, \$2.50	HUN	POL	BLR	TUR	GEO	MVA
Poverty rate, \$5.00	HUN	UKR	SRB	KGZ	GEO	AZE

Table 2. Panel Estimation Results and Peak-to-Bottom Elasticities

Variable		Full panel		Panel						Peak-to-bottom					
				Decline period			Growth period			Decline		Growth		Average	
		β	z	β	z	β	z	β	z	E	#eps	E	#eps	E	#eps
Life expectancy at birth, total	L1.HDV	0.7699	42.12	0.6077	6.74	0.7550	39.16								
	T	0.0149	6.45	0.0019	0.42	0.0144	4.92								
	L1	0.0172	7.28	0.0086	1.78	0.0181	6.49								
	L2														
	L3														
	const	17.1370	12.70	28.3476	4.36	18.2415	12.79								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	39708.05	0.0000	5729.64	0.0000	31773.84								
	Average per year	0.0161		0.0053		0.0162				0.0859	20	0.0400	29	0.0587	
Life expectancy at birth, male	L1.HDV	0.6968	39.05	0.6083	8.07	0.6815	35.81								
	T	0.0157	5.36	0.0029	0.52	0.0153	4.05								
	L1	0.0261	8.87	0.0121	2.05	0.0279	7.94								
	L2														
	L3														
	const	21.5677	17.04	27.2400	5.20	22.6431	16.71								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	36546.06	0.0000	5690.34	0.0000	29864.56								
	Average per year	0.0209		0.0075		0.0216				0.0945	21	0.0443	29	0.0654	
Infant mortality rate (per 1,000 live births)	L1.HDV	0.8948	34.69	0.4593	3.29	0.8483	31.86								
	T	-0.0510	-4.59	-0.0534	-2.31	-0.0458	-4.19								
	L1														
	L2														
	L3														
	const	0.9930	1.47	16.7881	3.81	1.6028	2.45								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	12928.68	0.0000	3098.88	0.0000	10772.85								
	Average per year	-0.0510		-0.0534		-0.0458				-0.0733	16	-0.1266	26	-0.1063	
Underfive mortality rate (per 1,000 live births)	L1.HDV	0.9165	39.14	0.5400	3.63	0.8532	39.60								
	T														
	L1	-0.0858	-5.02	-0.0637	-1.23	-0.0638	-4.53								
	L2														
	L3														
	const	0.8045	0.88	21.2687	3.19	2.1874	2.81								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	8976.19	0.0000	1549.79	0.0000	8031.09								
	Average per year	-0.0858		-0.0637		-0.0638				-0.0916	18	-0.1917	26	-0.1508	
Suicide rate for males aged 15-19	L1.HDV	0.3481	6.04	0.2496	1.81	0.3388	5.25								
	T														
	L1	-0.0809	-3.52	-0.0728	-1.38	-0.0946	-3.23								
	L2														
	L3														
	const	4.1444	2.99	9.8482	2.76	4.2616	2.98								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	3371.50	0.0000	807.51	0.0000	2619.24								
	Average per year	-0.0809		-0.0728		-0.0946				-0.3135	20	-0.0896	25	-0.1891	
Homicide rate (homicides per 100,000 population)	L1.HDV	0.3786	6.20	0.2703	1.66	0.3573	5.37								
	T														
	L1	-0.1114	-5.31	-0.1037	-2.39	-0.0975	-3.91								
	L2														
	L3														
	const	7.4187	6.79	1.5544	0.58	7.5791	6.60								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	685.09	0.0000	200.44	0.0000	580.83								
	Average per year	-0.1114		-0.1037		-0.0975				-0.3059	24	-0.0493	25	-0.1750	
Incidence of hepatitis	L1.HDV	0.5561	12.28	0.4289	2.95	0.3929	7.00								
	T														
	L1	-2.0550	-4.19	-0.9133	-0.67	-2.0619	-4.13								
	L2														
	L3														
	const	41.1065	2.36	40.9537	0.49	61.3353	3.76								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	1006.56	0.0000	264.17	0.0000	528.43								
	Average per year	-2.0550		-0.9133		-2.0619				-1.8125	7	-1.6115	26	-1.8541	
Incidence of sexually transmitted diseases	L1.HDV	0.8457	48.55	0.7585	5.52	0.8467	47.98								
	T														
	L1	-1.0759	-8.88	-1.2166	-1.67	-0.8622	-6.10								
	L2	-0.5944	-4.67	-0.8304	-1.50	-0.4117	-2.66								
	L3	-0.4923	-4.01	-0.8335	-1.47	-0.2925	-2.17								
	const	13.9833	3.56	-17.6059	-0.60	10.0893	2.58								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	17612.96	0.0000	1014.49	0.0000	13579.22								
	Average per year	-0.7209		-0.9602		-0.5221				-2.6714	19	-1.1852	26	-1.8127	
Sexually transmitted diseases in population aged 15-19	L1.HDV	0.8202	45.63	0.6019	7.34	0.8503	49.68								
	T														
	L1	-3.7873	-12.25	-3.1808	-3.39	-2.7672	-8.27								
	L2	-1.3765	-4.13	-2.3094	-2.31	-0.2732	-0.76								
	L3														
	const	19.6693	1.49	267.1431	4.44	12.9959	1.09								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	12713.67	0.0000	1840.89	0.0000	9035.70								
	Average per year	-2.5829		-2.7451		-1.5302				-4.5466	17	-2.7998	23	-3.5422	
Unemployment, total (% of total labor force)	L1.HDV	0.7398	19.36	0.8704	4.84	0.7516	18.35								
	T	-0.0729	-3.52	-0.0425	-0.70	-0.0760	-3.35								
	L1	-0.0527	-2.80	0.0147	0.26	-0.0614	-2.92								
	L2														
	L3														
	const	4.7168	7.09	0.2870	0.09	4.8061	6.54								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	11318.17	0.0000	482.10	0.0000	10257.83								
	Average per year	-0.0628		-0.0139		-0.0687				-0.5854	4	-0.1262	24	-0.1918	
Poverty \$2.5 Based on ICP Cons. in 2005 prices (ECAPOV Cons.) CORRECTED	L1.HDV	0.4719	5.09			0.4719	5.09								
	T														
	L1														
	L2	-0.4063	-3.08			-0.4063	-3.08								
	L3														
	const	36.4826	5.24			36.4826	5.24								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	2105.39			0.0000	2017.93								
	Average per year	-0.4063				-0.4063				-4.6268	1	-0.2490	24	-0.4241	
Poverty \$5 Based on ICP Cons. in 2005 prices (ECAPOV Cons.) CORRECTED	L1.HDV	0.6760	10.81			0.6760	10.81								
	T														
	L1	-0.7011	-6.03			-0.7011	-6.03								
	L2														
	L3														
	const	37.5109	6.04			6.4684	3.17								
Arellano-Bond dynamic panel	Wald prob. test	0.0000	4915.09			0.0000	4816.38								
	Average per year	-0.7011				-0.7011				-0.5041	1	-0.2299	23	-0.2413	

Notes:

This table provides the specification(s) used for each human development indicator. The Arellano-Bond dynamic panel specifications include the first lag of the human development variable; T and L1, L2, L3, L4 refers to current and lagged (T-1, ..., T-4, respectively) GDP per capita growth rate, measured in PPP terms.

The “Average” line heading refers to average elasticity per year in the econometric estimates, and the overall size of the elasticity over the entire episode of income decline or increase, respectively, for the Peak-to-Bottom estimates.

The “Average” column heading refers to the simple average of all decline and growth episodes in all countries for that particular human development indicator.

The heading β refers to the econometrically estimated slope coefficients for the variable listed in that row.

The column heading z refers to the z-statistic reported in the Arellano-Bond dynamic panel estimation method.

Shading indicates the lack of statistical significance at the 95% significance level for slope estimates (no shading for estimated intercepts). The Wald test statistic informs about the significance of all explanatory variables in the regression (we also display the associated probability level for the null hypothesis that all are irrelevant).

The column heading “#episodes” gives the number of country episodes of distinct income growth or decline periods for which the relevant HD variable was also available for that country.

The following countries were excluded due to the limited number of observations or failing the panel unit root test:

- Infant mortality, under-five mortality: Cyprus, Serbia, Turkey;
- Youth male suicide rate, incidence of hepatitis: Cyprus, Turkey;
- Incidence of sexually transmitted diseases: Bosnia and Herzegovina, Cyprus, Serbia, Turkey;
- Youth incidence of sexually transmitted diseases: Albania, Bosnia and Herzegovina, Bulgaria, Cyprus, Serbia, Turkey;
- Homicide rate: Belarus, Bosnia and Herzegovina, Cyprus, Montenegro, Russia, Turkey, Ukraine;
- Unemployment rate: Bosnia and Herzegovina, Estonia, Lithuania, Uzbekistan;
- Income poverty rate at \$2.50/day: Albania, Armenia, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Former Yugoslav Republic of Macedonia, Kazakhstan, Latvia, Lithuania, Montenegro, Serbia, Slovakia, Slovenia, Tajikistan, Uzbekistan;
- Income poverty rate at \$5.00/day: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Latvia, Slovakia, Slovenia, Tajikistan, Uzbekistan.

Interpreting historical estimation results for the full panel of countries

We have tried several potential specifications with common and country-specific intercepts, various lag lengths, and also static panel estimation. The results reported in Table 1 and discussed below are those from the estimates deemed to provide the best overall fit to the data. It is important to note, however, that the broad thrust of the results has been quite stable across the various specifications tried. This has provided some confidence that the reported results are representative of the information content of the sample, and robust to possible changes in the specification.

The full panel regression for **life expectancy** involves contemporaneous as well as one-year lagged income. The results indicate that a one percent drop in the growth rate of income implies a drop in life expectancy of somewhat less than two weeks in total, roughly equally distributed over time. The PTB elasticity estimate is markedly higher, with the impact estimated at a one month loss in average life expectancy for each percentage point decline in income growth during periods of decline, and a two-week gain for each additional percentage point in income growth in periods of upswing.

The estimated elasticities were marginally but noticeably and uniformly⁹ larger for **male life expectancy**, with a loss of over two weeks for each percentage point decline in income growth. PTB estimates show a 5-week loss in male life expectancy for each

⁹ Uniformity refers to results being the same for any specification, i.e., full panel, sub-panel for periods of declines or upswings, or peak-to-bottom average elasticity estimates.

percentage point decline in income growth during periods of decline, and over two weeks of gain for each additional percentage point in income growth in periods of upswing.

Sub-panel estimates for both these life expectancy indicators had the correct sign and were significant for periods of upswing, but lacked statistical significance in periods of downturns (the latter reflecting the small number of observations in the time dimension). Similar to the experience of other researchers, we were not able to obtain statistically significant results in our region for **female life expectancy**. We interpret this as an indication that the observed sensitivity of overall life expectancy to income growth is predominantly driven by the impact on male life expectancy.

Practically all remaining human development indicators—mortality, suicide and homicide rates, the unemployment rate, as well as all disease incidence rates and poverty indicators—evolve in a distinctly countercyclical manner, i.e., rise when income growth declines and drop when income rises. Both econometric and non-econometric methods underscore this (unsurprising) result.

The **infant mortality rate** showed a distinct impact. PTB average elasticity estimates were different for periods of downturns and upswings but, interestingly, with a somewhat larger magnitude for upswings. The PTB overall average and the full-panel elasticity estimate were very close, implying a decline in infant mortality of 0.1 cases per thousand births for each percentage point of income growth gain. Another interesting result was that infant mortality was seen to decline by almost two times more in periods of upswings than it increased in periods of downturn in PTB estimates. Unfortunately, sub-panel estimates lacked statistical significance, but the marginally insignificant estimates we were able to obtain showed a similar tendency.

The story on the **under-five mortality rate** is similar, with the results implying that a 5 percentage point drop in income growth rates would raise under-five mortality by one per 1000 live births after a year. Interestingly, the income elasticity of the under-five mortality rate is higher than that of infant mortality, implying a greater sensitivity of under-five mortality to economic downturns and upswings. The PTB elasticity estimates for the under-five mortality rate are larger than the panel estimates, reflecting the longer periods they cover; and the estimated magnitude of the elasticity for periods of upswing is markedly higher than that for downturns. The latter would translate to an improvement (i.e., decline) in the under-five mortality rate similar in magnitude to the panel estimate, whereas in periods of decline the estimated impact of the same extent of worsening in the income growth rate would be a worsening of a very marginal 0.5 per 1000 live births.

Suicide rates for males aged 15-19 are another countercyclical variable, with a very low econometrically estimated elasticity. The average PTB estimate is twice as big, masking an over three-fold higher sensitivity of this HD indicator to falling income (a 0.3 case rise per 100,000 base population when income growth drops by 1 percentage point) than to rising income. The elasticity estimates for the **homicide rate per 100,000 in the population** displays remarkably similar patterns and magnitudes. The emerging picture

for both these highly visible and socially significant variables is that a considerable impact builds up gradually, over years.

The elasticity of the ***incidence of hepatitis*** with respect to income growth is also counter-cyclical, with an increase of roughly two cases per 100,000 for each percentage point drop in income growth. Interestingly, the PTB results for hepatitis show no discernible difference in the magnitude of the impact in downturns versus upswings. The elasticity estimates for the ***incidence of sexually transmitted diseases in the whole population and in the population aged 15-19*** are more volatile. For the young age-group, the elasticity estimate is considerably (over three times) higher, reflecting their higher rate of sexual activity and lower average awareness of STDs.

The ***unemployment rate*** is seen to react already in the same year and in the subsequent one to changes in the growth rate in income. While the impact is statistically significant in both years, its magnitude is relatively modest: a 5 percentage point decline in income growth is associated with a 2/3 percentage point increase by the following year in unemployment. However, the implied cumulative decline of sustained income slumps is substantial. For example a three-year period with a decline of 3 percentage points in income growth each year is associated with a 5.6 percent increase in the unemployment rate by the fourth year. The larger PTB estimates also point to marked cumulative effects—and add the wrinkle of a four-fold larger surge in unemployment in response to a drop in income growth than the decline seen in response to the same magnitude of increase in income growth. This regression is clearly not a model of employment, and we note that a significant share of per capita income is wage income (directly affecting employment, which complicates the picture). In any case, we do not go beyond just registering the historical comovements of unemployment and income growth, which is consistent with viewing the former as a critical indicator affected by the crisis.

Turning to the ***income poverty rate based on US\$2.5 per day in 2005 PPP dollars***, an internationally comparable absolute poverty measure, the estimated impact based on the core (i.e., not augmented) dataset was broadly similar as for the previous case, except that a single lagged income was found to provide the best fit. When the augmented dataset was used, the magnitude of the estimated impact moderated to just over 0.4 percentage points while the lag length increased to two years.

The twin poverty measure of the ***income poverty rate based on US\$5 per day in 2005 PPP dollars*** produced a more stable estimated impact, consistently at a lag of one year, of 0.7 percentage point of poverty decline on this measure for a percentage point increase in the income growth rate on the core data, and a poverty decline of 0.7 percentage points on the augmented dataset. We consider the latter to provide a more reliable and better overall fit (the value of the Wald statistic has almost doubled). If so, one can conclude from the comparison of the estimated impacts based on augmented datasets that changes in income are associated with a greater change in the broader poverty measure than is the case for the US\$2.50 per day poverty rate—a plausible result.

Historical panel estimates for sub-regions

We have also grouped countries into geographical sub-regions, and run regressions for sub-regional panels using the full panel's best-performing specification as a starting point. Sub-panels are markedly smaller, and this has often weakened the fit. Given the already reduced sample size in the cross-sectional dimension, we have refrained from further reducing it in the time dimension by attempting to estimate separately sub-regional elasticities for periods of growth and decline. But we are able to report PTB average elasticities for these separate subperiods because those were calculated on an individual country basis. We note, however, that the number of episodes for which PTB calculations were possible at the sub-regional level is very low (at times zero or one), so these results are to be interpreted with caution.

The results from this exercise are presented in Table 3, available at:

[http://spreadsheets.google.com/ccc?key=0AmZFX-](http://spreadsheets.google.com/ccc?key=0AmZFX-FUPxL1dE82S1FrWTVNZ0FmUElUcG9WdncwQWc&hl=en)

[FUPxL1dE82S1FrWTVNZ0FmUElUcG9WdncwQWc&hl=en](http://spreadsheets.google.com/ccc?key=0AmZFX-FUPxL1dE82S1FrWTVNZ0FmUElUcG9WdncwQWc&hl=en), owing to their size. A summary overview of the results is provided by sub-panel below. Comparisons are made with the results from the full sample, and the precise definition of the country coverage is given in Appendix A.

- The **CIS+Georgia sub-panel** is a large part of the overall dataset. So perhaps it is not a surprise that it produced results broadly similar to those from the full panel for public health and poverty indicators. However, this sub-panel tended to show a lower impact of income changes on male and overall life expectancy (possibly related to the markedly lower level of male life expectancy in this sub-region); and also on suicide rates for young males and for the homicide rate. Another indicator found to be markedly less responsive to income changes was the unemployment rate, which had an estimated elasticity about $\frac{1}{3}$ lower. Generally, the fit was weaker, with several elasticities estimated on the basis of specifications from the full panel losing significance. Interestingly, in several cases, significance could be restored by increasing the lag length (e.g., from two to three years).
- The **CIS-3 group** of Russia, Belarus and Ukraine has shown remarkable homogeneity on mortality rates, where PTB elasticity estimates were smaller than in the full panel for periods of rising income. The econometric elasticity estimates for life expectancy and mortality variables are unfortunately insignificant for this subgroup. The panel for the subgroup produces a far better fit for the incidence of sexually transmitted diseases, with an estimated elasticity roughly two times higher than in the full panel. The elasticity for unemployment was almost 20 percent higher, and the inertia (reflected in the coefficient of the lagged unemployment variable) was also markedly higher. This may reflect the presence of a very large informal sector that helps soak up unemployed labor in good times and—given that its flexibility to shed labor is greater than that of the formal sector, while unemployment benefits are available for those without formal employment—spills excess labor to the ranks of the formally unemployed in downturns. Both the econometric and the PTB sub-panel estimates for the under

- 2.5 dollar poverty rate fell to half of that for the full panel or lower, while the elasticity for the under 5 dollar rate is comparable to that in the full panel. Thus, extreme poverty is less responsive than is the case for the overall panel.
- There is less of a coherent story emerging for the “**rest of the CIS+Georgia**” sub-panel, reflecting the heterogeneity of this group. The immediate response to changes in income of the under-five mortality rate is about double that obtained in the full panel, but this difference fades out with longer lags, consistent with the lower difference shown by PTB estimates (which span a longer period). While the econometric estimate for the income elasticity of the homicide rate is close to that of the full sample, the PTB measure is just a third in downturns, but about the same as for the full sample in times of rising income. The incidence of hepatitis exhibits a higher elasticity than in the full sample. For this group, we found an opposite pattern than for the CIS-3 group for the under 2.5 dollar poverty rate and for the under 5 dollar rate: extreme poverty is proving to be more responsive to income changes than the broader measure (both compared with the full sample). This may be related to the fact that there are more people living under the 2.5 dollar poverty rate in other countries in this group than in the CIS-3.
 - The results for the sub-panel for **oil-exporting CIS economies** (Russia, Azerbaijan, and Kazakhstan) were not easy to interpret, reflecting distinct heterogeneity among these countries. Numerous econometric estimates have failed, or displayed a marked discord with the PTB results; small sample size has also played a role. The under-five mortality rate is seen to have a much higher income elasticity; the pattern for the divorce rate is as in the previous group (but this also reflects the unweighted calculation method of the PTB measure). The econometric estimates for the incidence of various diseases are of poor quality, but a distinct story of higher income elasticities emerges from the PTB estimates (admittedly, the number of episodes is low). The unemployment elasticity is marginally above that for the overall sample, while poverty elasticity estimates are generally of poor quality. The \$5/day internationally comparable poverty rate showed lesser sensitivity to income change, while the regression for the lower poverty rate did not produce significant results.
 - For the **Central Asian CIS countries**, life expectancy elasticity estimates are broadly as for the full sample, but tend to lose significance in this smaller sample. The elasticity of the infant mortality rate is uniformly about a half higher than for the full sample; a similar story emerges from the PTB estimates for the under-five mortality rate, where the difference is even larger. This may reflect less effective health care systems which shift a larger share of the healthcare burden to households, which may have rather limited spare resources to cover health needs in times of a crisis. The PTB elasticity for the young male suicide rate is just half of that for the full sample in downturns but about the same in upturns; the same pattern emerges for the homicide rate. The elasticity is markedly higher for the incidence of hepatitis. The estimated income elasticities are higher than in the full sample for both the under 2.5 dollar poverty rate and the under 5 dollar rate.
 - The **CEE and Baltics** sub-panel comprises countries that jointly display distinct characteristics. The elasticities exceed by half that for the full sample for both life expectancy measures, especially in upturns, judged by PTB results. The estimated

elasticity for young male suicide rates is far higher than in the full sample, especially in downturns; homicide elasticities also exceed those in the full sample, but to a lesser extent (by about a third). The difference in elasticities compared with the full sample is also large with respect to the incidence of various diseases: lower for hepatitis, and higher for sexually transmitted diseases. The elasticity of unemployment to changes in income is about 1/3 higher in this sub-region than in the full sample. Poverty elasticity estimates are roughly one third higher for both the under 2.5 dollar poverty rate and the under 5 dollar rate than in the full sample.

- The results for the subgroup comprising the **Western Balkans** was generally similar with and without **Turkey**, so are discussed together. Life expectancy is seen to have a higher elasticity, with PTB estimates showing the difference to be concentrated in periods of downturn, when life expectancy suffers at twice the rate of the full sample. Suicide rates for young males show a higher responsiveness to income changes than in the general sample. The income elasticity of unemployment is also higher for this sub-panel than for the full sample if we exclude Turkey, and lower if Turkey is included. The former, as in the case of the CIS-3, may have to do with the large share of the informal sector in employment. Finally, poverty elasticity estimates are uniformly of a very poor quality.

Individual country regressions are not reported because they are often of poor quality and highly volatile. The main reason for this in our view is the lack of a sufficient number of observations, notably for poverty data, to be able to obtain stable econometric regression results. However, PTB average elasticity estimates have been calculated on an individual country basis. Throughout the paper, we use the averages of those elasticities over countries in the relevant sample. The detailed country-by-country PTB elasticities are available at <http://spreadsheets.google.com/ccc?key=0AmZFX-FUPxL1dE1WZHNfUW9jdjhsVXd4UldBZXExa1E&hl=en>.

Projections Using the Estimated Elasticities

We tackle the problem of not knowing the single best way to estimate the impact of income changes on HD indicators by calculating several reasonable estimates of the income elasticities, and work through the impact using the various specifications. This traces out a range of estimates for the actual impact. We argue that this range has a good chance of containing the actual future outturn.

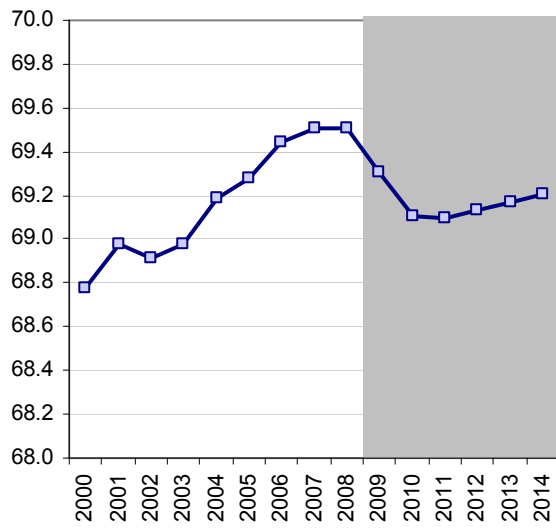
Instead of replicating the efforts of institutions that specialize in predicting future GDP growth, we take the IMF's latest published country-specific GDP projections from the 2009 October World Economic Outlook, and use the demographic projections from the UN World Population Prospects, 2008 edition (at www.esa.un.org/unpp) to calculate per capita projected growth rates for the period ahead. We argue that using these per capita growth projections as proxies for simulating the crisis impact forward is a valid approach. This is based on our finding of a near-perfect positive correlation between per capita

GDP growth rates and per capita PPP GDP growth rates in essentially all countries without statistically significant lag or bias.

We then plug in the projected per capita GDP growth rates described above into the respective regression equations to obtain projected paths for each HD indicator aggregated across countries using population-weighted averages.¹⁰ The resulting estimates are displayed in charts 1-3 below. They show that these paths (and those calculated using alternative elasticities using other plausible specifications, as well as those relying on PTB estimates) imply an adverse impact of the global financial crisis on human development in the region. We do not report projections at the sub-regional and country levels, because the reliability of those projections is weaker. We also do not report the projections based on PTB elasticities and down-turn-specific elasticities of either the econometric or PTB variety. For all these, the resulting charts display the characteristic kinks shown in the time paths of the human development indicator projections seen below. In sum, our key conclusions in the following section are robust, and focus more on broad region-wide trends than on country-specific results.

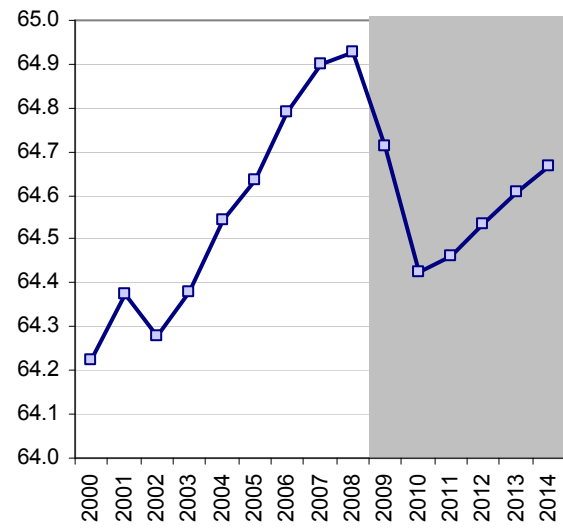
¹⁰ The countries entering these averages were the ones that featured in the panels used for the econometric estimates for each human development indicator (see notes to Table 1). As a robustness check we have also calculated unweighted averages, and found that the resulting charts are very similar.

Projections of crisis impact on Human Development indicators in the ECIS region



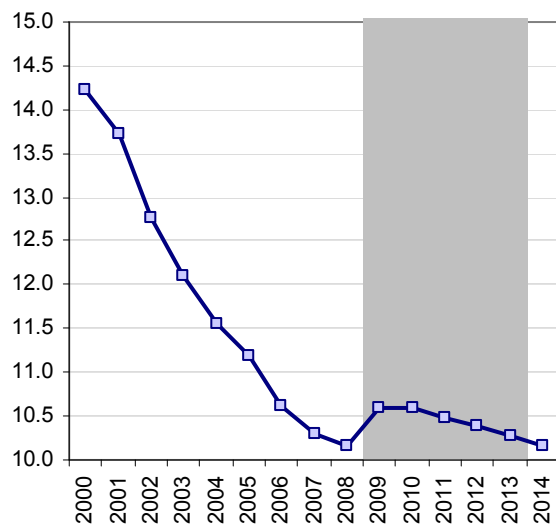
Life expectancy at birth, total

Arellano-Bond dynamic panel with one lag and T and L1



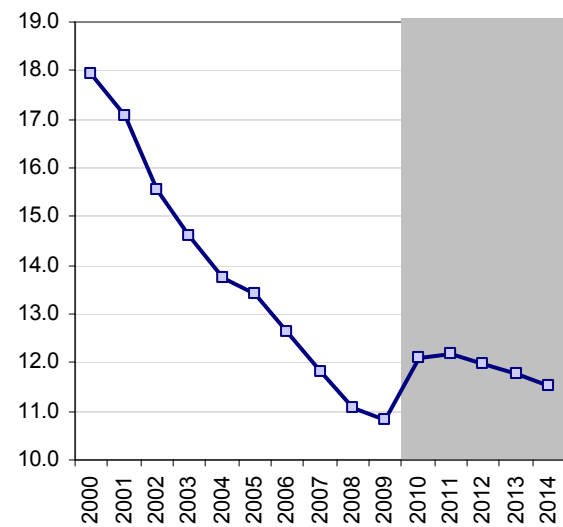
Life expectancy at birth, male

Arellano-Bond dynamic panel with one lag and T and L1



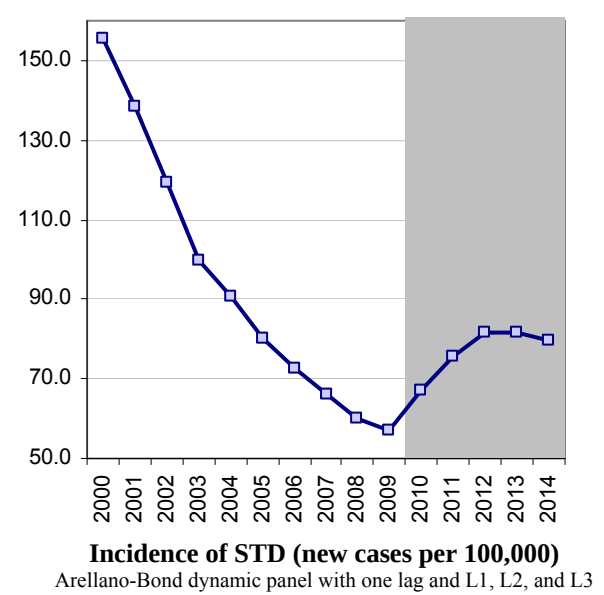
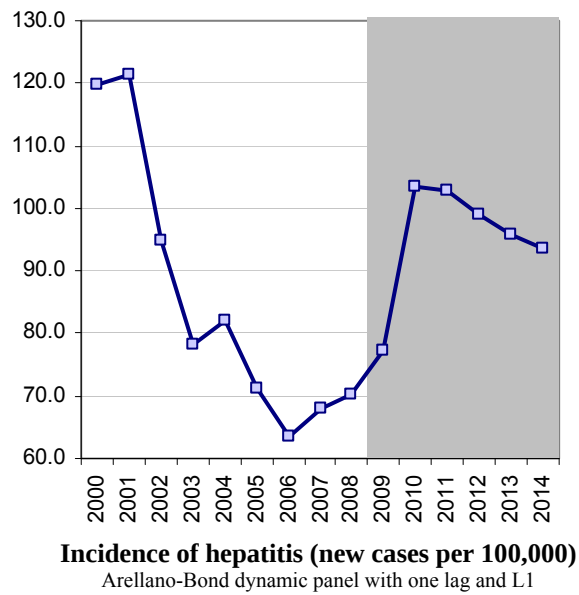
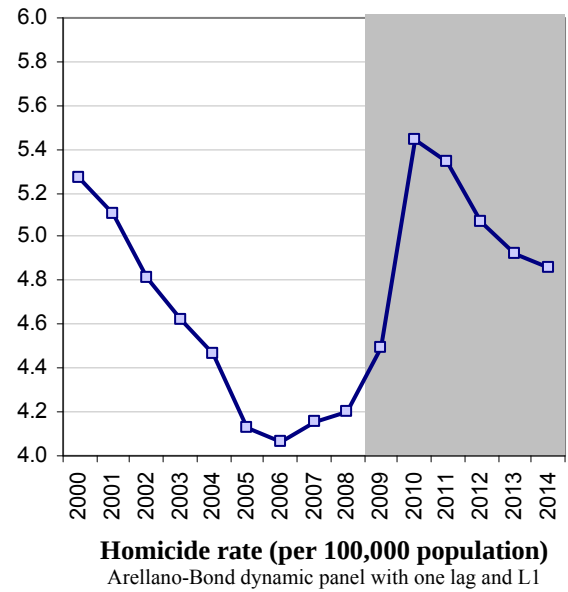
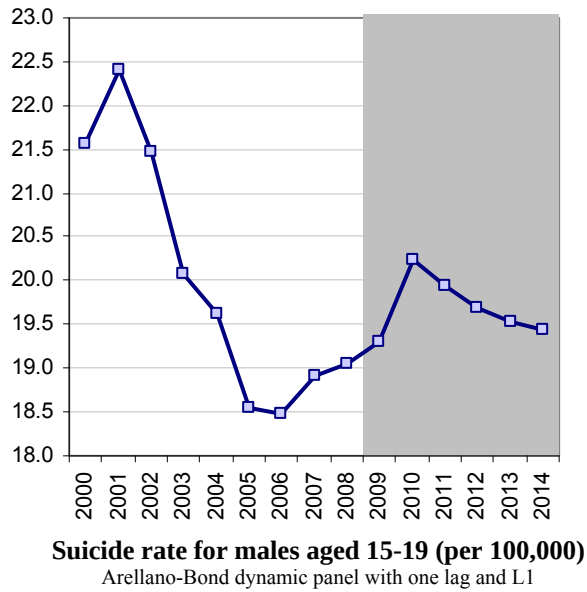
Infant mortality rate

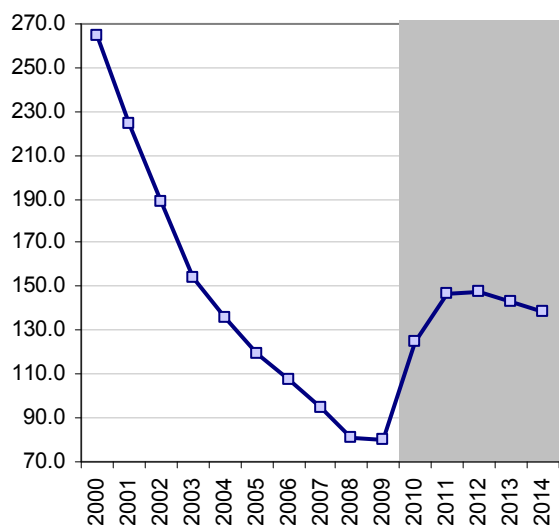
Arellano-Bond dynamic panel with one lag and T



Under-five mortality rate

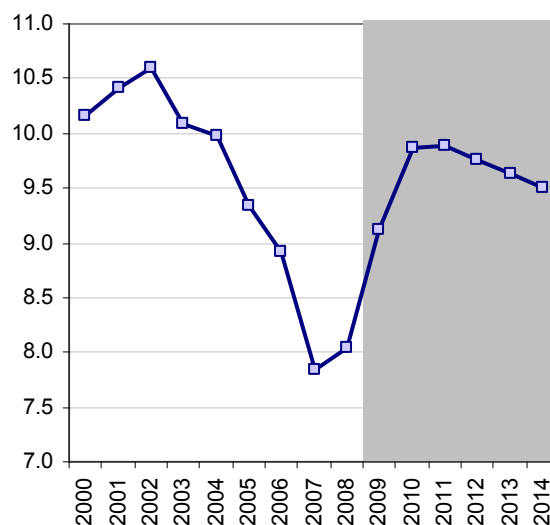
Arellano-Bond dynamic panel with one lag and L1





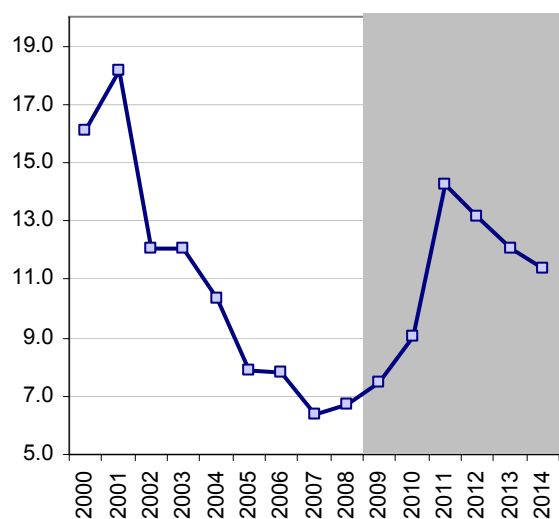
STD in population aged 15-19 (new cases per 100,000)

Arellano-Bond dynamic panel with one lag and L1 and L2



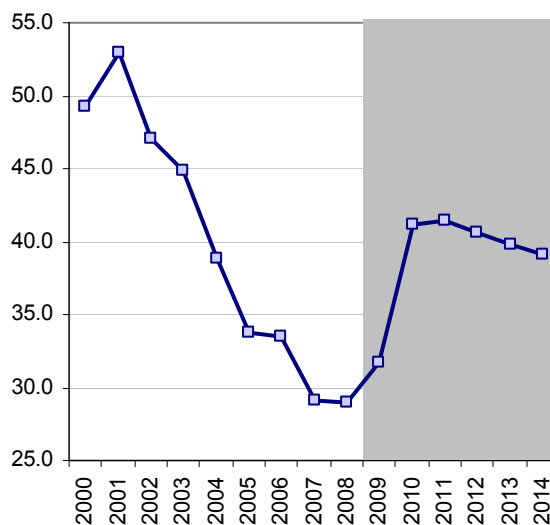
Unemployment, total (% of total labor force)

Arellano-Bond dynamic panel with one lag and T, L1



Poverty \$2.5 at 2005 prices

Arellano-Bond dynamic panel with one lag and L2



Poverty \$5 at 2005 prices

Arellano-Bond dynamic panel with one lag and L1

Notes:

See Appendix A for the definitions of variables.

The averages shown are calculated based on the country composition of panel used for econometric estimates. Charts show population-weighted averages of individual human development indicators for countries for which data are available.

Projections start in 2007 (in very few cases earlier, due to data limitations).

In describing the panel estimates, the lag refers to human development variable; T and L1, L2, L3, L4 refers to current and lagged (T-1, T-2, etc., respectively) PPP GDP per capita growth rate.

Shaded areas show periods after 2008, when human development indicators are projected to deteriorate compared with 2008.

Summary and Policy Implications

Summary of Results

The quantitative results convey a clear overall message. The impact of the global financial and economic crisis is large and predominantly negative for all HD indicators covered in most countries, and across the various elasticity measures used. Critically, the impact happens over several years, often with lags before a significant impact can be discerned. This is shown by both the econometrically significant estimates of lagged income, but also using PTB estimates—a distinctly different and simple (hence robust) statistical method. Thus, policymakers need to focus on the cumulative impact that is likely to be substantial; and realize that the impact lingers on. The main areas hit include income poverty and public health. But demographic indicators also display a worrisome picture, particularly for males—an aspect that may prompt a re-think of how best to define the gender dimensions of the crisis. Finally, the estimates suggest that the income elasticities can be distinctly different, often larger, in downturns.

Thus, essentially no uncertainty is left that a significantly negative impact of the crisis on human development indicators is already underway. It is increasingly clear that delays are likely to lead to greater social and economic costs, rather than a better outcome. Social and labor market policies must adjust now, especially given the lags with which the effects of those policies materialize.

As mentioned above, regressions are robust for the entire panel and to some extent for the regional sub-panels, but not for individual countries. Moreover, our broad findings regarding co-movements (which do not definitively establish causality) between income change and selected human development indicators cannot be taken as a sufficiently solid foundation on which alone a set of specific (let alone country-specific) policy recommendations can be built. These considerations pose limitations on the policy recommendations that can follow from our results. Ideally, those should help attain the best possible human development outcome given recent and expected future changes in per capita income.

But these findings can contribute toward such recommendations, and also toward coming up with specific areas of improvement. Specifically, they provide a building block for formulating robust, empirically based policy suggestions. Further building blocks include policy experience regarding specific measures and programmes that have worked (or have not worked) in the region, as well as insights into why this had been the case. Macroeconomic constraints, together with those posed by limited implementation capacity and the political process are also critical elements.

While recognizing those constraints, the paper doesn't stop at presenting the empirical results, but proceeds to provide some strategic considerations and the broad outlines of the policy response at the central and local government levels to the challenges posed by the crisis. These also reflect development practitioners' experience and knowledge from the region—factors that do not readily lend themselves to direct quantification. While the

resulting recommendations cannot always be directly linked with the findings of the empirical analysis, our hope is that the policy discussion will prove of some use. We also consider that identifying areas where efforts are needed to generate the necessary information flow to policymakers is a useful contribution.

Policy Implications

Strategic Considerations

Policymakers in the region—among the hardest-hit areas in the world—need to place the challenges posed by the crisis in context. In a globalized world, they face a confluence of shocks, both short- and long-term, all of which require policy action now. The former include the crisis-induced downturn marked by depressed employment despite possible incipient signs of recovering growth, the credit and liquidity crunch stemming from a deep financial crisis, and massive swings in commodity prices. Long-term challenges include looming macroeconomic risks related to the recent massive boost to global liquidity and rising public debt; adverse demographic trends in many of the region's countries; sharply rising income and social inequality in the past two decades; and on an even longer time scale, global climate change. Policymakers cannot delay the policy response to the longer term risks either owing to the long lags after which policies would yield a significant effect, and also because inaction could lead to escalating social and economic costs.

Since there are multiple objectives, the best way forward is to identify the optimal policies for each individually, then devise a “cocktail” of those that is internally consistent; fiscally feasible; and takes into account possible interactions among the various HD indicators, as well as among the various policy tools employed. Interactions among various policy measures can be synergistic (positive), or offsetting (negative). For instance, cost-sharing among proposed social programs or increasing efficiency stemming from scale can result in budgetary savings. Conversely, disincentives stemming from some measures or the need to assign the administration of additional programs to already overburdened civil servants can imply more than proportional increases in overall costs.

Policymakers need to distinguish between desirable policies that are distinctly crisis-related, and others that would make eminent sense under any circumstances. Regarding the latter, the crisis not only makes reforms inevitable by elevating the importance of raising financial, social, and environmental sustainability. It may also create opportunities to implement reforms. In particular, declining incomes may weaken entrenched interests that were able to block reforms to enhance economic efficiency, social justice, and governance in times of booming growth. Moreover, minds are concentrated as the clear risk of prolonged recession spurs social unrest; and the inevitability of reforms is also more readily accepted. These aspects should not be underestimated, since they help garner political support for those reform steps that should have been implemented in good times, but failed to clear the hurdles stemming from complacency, focused

lobbying, or lack of political will. On the other hand, this window of opportunity interacts with the electoral calendar, and nimble policy formulation that minimizes the recognition lag is needed to raise the chances of success.

Elements of the Policy Response

We focus particularly on three areas: public health indicators (life expectancy and mortality rates), unemployment, and poverty dynamics. All these areas have two features in common: the paucity of statistical data and the critical role of the state (at least in the near-term) in addressing crisis-related challenges.

An important finding of this paper is that statistical data on human development in our region have serious shortcomings. Income poverty data in particular, are collected on an inconsistent basis, resulting in an astonishingly weak poverty database throughout the region. The reasons vary from total lack of data (Turkmenistan), through weak statistical effort in this area (much of the CIS and Southern Europe), to serious inconsistencies in national definitions of poverty. In addition, Ukraine and a number of EU member states do not report absolute poverty data, implying a break in these series for most new EU member states (even though not required by the EU, Poland and Romania continue to produce absolute poverty figures). While the definitions for the poverty headcount and poverty gap indicators are uniform, serious definitional differences remain for national poverty indicators, while those that are internationally comparable suffer from a very limited number of observations. To make things worse from the point of view of policymakers seeking to base their decisions on empirical evidence, there are practically no poverty data for regions within countries. The timeliness of poverty data is also a critical problem, with many countries lacking any poverty data in the past 3-4 years. The latter could reflect reporting lapses or the fact that the data are not collected at all.

Relevant, timely and reliable statistical data are needed to monitor and analyze the crisis impact, and identify the most vulnerable regions, human development areas, and segments of the population in time for effective policy intervention. To this end, each country should compile at least annually, in a timely manner, an absolute and a relative poverty measure on an internationally comparable basis (i.e., using the same methodology). This is actually within reach, at least in principle. Countries in the region generally have the necessary infrastructure, statistical capacities and data from household budget surveys for calculating absolute poverty indicators. What is needed is agreement on the importance of this exercise and running the calculations. A useful first step in this direction would be to coordinate the various statistical tools and methodologies used by to generate poverty data (household budget surveys, labor force surveys, and censuses) within and across countries.

To fully understand the picture on poverty, it is necessary to go beyond national aggregates. This is important in light of significant existing, but largely undocumented regional disparities in most countries of the region. Thus, we propose compiling at least one simplified poverty indicator at sub-national level to support regional social policy formulation.

The crisis highlighted the important role of states in determining human development outcomes. Striking the balance between “too little” and “too much” intervention is not easy. Experience shows that the public expects the state to “protect” in periods of downturns and “not to stand on the way of entrepreneurial energy” in periods of upturns. Although this sounds appealing, it is very hard to operationalize this principle in real time, especially given the weak information base and shifting political considerations. A better guiding principle would be to aim for a stable role throughout the economic cycle, focusing on addressing market failures and providing public goods. Supporting social programs and investment in human capital while providing emergency interventions to mitigate the immediate crisis impact fits into this mold.

In meeting its responsibilities, the government must weigh the short-term costs and benefits (e.g., saving on social programs) against long-term ones (e.g., eroding the human capital base for human development). Governments should not abandon their long-term responsibilities for social investments and human capacity development. “Savings” on investment in human capital can be very expensive in the long run. The differences in the impact of the crisis on individual countries in major human related areas appear correlated with (i) the model of reform adopted (and respectively the role assigned to the state in the economy and social services provision); and (ii) the magnitude of public investment in human development in the past.

Any crisis is an opportunity and the current one can be an opportunity for public sector reform. The provision of social services (including social safety nets) is often far from efficient. Cutting their overall level, however, will not raise efficiency: this would require carefully crafted reforms of the social safety net and the provision of public sector social services. Hence governments should design and implement human development-centered public sector reforms. While the crisis may well necessitate prompt action, the response should be formulated with these longer-term considerations in mind. Diversifying the provision of social services, i.e., providing beneficiaries with the opportunity to choose providers (and in the process developing the market for such services) could be a useful objective. This could help reduce the costs of social service provision and also create jobs.

The crisis hit different groups in society differently. Marginalized populations may have been hit harder, and are likely to recover less easily. The picture however is more nuanced owing to the emergence of a significant group of “new poor”. There is a need to distinguish between this group, which was pushed (from the ranks of those at risk of poverty) by the crisis into poverty very recently, and those who have been in that status for some time. Existing safety nets are often much better at assisting the latter group than the former. Policymakers also need to calibrate measures carefully, making them group-specific, because the characteristics and responses to policy measures of these two groups may differ. Hence governments should make deliberate efforts to avoid “one size fits all” approaches in social policy and social protection as they design interventions reaching out to both individuals that have just fallen behind as well as to those who have been in marginalized position prior to the crisis.

Interventions should not be limited to social assistance designed to counter rising poverty, but should also provide broad access to social services (namely health and education) to prevent the erosion of human capital. Given the lag between resumed growth and improvement of human development indicators after periods of decline, this preventive role of the state appears a major responsibility of governments that will remain on the agenda long after economic growth resumes.

The sustainable maintenance of even a well-targeted social safety net may be at peril owing to the very narrow tax base in many countries of the region. Thus, widening the tax base—by eliminating tax loopholes, including international ones—has become a critical social and economic issue. It can help raise revenues without adversely affecting workers and economic incentives. The alternative is an inadequate social safety net or other unsustainable expenditure cuts that can lead to rising social tensions; or large deficits and a permanently higher future tax burden, reflecting escalating social payments as demographic pressures lead to soaring pension and health spending.

The simultaneous shrinking of the fiscal space and increase in social needs, together with the potential for significant social tensions adds to the urgency of better targeting social assistance. This is critical for raising the cost-effectiveness of the social safety net. Identifying observable characteristics of the poor/vulnerable that sets them aside from other parts of the population and life-line tariffs in utility charges could be useful ways to improve targeting. The use of incentives to self-select in applying for social assistance can also enhance overall targeting efficiency of some social programs. For instance, if the wage level in public work programs is set correctly, then people who would otherwise avail themselves of cash transfers can be attracted toward paid public works, enhancing the gains from budgetary spending and limiting human capital erosion in the process. There might also be scope for applying simple conditions on cash transfers clearly oriented toward enhanced provision of public goods (e.g., by improving attendance rates in primary and pre-primary education, or by raising child inoculation rates against communicable diseases).

Better targeting of social safety nets should go hand-in-hand with efforts to reduce dependency. Appropriately calibrated incentives and specific measures are needed to encourage individuals to use active self-reliant approaches, instead of staying on welfare indefinitely. Programs to move recipients of social support from dependency to employment have been tested on various occasions in the region and remain the subject of active discussion in many countries. The fundamental problem they faced was the small opportunity cost of staying on welfare—an obvious aspect for policies to focus on.

The low level of regular incomes for people with limited qualifications (close to the minimum survival provided by welfare) makes it economically irrational to switch to risky, low-paid employment. If informal employment opportunities are taken into consideration, untargeted welfare payments often turn into a “tax break”, facilitating the move of considerable parts of the population out of formal employment. The sustainability of welfare-to-work programs largely depends on the overall wage levels in

a country (the narrower the gap between welfare and labor incomes, the stronger the incentives to stay on the former).

Welfare-to-work programs largely depend on the availability of jobs. Job erosion during an economic downturn leads to increased pressure on the state to ‘provide employment’ and create jobs through public works schemes. This in fact brings the state back into the role of active employment provider. But the immediate benefits of this approach are questionable if the long-term implications are not taken into consideration. Experience suggests that governments should aim to leave the role of employment provider to the private sector.

A lot of experience exists in the region in that regard. A leading example involved publicly-funded schemes for the employment of vulnerable populations under the set of projects known as “Beautiful Bulgaria” (where the scheme was first implemented in 1997), “Beautiful Romania,” and “Beautiful Serbia”. These approaches boiled down to public works for the refurbishment of the urban environment and as a rule had training and requalification components. Indeed, public employment schemes can serve as a cushion in periods of job losses but their economic impact is mainly short-term, unless specific solutions are found to make them self-sustaining. They also need to fit into the overall scheme of social policy reforms. Evidence from such programs suggests that temporary public employment schemes are efficient if they are seen as a tool and not an objective in their own right. While they provide temporary income security for those involved and contribute to an enhanced living environment, their greatest merit is their role in improving the educational and vocational level of those enrolled, maintaining their working habits and self-respect.

The social rate of return on public employment schemes can be additionally increased if the latter are linked to environmental and infrastructural improvement. Benefits of such programs include decreasing energy costs through buildings refurbishment, raising the appeal of communities for potential investors by improving infrastructure, providing long-term unemployed with a sense of hope, and decreasing the threat of marginalization. Government-funded green jobs—which address climate change, reduce pollutant emissions or help improve irrigation, sanitation or reverse deforestation—could be another example of positive externalities of public employment schemes.

Still, care is needed to limit the scope of such emergency interventions to avoid a permanent increase in the state’s economic role. Massive bank rescue packages and increased public spending on infrastructure related projects (often with limited job-creation impact) may well be needed in a crisis, but should be temporary. State-run job-creation programs tend to be “sticky” both due to their social appeal and political leverage (many observers argue that their intensity is more closely correlated with the electoral than the economic cycle, growing rapidly prior to major elections). Implementing public policy interventions requires careful calibration to avoid feeding sophisticated rent-seeking behavior, moral hazard, adverse selection, and corruption schemes. In this regard, governance structures need to be strengthened, notably through

improved transparency and accountability; by bringing procurement rules and their implementation in line with best international practice; and by engaging civil society and enhancing the freedom of the press.

One way of mitigating the risks of rent-seeking and corruption is focusing interventions at the level of local governments. Local governments have a distinct informational advantage compared with the central government in determining what is needed and who is truly in need of support by virtue of being “closer to the action”.¹¹ At that level, transaction costs are often lower, processes can be more transparent and the resources allocated can be better targeted to specific needs. On the other hand, the actual capacity of local actors in most countries of the region to formulate and implement policies is very low. They need to develop such capacity substantially, and learn to think in economic (result-based) terms, defining objectives, prioritizing different goals, choosing optimal options and allocating resources efficiently. The best way to achieve this is through practice, in the process of doing and scaling up from small, successful pilots to bigger endeavors. These are natural areas for effective UNDP assistance.

Some of the policy challenges are specific to the region given its recent historical experience with decades of ostensibly egalitarian socialist rule, where the state has made the decisions and the public was largely prevented from making effective inputs to policy choices. The crisis has revealed the limited progress made in the region in shifting policy-making from a far-away “center” to free individuals—an important aspect of transition. Countries lagging behind in this regard are harder hit by the crisis and are often more prone to resorting to state-centered instruments of response.

Supporting individual initiative however is not sufficient, and can in fact backfire in the absence of transparency and a broadly shared set of values. One of the reactions to the collectivist egalitarianism of the socialist era was extreme individualism that neglected the importance of social networks, social solidarity and the very idea of common shared interests. The switch to this sort of extreme individualism in past decades may have contributed to the severity of the impact of the crisis. The lesson is that promoting a conceptual social framework in which individuals acknowledge that they have a common sphere of shared interests is important for unleashing socially beneficial individual entrepreneurship.

Such approaches are particularly effective at local and community level. Involving communities in joint projects—starting from joint discussions on local deficits and reaching consensus on urgent priorities—is hard, but can be highly effective. For example, community-based projects promoting local self-governance and community-based initiatives throughout Ukraine have proved successful in creating an enabling environment for self-sustaining community development at the local level. The program is assisting 200 districts (1000 communities) in developing projects in the fields of health (establishing local health posts network), environment (waste treatment and pesticide

¹¹ Arguments along these lines were used to support the subsidiarity principle in EU public finance management.

inactivation), energy (simple but effective energy saving measures, promotion of renewable energy sources), and local transport. Similar projects in other countries include school refurbishment that reduces energy costs, installation of sustainable energy sources, building small-scale food processing or packaging facilities. In all such cases, the benefits associated with the projects are not limited to temporary increases in employment, but also include expanded long-term opportunities.

Rural development, including in the non-farm rural economy, is a key area of possible high-impact intervention. Policies could usefully focus on developing farmer-controlled businesses (cooperatives). These can help overcome constraints posed by small landholdings, limited sources of inputs, poor competition in wholesale markets, and lack of capital. To enhance microfinance for agriculture and the non-farm rural economy, more funds available for on-lending, improved capacity of microfinance organizations, and new lending products are all needed. Facilitating agricultural commercialization can help raise efficiency. To this end, measures to foster technology diffusion are needed — such as making available proven, financially feasible technology suited to available volumes. Finally, agricultural extension to provide information on production alternatives, markets and marketing, production economics, input utilization, and farm management is critical.

The impact of local level interventions can be further augmented when implemented in the framework of area-based development. Targeting development interventions to vulnerable areas—rather than to vulnerable groups—can prevent group-based competition over resources. Such competition can hinder efficiency and optimal allocation of resources and lead to negative human security outcomes during crises. Experience suggests that area-based development interventions have serious potential for alleviating the risk of ethnic or religious conflicts that may reappear as a potential cleavage line between various groups in society in times of crisis.

To summarize, local level actors (local governments, CSOs, citizens) are central to formulating an appropriate and sustainable response to the crisis. They can and should engage in small-scale, concerted endeavors that help people accumulate experience and improve their capacity to get things done. Development of community networks should be supported to facilitate individual actors' access to markets. All these could markedly increase the stock of social capital in most countries of the region.

UNDP can play a very useful and effective role in these endeavors. It should position itself as the essential micro-level provider of projects that are critical for macroeconomic policies and large World Bank-type sectoral projects to gain traction in regions further away from the capital and large cities; and in reaching and involving vulnerable or marginalized parts of the population. UNDP will have to enhance the cost-effectiveness of development support through projects/interventions that help identify the right recipients, deliver resources efficiently to them, and reduce leakage from the social support system. Coordinated action of donors is also important to make the most of scarce funds. This is an area where the UNDP can build on its experience in enhancing technical-level donor coordination (notably through websites, web-based discussion

spaces and focused regular, low-key meetings among donors and key NGOs). A lead role for UNDP in donor coordination could prove to be a valuable source of up-to-date information for everyone involved. Finally, while governments' thinking will be dominated by immediate concerns, UNDP should help retain focus on critical long-term issues. Key examples for those include pension, health, and immigration reforms needed to address looming demographic changes; and proper pricing of energy and building a consensus for action in the area of climate change.

Human development indicators used in the paper

1. Life expectancy at birth, total
2. Life expectancy at birth, male
3. Infant mortality rate (per 1,000 live births)
4. Under-five mortality rate (per 1,000 live births)
5. Suicide rate for males aged 15-19
6. Homicide rate (homicides per 100,000 population)
7. Incidence of hepatitis
8. Incidence of sexually transmitted diseases
9. Incidence of sexually transmitted diseases in population aged 15-19
10. Unemployment, total (% of total labor force)
11. Population below \$2.50PPP per day
12. Population below \$5.00PPP per day

Countries covered:

Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, FYR Macedonia, Moldova, Montenegro, Poland, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Tajikistan, Turkey, Ukraine, Uzbekistan.¹²

The sub-groups are defined as follows:

CIS+Georgia: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Ukraine, Uzbekistan

Western CIS: Belarus, Russian Federation, Ukraine.

Rest of CIS+Georgia: Armenia, Belarus, Georgia, Kyrgyzstan, Moldova, Tajikistan, Ukraine, Uzbekistan.

Oil exporters in CIS: Azerbaijan, Kazakhstan, Russian Federation.

Central Asia CIS: Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan.

CEE and Baltics: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.

Western Balkans: Albania, Croatia, FYR Macedonia, Montenegro, Serbia.

Western Balkans and Turkey: Albania, Croatia, FYR Macedonia, Montenegro, Serbia, Turkey.

¹² Turkmenistan is excluded owing to the paucity of data.

Dealing with Possible Unit Roots

One obvious criticism to econometric exercises of this kind is that the use of OLS-based estimates relying on variables arising from a unit root (non-stationary) stochastic process can produce misleading estimates. In particular, regressing one variable with a strong trend in it—of which time series with unit roots are one example—on another with strong trends using OLS and the usual standard error formula will yield an apparently significant relationship whether or not one exists in reality. Thus, the regression results would be spurious in the sense of Newbold and Granger (1974). We rely on definitional characteristics of the variables used and on panel unit root tests in arguing that our results are not rendered spurious by nonstationarity problems.

As for definitions, we use the growth rate of per capita PPP GDP as the regressor—the first difference of a variable that is generally accepted to be integrated of order 1. The first difference would then be integrated of order 0, resolving the problem for this variable. Regarding the human development indicators, we note that a unit root process cannot asymptotically be confined to an interval. Thus, using shares for all our dependent variables that can—by definition—never take a value outside the unit interval could lend some comfort about nonstationarity. At an informal level, the Arellano-Bond panel regressions have yielded estimated coefficients on the lagged dependent variable that were statistically significantly different from one.

An econometrically rigorous resolution of the unit root issue, however, requires formal statistical testing. To this end, we have run Augmented Dickey-Fuller (ADF) tests individually for each human development variable used in the reported regressions. But the ADF tests have very low power at our sample size in the time dimension, and indeed the results were mixed, leading to non-rejection of the hypothesis of a unit root in a good number of cases. We then turned to panel unit root tests, from among which, following Maddala and Wu (1999), we have chosen the Fisher-type tests they found to have superior power. We have run all four tests that are in this class in parallel, and accepted in the first round only those dependent variables for which they unanimously rejected the null hypothesis of unit roots in the entire panel. For the remaining dependent variables we have chosen a few countries (based on the country-specific ADF tests) where the unit root problem was the biggest, and dropped them from the panel for that particular variable. Whenever dropping just a few countries from the panel sufficed for getting clean test results for all four panel unit root tests, we proceeded with the smaller panel. We dropped two variables from the econometric investigation altogether, for which the unit root issue could not be unambiguously resolved this way (divorce rates and poverty rates on national definition). All reported results are based on panels that have passed this procedure involving the battery of four Fisher-type panel unit root tests (Table 4).

We have not been able to run the Hadri (Lagrange multiplier) panel unit root test that has stationarity of all country variables in the panel as the null hypothesis. A requirement of

that test is a full panel in both dimensions, which our data fails by a wide margin. The strategy of attempting to cut in each dimension until a subpanel emerges with no missing data was not feasible owing to the “holes” in many time series (i.e., missing data in the middle, rather than at either end of time series). The cuts would have been so drastic that (i) the power of the test would have been highly questionable, and (ii) econometric estimation based on that small subpanel would not have been meaningful.

Table 4. Fisher-type panel unit-root test

Variable	Result	Inverse normal Z		Inverse logit		Inverse chi-squared P		Modified inv. chi-squared Pm	
		p-value	result	p-value	result	p-value	result	p-value	result
Life expectancy at birth, total	strongly rejected	0.0244	rejected	0.0133	rejected	0.0015	rejected	0.0003	rejected
Life expectancy at birth, male	strongly rejected	0.0029	rejected	0.0022	rejected	0.0006	rejected	0.0001	rejected
Infant mortality rate (per 1,000 live births)	strongly rejected	0.0257	rejected	0.0133	rejected	0.0009	rejected	0.0001	rejected
Underfive mortality rate (per 1,000 live births)	strongly rejected	0.0003	rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected
General divorce rate (per 100 marriages)	strongly rejected	0.0179	rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected
Suicide rate for males aged 15-19	strongly rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected
Incidence of hepatitis	strongly rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected
Incidence of sexually transmitted diseases	strongly rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected
Sexually transmitted diseases in population aged 15-19	strongly rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected
Homicide rate (homicides per 100,000 population)	strongly rejected	0.0158	rejected	0.0051	rejected	0.0016	rejected	0.0002	rejected
Unemployment, total (% of total labor force) CORRECTED	strongly rejected	0.0441	rejected	0.0008	rejected	0.0000	rejected	0.0000	rejected
Poverty \$2.5 Based on ICP Cons. in 2005 prices (ECAPOV Cons.) CORRECTED	strongly rejected	0.0318	rejected	0.0184	rejected	0.0342	rejected	0.0213	rejected
Poverty \$5 Based on ICP Cons. in 2005 prices (ECAPOV Cons.) CORRECTED	strongly rejected	0.0011	rejected	0.0000	rejected	0.0000	rejected	0.0000	rejected

Note: Based on augmented Dickey-Fuller tests. Null Hypothesis: All panels contain unit roots; Alternative Hypothesis: At least one panel is stationary; Significance 0.05. The following countries were excluded due to the limited number of observations or failing the panel unit root test: Infant mortality, under-five mortality: CYP, SRB, TUR; Youth male suicide rate, incidence of hepatitis: CYP, TUR; Incidence of sexually transmitted diseases: BIH, CYP, SRB, TUR; Youth incidence of sexually transmitted diseases: ALB, BIH, BGR, CYP, SRB, TUR; Homicide rate: BLR, BIH, CYP, MNE, RUS, TUR, UKR; Unemployment rate: BIH, EST, LTU, UZB; Poverty rate at \$2.50/day: ALB, ARM, BIH, BGR, HRV, CYP, CZE, LVA, KAZ, MNE, MKD, LTU, SRB, SVK, SVN, TJK, UZB; Poverty rate at \$5.00/day: ALB, BIH, BGR, HRV, CYP, CZE, LVA, SVK, SVN, TJK, UZB.

Inverse normal Z statistic offers the best trade-off between size and power, and Choi (2001) recommends using it in applications; inverse logit L* test typically agrees with the Z test; when the number of panels is finite, the inverse χ^2 P test is applicable; for large panels, Choi (2001) therefore proposes the modified inverse χ^2 Pm test which converges to a standard normal distribution.

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