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(International Master in Economy, State and Society)

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HEALTH SYSTEMS IN TRANSITION: PRIORITIES, POLICIES AND HEALTH OUTCOMES

Master Dissertation

Prague 2009

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Date of Defence:	22 June 2009
Assessment:	.....

Bibliographic record

BORISOVA, Liubov. Health Systems in Transition: Priorities, Policies and Health Outcomes. Prague: Karlova Universita, Fakulta Sociálních Věd, Institut ekonomických studií, 2009. 154 pp. Supervisor of the Dissertation: Mgr. Henrieta Maďarová MS.

Annotation

The dissertation deals with the links between health care systems and health outcomes in the so-called 'transition' countries. The main questions to be addressed are: *"Do health care systems and their transitions influence health outcomes in the transition area and if they do – how?"* The combination of qualitative techniques and econometric methods allowed for a creation of the structural classifications of the health care systems in transition and produced important findings. Firstly, health care transitions, and especially their structural component, are found to be significant in determining health status in the CEE and CIS countries. Secondly, however, the socio-economic determinants of health were established to also play a major role in determining health inequalities in the transition area.

Keywords

health care system, health outcome, health inequalities, transition, determinants of health

Statement:

1. This statement is to confirm that this paper is a product of my own work and also to confirm that I used the listed sources in producing it.

2. I agree that the paper can be checked for research and studying purposes.

Prague, 22 May 2009 Liubov Borisova

Acknowledgment

There are several people to whom I would like to address my special appreciation for their help and support during my work on this dissertation. Firstly, I would like to thank my supervisor Henrieta Mad'arová, who guided me with invaluable advices, timely critique and superb expertise in the field. Secondly, my thanks are to Lucie Bryndová for inspiration, enthusiasm and knowledge, as well as for the provided opportunity for me to attend the Ministerial Conference "Financial Sustainability of Health Systems", which only further encouraged and inspired my interest in the topics of health and health care. I would also like to thank Michal Mejstřík for provided guidance at the MA Thesis Seminars, and Petr Háva for stimulating my interest in health care systems research. For constant administrative support I would like to thank our Prague coordinator Jiři Vykoukal. For the essential help with the very formulation of the topic and for non-obligatory constant support, help and friendly advice, I am always very thankful to Chris Gerry. Finally, special thanks are to my colleagues and friends Natalia Shilyaeva, Martin Fischer and Irina Sadovskaya for being patient with me throughout the whole year, for help with econometrics and friendship.

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ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
BBP	Basic Benefits Package
CEE	Central and Eastern Europe
CIS	Commonwealth of Independent States
DALE	Disability Adjusted Life Expectancy
DALY	Disability Adjusted Life Years
DEA	Data Envelopment Analysis
DFLE	Disability Free Life Expectancy
DRG	Diagnosis Related Groups
EBRD	European Bank for Reconstruction and Development
ESS	European Social Survey
FSU	Former Soviet Union
GDP	Gross Domestic Product
GP	General Practitioner
HALE	Health Adjusted Life Expectancy
HE	Health Expenditure
HiT	Health in Transition
HIV	Human Immunodeficiency Virus
LDC	Less Developed Countries
LE	Life Expectancy
LEB	Life Expectancy at Birth
MEPV	Major Episodes of Political Violence
MoH	Ministry of Health
NBB	New Baltic Barometer
NDB	New Democracies Barometer
NHS	National Health Services/System
NIS	Newly Independent States
NRB	New Russia Barometer
OOP	Out-of-pocket
OTE	Overall Technical Efficiency
PbHE	Public Health Expenditure
PHI	Private Health Insurance
PrHE	Private Health Expenditure
PTE	Pure Technical Efficiency
PYLL	Potential Years of Life Lost
RLMS	Russian Longitudinal Monitoring Survey
SDR	Standardized Death Rate
SHI	Social Health Insurance
THE	Total Health Expenditure
VHI	Voluntary Health Insurance
WB	World Bank
WDI	World Development Indicators
WHO	World Health Organisation

INTRODUCTION

During the last two decades the countries of Central and Eastern Europe have been experiencing processes of economic, social and political transition involving the reorientation of their institutions and structures from centralised and planned to market and democratic arrangements. The diversity of experience in socio-economic, political *and* health outcomes that has emerged is important both for the countries themselves but also for the wider region. The existing divide between 'West' and 'East' has been transformed: while some countries have been steadily converging closer to Western Europe, others have fallen yet further 'behind' and in myriad ways. A key element of these changes has involved the transformation and reformulation of the social security and health systems. The transition of health care systems is an often neglected, though clearly important issue and against a diverse, often deteriorating background of health 'performance' during this period, the linkages between health systems, their reform and health outcomes assumes particular significance.

The health outcomes in the transition area have been deteriorating since the 1970's, especially in the countries of the former Soviet Union. With the start of transition, most countries experienced something of a short-lasting deterioration in their health outcomes and some remain lagging behind. All of these health outcomes are influenced greatly by factors such as lifestyle, genetics, the socio-economic situation, the environment and so on. Nevertheless, there are certain diseases, the deaths from which are completely or partially *amenable to health care and prevention* – such as tuberculosis, hepatitis, diabetes, cardiovascular and heart diseases, asthma, etc. – and this is where the health care services play a crucial role[1]. Therefore, while personal and environmental factors are important for *being* healthy, medical services are crucial for *prevention* and *treatment* of illnesses when they already exist – thus in '*returning*' health. This side of the story on the determinants of health in the transition area represents something of a gap in the existing research.

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[1] Nolte, Ellen; McKee, Martin. *Does Health Care Save Lives? Avoidable Mortality Revisited.* The Nuffield Trust. 2004.

This dissertation therefore aims to address that gap. In particular it sets out to try to establish and understand the links between health outcomes and the functioning of health care systems and in so doing endeavours to identify the transmission mechanisms between different health care systems and different outputs, in the context of transition countries. The main research questions therefore are:

- How have the health care *priorities*, *policies* and *health outcomes* evolved in Eastern Europe since 1989?
- Can the differing health outcomes in transition countries be explained by the observed differences in priorities, policies and emerging health care structures?
- If yes, what is the link between them?

There is a strong motivation for the choice of the region of interest. Historically many of the CEE and CIS countries have been placed somewhat in between Europe and Asia – at the crossroads[2]. More recently, despite the turn towards market liberalisation and democracy, the communist legacy still leaves its traces – in some countries more than in others. Sudden cultural and ideological changes still cause instability of political and economic policies, as well as considerable diversity between countries throughout the region. At the same time, many of these countries do share some common, often rather painful experiences rooted in the past, sensitive memories and quite low subjective well-being. The diversity touches the area of health care as well and provides a truly rich tapestry of different systems, ideal for empirical analysis of health and health inequalities.

The regional dimension of research allows us to augment the main research questions with the following additional hypothesis, which reflects the importance of health care systems and transitions in the area, namely:

- Countries in the transition area adopted certain *paths* in their health care transitions, and these transitions can be classified into *groupings* defined by the *structural* differences and similarities created by the different *transitional paths*.

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[2] E.g. Neumann, Iver B. *Uses of the other. "The East" in European identity formation.* Manchester: Manchester University Press. 1999. Tunander, Ola; Baev, Pavel; Einagel, Victoria I. *Geopolitics in Post–Wall Europe. Security, Territory and Identity.* London: SAGE Publications. 1997.

We find the following core results. *Firstly*, the health care systems and their transitions did take certain paths, which can be distinguished as classifications of health care systems. *Secondly*, these classifications, which capture the *structural* diversity of the health care systems in transition, even though possibly capturing additional unrelated characteristics, do indeed explain the health inequalities in the transition area and add value to the health production research. *Thirdly*, the structural characteristics are shown to matter differently for different countries. *Fourthly*, regardless of the incorporation or otherwise of these classifications, our research robustly confirms, using panel econometrics the significant role of socio-economic and lifestyle factors in determining health status.

The dissertation proceeds as follows. First, the main theoretical grounding is developed from the research on health production functions, which is discussed in detail in Chapter 1. It is then argued that the existing proxies of health care systems are not sufficient and a deeper structural analysis is needed. Thus we then proceed with a qualitative comparative analysis of health care systems. In doing so Chapter 2 briefly surveys the existing diversity of health outcomes and health care systems in the transition countries. Chapter 3, using qualitative techniques and cluster analysis, then classifies the systems according to the transitional differences and the structural characteristics of the health care systems in transition. Chapter 4 builds health production functions for the transition countries, deeply grounded on the theoretical considerations of Chapter 1 and implementing the system groupings culled from Chapter 3 as proxies for structural differences of health care systems. In this chapter, we use a transition data set and employ a mix of panel effects models.

Thus, this research adds to the existing literature of determinants of health through, firstly, its aggregate approach to health determinants analysis – incorporating socio-economic, lifestyle, political and health care factors; and secondly, though creating the classifications of health care systems and incorporating them into research – a methodological innovation, which – to our knowledge – has not been used in previous works.

CHAPTER 1. BUILDING FRAMEWORK.

The topic of the determinants of health and demand for health has been extensively investigated quantitatively and qualitatively, using both micro- and macro-level data. In order to understand, how health care influences health and the demand for health of a population, numerous attempts have been made to establish the causal pathways linking health outcomes and characteristics of the health care systems. Chapter 1 discusses the existing research on the determinants of health outcomes and debates the possibility for building a framework for further research stemming from the existing studies. It additionally develops a possible framework for the research of health care systems in the context of Central and Eastern European (CEE) region countries, more commonly referred to as the transition countries.

DEFINING HEALTH AND HEALTH SYSTEMS

Some initial definitions have to be given. The World Health Organisation (WHO) considers health to be "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"[3]. We accept this definition, but for analysis have to use the existing data and available indicators as proxies for the complex term of 'health': actual incidence of illnesses, life expectancy and mortality.

Health systems in the modern world are very difficult to define, it is sometimes impossible to distinguish where the health system begins and ends. Moreover, the difference between 'health policy' and 'health care policy' exists. While health care policy deals purely with health care provision, financing and interventions, health policy suggests a broader meaning and includes other fields of

[3] Preamble to the Constitution of the World Health Organization. WHO Basic Documents, Forty-fifth edition, Supplement, October 2006. p.1. http://www.who.int/governance/eb/who_constitution_en.pdf [Access: 15.12.2008] (The Constitution was adopted at the International Health Conference in New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization. No. 2. 1956. p. 100) and entered into force on 7 April 1948 – Ibid.)

possible state interventions into population health: transport, environment, social security, etc.[4]. WHO "defines a health system to include all the activities whose primary purpose is to promote, restore or maintain health"[5]. Even though the distinct separation between the two definitions is becoming more and more blurred, to slightly sharpen our research we concentrate on the more narrow definition – '*health care policy*' and '*health care systems*'.

DETERMINANTS OF HEALTH

It can indeed be argued that the factors that determine health lie far beyond the health care systems. For example, Goran Dahlgren develops a model of concentric circles, where the first circle that influences human health, besides age, gender and hereditary factors, is individual lifestyle factors; and the last circle, which influences all the previous circles, is the "general socioeconomic, cultural and environmental conditions"[6]. Therefore, health is influenced greatly by the social and cultural change, transformation of lifestyles and dietary conditions, as well as environmental factors[7].

Richard Auster, Irving Leveson and Deborah Sarachek estimate the elasticity of mortality change to health services consumption change, and find that health services consumption contributes to only 10% change in mortality rates, while more than 50% is attributed to environmental, societal and personal factors[8]. Thus, the latter are important – if not the most important – determinants of health. It has to be stressed, however, that while overall concept of *being 'healthy'* is influenced by the lifestyles and environmental factors, *'bringing health back'* is the major responsibility of the health care services. Thus, keeping in mind the importance of the socio-economic determinants of health, it is increasingly important to analyse the influence of the health care systems on health.

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[4] Palfrey, Colin. *Key Concepts in Health Care Policy and Planning. An introductory text*. Basingstoke: Macmillan Press Ltd. 2000. p.3

[5] Musgrove, Philip; Creese, Andrew; Preker, Alex; Baeza, Christian; Anell, Anders; Prentice, Thomson. *The World Health Report 2000. Health Systems: Improving Performance*. World Health Organization. 2000.

[6] Dahlgren, Goran. *European Health Policy Conference: opportunities for the future. Volume II – Intersectoral action for health.* Copenhagen. WHO Regional Office for Europe. 1997.

[7] *Closing the gap in a generation. Health equity through action on the social determinants of health.* Commission on Social Determinants of Health Final Report. World Health Organisation. 2008. http://whqlibdoc.who.int/publications/2008/9789241563703_eng.pdf

[8] Auster, Richard; Leveson, Irving; Sarachek, Deborah. The Production of Health, an Exploratory Study. *The Journal of Human Resources.* Vol. 4, No. 4. University of Wisconsin Press 1969. pp. 411-436.

EMPIRICAL APPROACHES TO HEALTH PRODUCTION

Today two empirical approaches to analysing health production exist. One of them is based on the definition of health as a personal commodity and relies on micro-level data. Often longitudinal surveys are used and the self-perception of health and socio-economic conditions is analysed – this is becoming more and more often used for the CEE transition countries. This approach takes the researcher back to the work of the 'founding father' of the health production function Michael Grossman[9], who believed that every individual inherits a certain level of health which deteriorates over time but that can be improved through investing in it – thus, the demand function for the commodity of 'good health' is constructed[10]. Grossman argued that age, income and education are important determinants of health status, demand for health and medical services[11].

The second approach views health as an output, for example, of the health care system and is influenced by certain inputs into it. This approach mainly uses macro-level data, is often based on cross-country comparisons and is frequently used for analysis of cost-containment in many developed countries[12]. Thus, many researchers attempt to investigate the effectiveness and efficiency of health care expenditures on the national level, quantity of health care resources provided, types of health insurance coverage and other possible characteristics and health care options with regards to their effect on aggregate health outcomes.

However, the two approaches are no longer easily distinguished between. Firstly, both approaches assume an 'input'-'output' logic consistent with the production function methodology and secondly, researchers have incorporated the features of both into their explorations[13]. Since our interest in this paper is on the link between system inputs and health outputs in the remainder of the chapter we

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[9] Grossman, Michael. *The demand for health: a theoretical and empirical investigation.* National Bureau of Economic Research. New York: Columbia University Press. 1972.
[10] Grossman, Michael. On the Concept of Health Capital and the Demand for Health. *The Journal of Political Economy*, The University of Chicago Press. 1972. Vol. 80, No. 2, pp. 223-224.
[11] Ibid. p. 247.
[12] Nixon, John; Ulmann, Philippe. The relationship between health care expenditure and health outcomes. Evidence and caveats for a causal link. *European Journal of Health Economics*. 2006. No.7. p.8.
[13] Ibid. p.8.

concentrate on research conducted in that spirit, using cross-country aggregate data. Moreover, according to Mark C. Berger and Jodi Messer, in order to analyse the effect of policy choices and health care systems transformations on health outcomes, one should use macro-level cross-country comparisons:

> "...if one wants to look at the effectiveness of various reforms or differences in health systems on health outcomes, an international sample is superior because of the variation it provides in the type of health care system"[14].

MEASURING AGGREGATE INPUTS AND OUTPUTS OF HEALTH RPODUCTION

An extensive bulk of studies on health production has been carried out for the OECD countries. Some are based on cross-section or cross-section/time-series analysis and it is data availability which largely explains the frequency of research based on this set of countries. Within this strand of literature though there is a diversity of empirical approaches employed; with a range of different model specifications, econometric methodologies, time periods and country coverage.

As a starting point, the attention has to be drawn to the health outputs that are most commonly used for estimating the health production function. The dilemma of which of the available indicators reflect the health status best has existed for a long time in the health-related research. As John Nixon and Philippe Ulmann emphasise in their article, "health outcomes are ... qualitative and quantitative, and only the latter may be assessed by the available statistical and econometric techniques"[15]. Thus, in general, assessing health through available indicators should always be done with a certain degree of caution.

There are quite a few proxies available and frequently used for health production functions. The most commonly used are life expectancy and mortality rates, which by themselves have a variety of available types: life expectancy at birth, life expectancy at a certain age, infant mortality, maternal mortality, total mortality rates, etc. Even though these are considered to be the most reliable and available, they cannot be said to perfectly reflect the health status of a person or population. Firstly,

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[14] Berger, Mark C.; Messer, Jodi. Public financing of health expenditures, insurance, and health outcomes. *Applied Economics*. 2002. No. 34, p. 2106.
[15] Nixon; Ulmann. The relationship between health care expenditure and health outcomes. 2006. p.17.

life expectancy does not account for the quality of life lived. Secondly, mortality rates include a big risk of externalities influencing the mortality rate[16]. In recognition of this, in recent years the WHO and the OECD have tried to introduce new variables, which could incorporate both the life expectancy and the quality of life, accounting for morbidity. As a result, variables such as potential years of life lost (PYLL), disability-adjusted life expectancy (DALE) and disability-adjusted life years (DALY) have been created. However, aside from being equally imperfect proxies for 'health', due to the lack of data, it is impossible to use these variables for time-series panel data studies and so their use has been less widespread. Thus, it remains the case that some form of life expectancy or mortality indicator is the most widely used proxy for health.

Another similarity of all the studies under review is that, as input proxies, they use one or other kind of health care expenditures or a combination of them (total, public, private, inpatient, outpatient, etc.) as main health care system inputs into health outcomes[17] which reflect either the amount of supply of health care services[18] or characteristics of the system in general. These are then used in an attempt to discover the effectiveness and efficiency of health care spending on health outcomes in order to establish the links between health system inputs and health status outputs. To depict the structural differences of the health care systems in various countries, researchers also use variables of resources available within the system – number of hospital staff, hospital beds, as well as other system characteristics – insurance coverage, length of stay in the hospital, etc.

However, most of the studies acknowledge that health care system characteristics are not the only inputs into health outputs[19], thus authors incorporate other proxies in their model estimation in order to control for other factors that influence health. Most commonly used are the environmental conditions people live in, lifestyle factors, demographic situation, socioeconomic conditions.

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[16] Joumard, Isabelle; André, Christophe; Nicq, Chantal; Chatal, Olivier. *Health Status Determinants: Lifestyle, Environment, Health Care Resources and Efficiency*. Organisation for Economic Co-operation and Development. Economics Department Working Paper No.627.04.08.2008 ECO/WKP. 2008. pp.7-8.

[17] Berger; Messer. Public financing of health expenditures, insurance, and health outcomes. 2002. p. 2108.

[18] Thornton, James. Estimating a health production function for the US: some new evidence. *Applied Economics*. 2002. No. 34, p.60.

[19] Nixon; Ulmann. The relationship between health care expenditure and health outcomes. 2006. p.17.

Environment is frequently expressed in the air pollution rates; fat and meat, fruit and vegetable consumptions as well as nutrition, alcohol and cigarette consumption are common proxies of lifestyles. The demographic situation is often taken into account for biological reasons[20] and while generally the elderly require more health services, the proportion of elderly population is often controlled for in the models as well. Researchers widely acknowledge that genetic composition is important, though there is no proxy that can clearly account for it[21], so the controls for country-specific effects are taken into consideration in some studies in an attempt to account for these differences. 'Socioeconomic conditions' is the most diverse set of variables and can include GDP and/or income, inequality indices (Gini), education, unemployment, etc. – these can be expressed in a variety of variables.

The focus of this literature review is on establishing a framework for understanding the links between health care systems and health outcomes. Therefore, rather than detail all of the possible empirical approaches covered in the literature, we concentrate more specifically here on the way in which authors try to account for the effect of *health care system inputs* and their differences between countries, while at the same time controlling for other factors[22].

MEASURING HEALTH SYSTEMS

As was mentioned above, the most popular proxy for system characteristics is health care expenditure. John Nixon and Philippe Ulmann in their study analyse the determinants of health outcomes – life expectancy and infant mortality rates[23] – on a set of fifteen members of the European Union (pre 2004-accession) over a period of 16 years. They try to review the structure of the health care system and its supply through introducing, apart from the expenditures, variables such as number of physicians and hospital beds, patient admission rate and average length of stay, as well as the population coverage, and controlling for country-specific effects. Nixon and Ulmann found that the

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[20] Berger; Messer. Public financing of health expenditures, insurance, and health outcomes. 2002. p. 2107.
[21] Macinko, James; Starfield, Barbara; Shi, Leiyu. The Contribution of Primary Care Systems to Health Outcomes within Organization for Economic Cooperation and Development (OECD) Countries, 1970–1998. *Health Services Research*. June 2003. Vol.38. No.3. p.834.
[22] For the interested reader, the full range of studies considered in this paper is presented in Appendix 1.
[23] Nixon; Ulmann. The relationship between health care expenditure and health outcomes. 2006. pp.7-18.

health system inputs they introduced (particularly, health expenditure and number of physicians) are significant in explaining variations in health outputs, but suggest that the role of the health care system as an input into health status is undoubtedly *ambiguous*, and that is why they argue different studies might give opposite and sometimes even conflicting results.

Similar findings regarding the role of total health expenditures are achieved by Isabelle Joumard et al. in OECD Working Paper "Health Status Determinants: Lifestyle, Environment, Health Care Resources and Efficiency"[24]. The authors introduce health expenditures in one of their models and the number of practitioners in another and claim them to be proxies for health care system inputs in to health outputs (life expectancy and premature mortality). Besides, they try to analyse the efficiency of health care spending in different countries. However, even though they do find that health care expenditures are important determinants of health outputs, the data envelopment analysis (DEA) shows that the efficiency of the rising health expenditure varies across countries and therefore there is space for the *improvement of efficiency of resource allocation and overall system functioning without raising spending*[25]. The weakness of this study is however in the way the models are estimated, especially the health care system inputs of them: one model accounts *only* for the financing of the health care system, and the other – *only* for the organisational side of it, without an attempt to incorporate both and/or introduce other health care system characteristics.

In a similar spirit but using regional data, within *one* country, Pierre-Yves Cremieux et al. undertake a research of the health care spending as health outcome determinant based on the data of the 10 Canadian provinces over a period of 15 years[26]. Their findings of the determinants of health outputs (infant mortality rates and life expectancy) are concordant with the ones presented above, though they found a *very strong* relationship between GDP, health expenditures, number of physicians and health outcomes, which they explain by the more homogeneous nature of the data which is

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[24] Joumard et al. *Health Status Determinants.* 2008.
[25] Ibid. p.38.
[26] Cremieux, Pierre-Yves; Ouellette, Pierre; Pilon, Caroline. Health care spending as determinants of health outcomes. *Health economics*. 1999. No.8. pp.627-639.

available for one country and is impossible to obtain while making cross-country comparisons[27]. This study proves that the *quality*, *heterogeneity* and *availability of data* are very important issues for any research, but for the research of the determinants of health in particular.

Mark C. Berger and Jodi Messer try to go further in an attempt to account for the structural differences of health care systems, and introduce, besides total health expenditures, the variable of public health spending and proportions of population eligible for inpatient and/or ambulatory care benefits under a public scheme[28]. Their findings confirm the association between higher health care expenditures, healthier behaviours, higher education and lower mortality rates. However, the *higher proportion of public expenditure* appeared to have an *opposite effect on mortality*, thus the authors argue (though with caution) that "…increases in public financing may lead to a less productive mix of services or less efficient provision of services"[29]. Research of Berger and Messer argues for the importance of accounting for the *public-private mix* of the health care systems. However, the relationship between health outcomes, and public and private components of the health care systems, remains very controversial.

A different result was reached by Theo Hitiris and John Posnett[30], which is based on data from 1960 to 1987 for 20 OECD countries. The authors firstly try to prove the positive relationship between the health care expenditures, GDP and demographic characteristics of the society, as well as then establish the links between these inputs and health outputs – mortality rates. However, as the added variable of *public finance share in health care* appears not to change the explanatory power of their models and is *not significant* by itself in that model specification, it is simply excluded. They still argue that the "health finance and delivery may, after all, prove to have an important influence on the demand for health care"[31].

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[27] Ibid. pp.636-638.
[28] Berger; Messe. Public financing of health expenditures, insurance, and health outcomes. 2002. pp. 2105-2113.
[29] Ibid. p. 2111.
[30] Hitiris, Theo; Posnett, John. The determinants and effects of health expenditure in developed countries. *Journal of Health Economics*. 1992. No. 11. pp. 173-181.
[31] Ibid. p. 180.

Valuable findings are presented in the research of Sharmistha Self and Richard Grabowski on a set of 191 countries worldwide – developed, middle-income and less developed countries (LDC)[32]. They take DALE as a health output, while public and private shares of health expenditures act as system inputs. Their findings suggest that increases in public spending have no effect in developed countries, but exert a strongly positive influence in developing countries and LDC. This suggests that the *economic and developmental situation* of a certain country or a group of countries might play a crucial role in conditioning the impact of public (and private) health care expenditures.

Nevertheless, returning to the controversy of the effect of the public-private mix of the health care system and the research by Hitiris and Posnett – the interesting finding of it is that one of the introduced dummy variables – for the United Kingdom – was found to be positively associated with crude mortality rates, suggesting that given the same level of spending as in other OECD countries, the UK might be worse off with mortality indicators[33]. At the same time, Javier Elola, Antonio Daponte and Vicente Navarro suggest opposite findings in their research of National Health Services (NHS)[34] versus Social Health Insurance (SHI) systems[35]. The authors introduce solely the health care system characteristics in their model specification of health outputs (PYLL and infant mortality rates); but, besides the total health spending and public share of expenditures, the dummy variables for NHS and SHI are used. They find that in general national health services tend to have lower infant mortality rates than social security systems and, thus could be argued to be *more efficient* in producing better health outputs[36].

But again, Jaume Puig-Junoy, in his work finds contrasting results[37]. Puig-Junoy uses DEA of life expectancy as an output and proxies of material characteristics of health care (such as number of

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[32] Self, Sharmistha; Grabowski, Richard. How effective is public health expenditure in improving overall health? A crosscountry analysis. *Applied Economics*. 2003. No.35. pp. 835–845.
[33] Hitiris; Posnett. The determinants and effects of health expenditure in developed countries. 1992. p. 180.
[34] Taking into consideration that we classify United Kingdom as a country with NHS and was also part of the research of Elola, Daponte and Navarro.
[35] Elola, Javier; Daponte, Antonio; Navarro, Vicente. Health Indicators and the Organization of Health Care Systems in Western Europe. *American Journal of Public Health*. October 1995. Vol.85, No.10. pp. 1397-1401
[36] Ibid. p. 1401.
[37] Puig-Junoy, Jaume. Measuring health production performance in the OECD. Applied Economics Letters. 1998. No.5. pp. 255–259.

doctors and hospital beds) as inputs. Then the efficiency scores found through DEA are used as the dependent variable with human capital characteristics and share of private funding as explanatory inputs. He concludes that *increases in private spending increase the technical efficiency* of health care systems[38]. But the most interesting finding concerns the fact that the most efficient 'country-producers of health' appear to be Austria, Greece, Italy, Japan, Portugal and the United Kingdom, while Denmark, Finland, Sweden and Norway are claimed to be the least efficient.

The obvious discrepancies in results using similar data (most of the discussed papers are predicated on the data from the OECD database) highlight the complexities of identifying causality in the health input-output sphere. With this in mind we now move on to cautiously propose a framework for our analysis.

Proposed Framework: Alternative Evaluation of the Health Care Systems

Apart from contradicting the results of Elola et al, Puig-Junoy's findings also suggest a crucial direction for building the framework adopted in this paper: specifically, the *type* of health care system (for example, NHS or SHI) is not sufficient for depicting the *differences* of the health care systems. Puig-Junoy shows that while being the same *type* of health care system, the UK on the one hand, and Denmark, Finland, Sweden and Norway – on the other, they are situated on the very opposite ends of the *efficiency* scale he created. This emphasises the point that there are still important *country-specific differences* in the structures of health provision even of the same type systems. Accordingly, the same argument can be applied to SHI or private health insurance (PHI) systems.

Thus, we argue that the framework for analysis of the determinants of health has to incorporate the *structural characteristics* of different systems on the country-specific level. Due to the absence of proxies available to account for these, the research on primary care of Barbara Starfield[39] and

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[38] Ibid. p.258.

[39] Starfield, Barbara. Is primary care essential? *Lancet*. 1994. No.344. pp.1129–1133; Starfield, Barbara. *Primary Care: Concept, Evaluation, and Policy*. NY, USA: Oxford University Press, 1992; Starfield, Barbara. *Primary Care. Balancing Health Needs, Services, and Technology*. NY, USA: Oxford University Press, 1998; Starfield, Barbara. New paradigms for quality in primary care. *British Journal of General Practice*. 2001. No.51. pp.303–309; Starfield, Barbara. Primary care and health. A cross-national comparison. *Journal of American Medical Association*. 1991. No.266. pp. 2268–2271.

colleagues[40] is very valuable as an example of a possible solution. Starfield creates a *scale of organisation and delivery of primary care*[41] which is adapted and reconfigured in the further research and incorporates "*structural characteristics*" – health system financing, allocation of resources, physicians, accessibility of services, longitudinality; and "*practice features*" – gate-keeping, efficiency of co-ordination between levels, range of health care services, patient-focused longitudinality, family or community orientation[42]. All countries are scored from 0 to 2 on each component (through expert analysis) and get either a total score, with 20 being the highest and representing the strongest primary care[43], or in other studies – the mean or the rank was taken[44]. These scores have then been implemented in the model estimation as one of the inputs of the health care system into health outputs on the data of 18 OECD countries over 28 years (1970-1998). They find that the *structure* of primary care, its financing and delivery of services are important determinants of health outcomes on the national levels, *at least* for the 18 OECD countries the research is focused on[45]. The authors also suggest that the observed differences could be explained by uneven reforms and "that health reform in OECD countries has not uniformly targeted primary care"[46].

Even though the research by Starfield et al. is based on OECD countries and particularly concerns *primary care*, rather than health services in general, it confirms that *types* of health care systems, *expenditures* and *resources* are not enough to capture the *structural differences* between the systems; in other words, this research vividly shows the necessity of defining other possible *systemic* inputs into health.

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[40] Shi, Leiyu; Starfield, Barbara; Kennedy B.P.; Kawachi I. Income inequality, primary care, and health indicators. *Journal of Family Practice*. 1999. No.48. pp.275–284; Starfield, Barbara; Shi, Leiyu. Policy relevant determinants of health: an international perspective. *Health Policy*. 2002. No.60. pp. 201–218; Macinko; Starfield; Shi. The Contribution of Primary Care Systems to Health Outcomes. 2003. pp.831-865.
[41] Starfield. Is primary care essential? 1994. pp.1129–1133; Starfield. *Primary Care.* 1998.
[42] Ibid.
[43] Ex. Macinko; Starfield; Shi. The Contribution of Primary Care Systems to Health Outcomes. 2003.
[44] Ex. Starfield; Shi. Policy relevant determinants of health. 2002.
[45] Macinko; Starfield; Shi. The Contribution of Primary Care Systems to Health Outcomes. 2003. p.854-856.
[46] Ibid. p.858.

THE IMPORTANCE OF THE REGION: THE POST-COMMUNIST WORLD

Consistent with this, Macinko, Starfield and Shi acknowledge that their findings could not be generalised to other countries. This caution, that 'country' or 'region' matters, is echoed in most of the studies we have reviewed. What is also necessary to keep in mind, is the *importance of specific country effects* – cultural, genetic and historical patterns. Thus, the region and the set of countries have to be strictly defined in the research on health production functions based on some criteria. In the present research transition countries – all of the states which started the transformation from the Communist regime and centralised economy to democracy and market structures in the late 1980's – beginning of the 1990's – has been chosen for the analysis.

As it already have been argued, the post-Communist countries represent an interesting and important case for political scientists, economists and sociologists, as they are going through challenging and difficult transformations, with having some Communist baggage influencing them. The impact of international co-operation on the development of these countries seems to gain importance as the vast gap is developing between the countries which joined the EU (and thus received more aid and advice during transition) and the ones that did not – these disparities are emerging in most sectors and spheres – economic, political, societal, health. Thus, it is argued, that this region represents a very interesting case for the study of the determinants of health and measuring the impacts of the health care transition on the health outcomes.

However, based on the review of the existing literature of the health production functions, it is easy to notice, that this type of research on the transition countries is lacking. An example of the existing research is a study based on the micro-level data of 7 CEE countries by Martin Bobak et al[47]. They use the New Democracies Barometer (NDB), New Baltic Barometer (NBB), New Russia Barometer (NRB) and build the health production function for self-rated health with inputs of

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[47] Bobak, Martin; Pikhart, Hynek; Rose, Richard; Hertzman, Clyde; Marmot; Michael. Socioeconomic factors, material inequalities, and perceived control in self-rated health: cross-sectional data from seven post-communist countries. *Social Science and Medicine*. 2000. No. 51. pp.1343-1350.

perceived control, education, inequality and material deprivation[48]. Thus, this is a rather different research, in which health is understood as a commodity, following Grossman's health production function.

Research in the CEE region is often not a cross-country comparison, but rather based on one specific country, for example, the study of socioeconomic determinants of mortality in Russia by Francesca Perlman and Martin Bobak[49], based on the Russian Longitudinal Monitoring Survey (RLMS). They analyse the effects of socio-economic characteristics – such as income, education, household expenditures, material measures and health behaviours – on the standardized mortality ratio. They come to the conclusion that education is one of the important factors that influence mortality[50]. This study is also quite different from the studies that have been discussed above – it does not address the issues of the health care systems influences on health, rather concentrating on within country variation in health outcomes.

One study is particularly interesting and relevant to the topic of the relationship between the health care systems and health, though also presents quite a different approach to it. The research by Terje Andreas Eikemo et al. does not concentrate solely on the Central and Eastern European countries, but they are included in the study of differences of self-perceived health and welfare state regimes in Europe, classified into five typologies (one of which is the Eastern European group)[51]. They have several conclusions. First, the *welfare regimes*, which provide "a variety of social transfers … as well as key services"[52] (including health care services), are important factors explaining health inequalities in Europe and explain half of the variation in health between countries[53]. Second, they particularly *distinguish the region of Central Europe*, as one of the poorest health areas reported within the analysis. This study does not deal with the health care services directly, though does have a

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[48] Ibid. pp.1349-50.
[49] Perlman, Francesca; Bobak, Martin. Socioeconomic and Behavioral Determinants of Mortality in Posttransition Russia: A Prospective Population Study. *AEP*. Vol. 18. No. 2. 2008. pp.92–100.
[50] Ibid. pp.98-99.
[51] Eikemo, Terje Andreas; Bambra, Clare; Judge, Ken; Ringdal, Kristen. Welfare state regimes and differences in self-perceived health in Europe: A multilevel analysis. Social Science and Medicine. No.66. 2008. pp. 2281-2295
[52] Ibid. p.2282.
[53] Ibid. p.2289.

reference to the importance of them[54]. Moreover, it draws attention to the uniqueness of the CEE area, but misses the significant and increasing *heterogeneity of the region*, which has to be taken into account.

Yet another different approach is presented in the research of Adam Wagstaff and Rodrigo Moreno-Serra[55] on the Central and Eastern Europe and Central Asian countries. In their work they try to establish the links between the adoption of SHI and health status, expenditure and hospital utilisation outcomes, as well as the impacts of *SHI adoption* on the labour market characteristics. They choose the CEE region due to the recent transition of some of them from tax-based to SHI systems, while some still remain tax-based and provide a solid ground for comparisons. They find, that though the SHI adoption did increase the overall government spending on health, it did not have major impact on the health status of the population[56].

Thus, the research on health care systems and health outcomes concentrated on the post-Communist world is quite rare – if not missing. This finding and all of the above arguments and controversies influenced the decision to, ***firstly***, concentrate on this particular area. Research on health production at the macro-level made on a set of transition countries is per se innovative as has not previously been done in detail. Moreover, the countries of CEE and CIS represent the growing diversity within – often referred as one – region. ***Secondly***, due to the lack of the in-depth analysis of the health care systems in building health production functions, search for particular characteristics of the systems, which could distinguish certain types *within* a broader group of transition countries – other than differences in *type* of systems, health *expenditures* and *organisational* features – seems to be vital. *Classification* of the health care systems in transition according to the established characteristics could give a possibility to account for *structural* differences of the systems as inputs contributing to the health outputs of populations.

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[54] Ibid. p.2291.
[55] Wagstaff, Adam; Moreno-Serra, Rodrigo. *Europe and Central Asia's Great Post-Communist Social Health Insurance Experiment: Impacts on Health Sector and Labor Market Outcomes.* Policy Research Working Paper 4371. WPS4371. The World Bank. 2007.
[56] Ibid. pp.23-27.

Originating from the present literature review, a framework for studying health care systems' outputs is developed. Specifically, the *aggregate macro-level analysis* was chosen, as it was proven to be the most suitable for cross-country comparisons. Besides, the importance of more *careful consideration of the systemic and structural proxies* was recognised, as well as the need for developing new variables to account for them. *Significance of regional and country characteristics* in conditioning how systems transfer into outcomes was also noted and it becomes apparent that the latter observation is of high importance for the transition countries, as all of them take different ways in their transformations and particularly have constantly changing societies and institutional frameworks, which result in varied outputs and outcomes.

CHAPTER 2. HEALTH AND HEALTH CARE IN COMMUNISM AND TRANSITION.

In the literature review it was argued that it is essential to analyse health care systems' structures carefully and in-depth – in order to identify important heterogeneities in approach and delivery. Nowhere is this more true than in the countries of so-called 'transition'. Therefore, in Chapter 2, a brief examination of the health systems in transition will be conducted in order to be able to further establish a justifiable classification of them, appropriate for empirical research. First, the health outcomes – both during Communism and after – will be analysed in order to understand the peculiarities and specificities of the transition area. The Chapter will then proceed to a short theoretical overview on the health care systems, followed by the analysis of the trends in health care policies and structural changes in transition, linked to the analysis of the communist legacies.

HEALTH OUTCOMES[57]

At the end of the 19th century, life expectancy in Russia, for example, was 32 years, by 1938 it was 43 years and by 1965 – 64.3 (47, 59 and 67.5 respectfully in France)[58]. Similar success could be seen in the post-war CEE and CIS countries, on the initial stages of adopting the Communist system. By 1960's the health status was considered good even in international terms in most countries of CEE and CIS.

However, the reality started to change in the 1970's, when the world faced new challenges in terms of health: the raising burden of chronic rather then infectious diseases and later – HIV. While the Western countries managed to adjust their policies to the new challenges, Eastern Europe remained narrow-headed. By 1980's a steady health gap developed between Western Europe on the one hand,

[57] All detailed information is available in the Appendix II. All data is taken from European HFA Database. WHO/Europe. January 2009.
[58] Tragakes, Ellie; Lessof, Suszy. *Health care systems in transition: Russian Federation.* Ed. Tragakes, Ellie. Copenhagen: European Observatory on Health Systems and Policies, Vol.5, No.3. 2003. pp.7–8.

and Central and Eastern European countries – on the other. Moreover, even before the start of transition, the two groups start to clearly distinguish *within* the area of interest itself – Soviet republics and Communist countries of Central Europe.

MORTALITY-BASED INDICATORS

Starting in the 1970's *life expectancy* in the Soviet Union started to slowly decline, the Communist bloc countries experienced almost no changes, while in the West it was constantly increasing (Figure 1). Mortality rates also witness a steady improvement in the EU countries, and almost no changes in the CEE and CIS (Figure 2).[59]

Figure 1. Life Expectancy at birth for selected CEE and CIS countries and average for EU-15

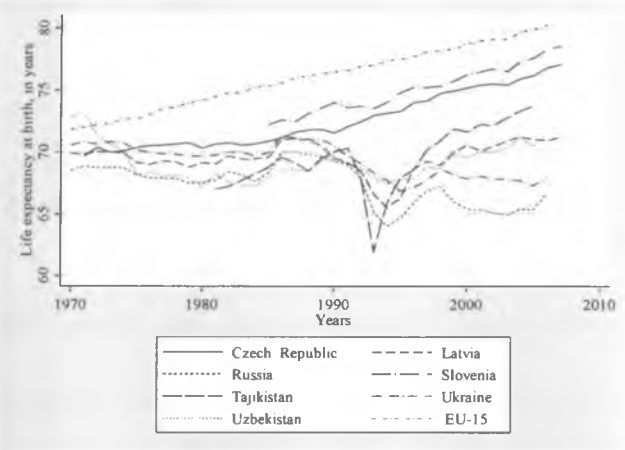
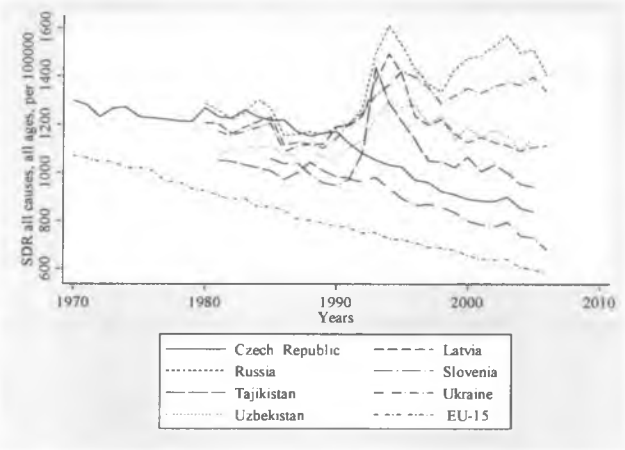


Figure 2. Mortality rates for selected CEE and CIS countries and EU-15 average



It is easy to notice that the tendencies for different countries in the 1990's were different: most countries experienced a depreciation of health indicators in the first years of transition, but in some countries it was very short and followed by rapid improvements, while in others the improvements were slow – if any[60].

Several clear groups can be distinguished within transition area according to life expectancy at birth (LEB). The countries of Central Europe – the new EU members, as well as most countries of Southeast Europe form one group with LEB improving steadily in the recent years, while the countries of the former Soviet Union are worse off (See Appendix II). The interesting case present the Asian

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[59] See Appendix II for more details.

[60] Nolte, Ellen; McKee, Martin; Gilmore, Anna. Morbidity and Mortality in the Transition Countries of Europe. In Macura, Miroslav; MacDonald, Alphonse L; Haug, Werner (Eds.). *The New Demographic Regime: Population Challenges and Policy Responses*. United Nations. Geneva, 2005. pp.154-155

countries of the FSU – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan. In terms of LEB they perform better than the rest of FSU, but worse then CEE countries. However, turning to the male life expectancy at the age of 15 (Figure 3), the gap between the Asian CIS and CEE countries is narrowing even more. This could easily be explained through the high infant mortality rates (Figure 4) in the area throughout transition, even comparing to the other FSU countries[61].

Figure 3. Male life expectancy at the age of 15 for selected transition countries (1988-2007).

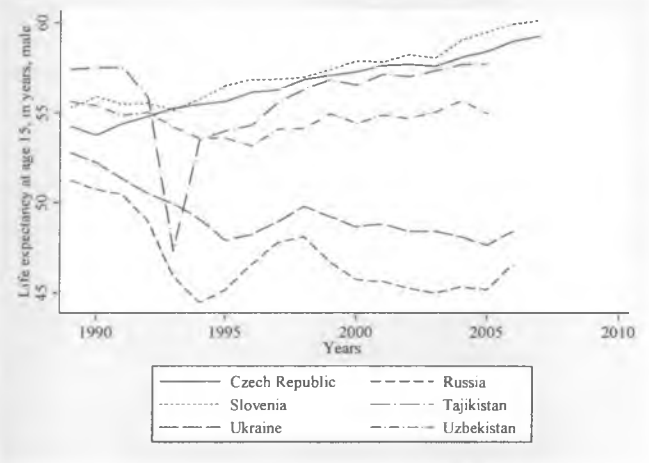
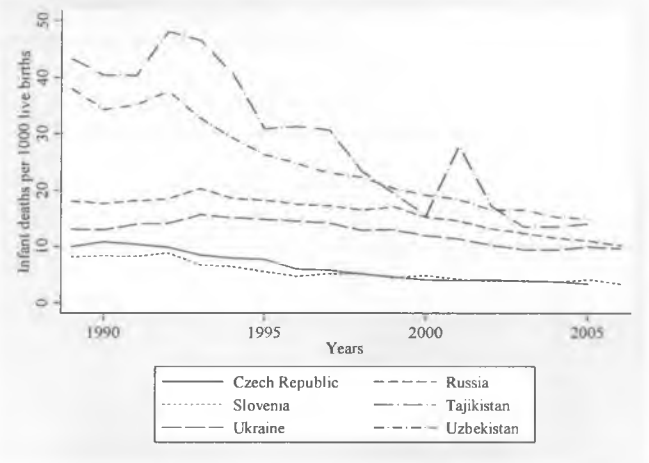


Figure 4. Infant mortality rate for selected transition countries (1988-2007)



The gender differences in life expectancies in transition countries are significant as well: the male-female life expectancy gap is higher than the one in Western European countries, and in some countries it has been rising throughout transition (Figure 5 –Figure 6).

Figure 5. Difference in female and male life expectancy at birth for selected transition countries and EU-15 average (1988-2007).

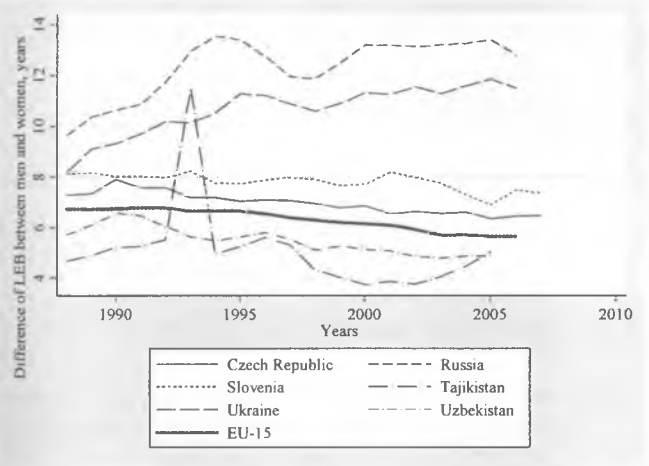
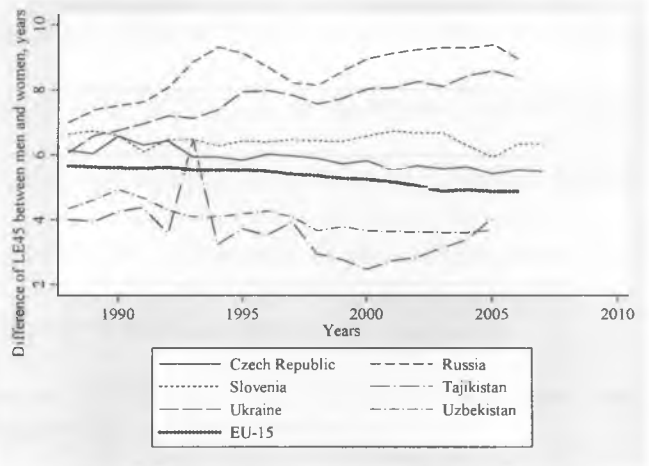


Figure 6. Difference in female and male life expectancy at the age of 45 for selected transition countries and EU-15 average (1988-2007).



[61] The further complication of the matter is that the real estimates for the infant mortality rates in these countries might be even higher than the official estimates, due to the pitfalls of the registry systems (McKee, Martin. Winners and losers: the consequences of transition for health. In Figueras, Josep; McKee, Martin; Cain, Jennifer; Lessof, Suszy (Eds). *Health systems in transition: learning from experience*. Copenhagen: European Observatory on Health Care Systems, 2004. p.40)

Another significant feature of the health status in transition countries is the age specific differences. The most vulnerable age group appears to be the working age adults, especially men[62]. For example, in some FSU countries the deaths among males aged 0-64 years comprise more than half of all deaths, thus around 53-58% of men do not live to be older than 65 years in Russia and Ukraine (Figure 7). Moreover, there is a visible divide among the countries within the new members of the EU as well (Figure 8). The mortality 'East-West' divide among women is not so clear[63].

Figure 7. The ratio of deaths for males in the ages 0-64 of the total number of male deaths for selected CEE countries (1988-2007)

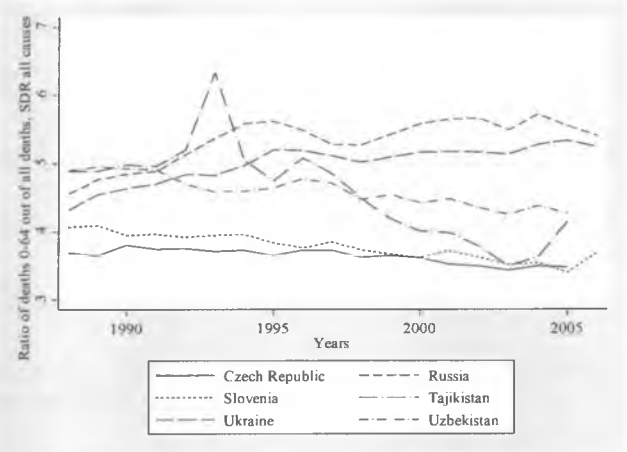
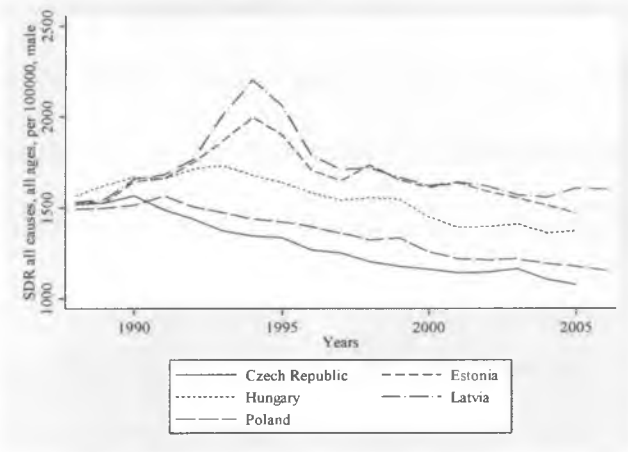


Figure 8. Male mortality for selected CEE countries – members of the EU (1988-2007)



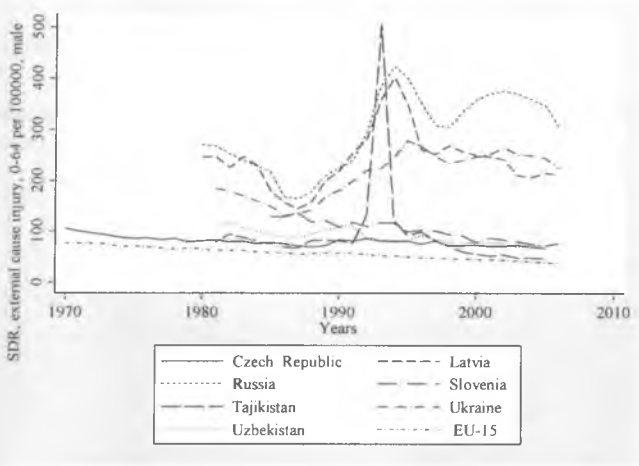
IMMEDIATE CAUSES OF DEATHS

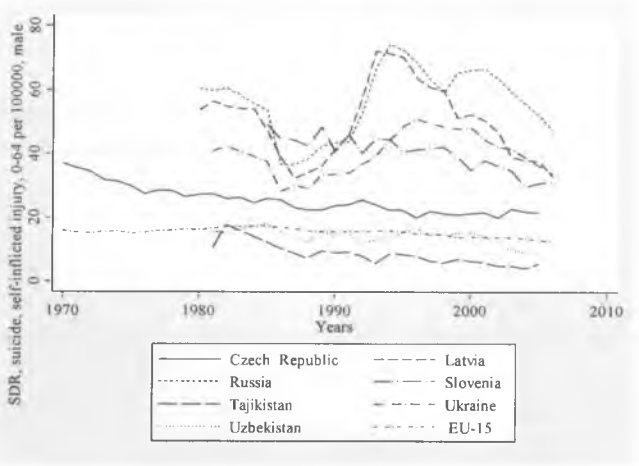
For understanding health inequalities, causes of deaths are also important. ***Firstly***, deaths caused by *external injuries and violence* are significant, which now account for about a quarter of all deaths in men aged 25-64 in CIS[64]. In 2006 the average rate of deaths from external injuries for males aged 0-64 for CIS countries was 5.8 times higher than for EU-15 and 2.5 times higher than for CEE countries of the EU[65]; the suicide rate for men in the same age category was 2.8 and 1.5 times higher respectfully[66](Figure 9–**Figure 10**). This is often attributed to the high spread of alcoholism, especially in the CIS countries – the reasons that lie beyond health care systems influence.

Figure 9. Mortality from external cause injury for males, aged 0-64 for selected transition countries and EU-15.

Figure 10. Mortality from suicide for males, aged 0-64 for selected transition countries and EU-15.

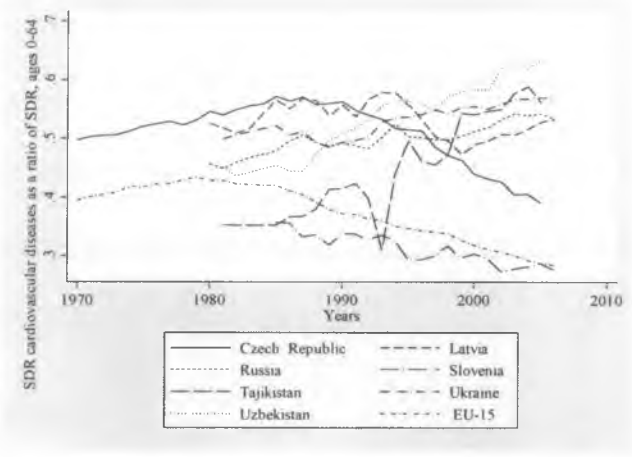
[62] Nolte; McKee; Gilmore. Morbidity and Mortality in the Transition Countries of Europe. 2005. pp.157-160.
[63] Ibid. p.160
[64] Ibid. p.161.
[65] According to WHO/Europe, European HFA Database. January 2009.
[66] According to WHO/Europe, European HFA Database. January 2009. See Appendix II.





Secondly, since 1970's *cardiovascular diseases* play a major part in the high mortality rates in the transition area. Thus, deaths from these diseases are 6.5-6.8 times higher for CIS among adults aged 0-64, than those for Western Europe; these rates are 2.6-3 times higher for CEE new members compared to EU-15. In 2006 these causes contributed from 37 up to 60% of deaths in that age group in different transition countries (Figure 11).

Figure 11. Ratio of mortality caused by cardiovascular diseases from the total mortality for adults aged 0-64 for selected CEE and CIS countries



MORTALITY AMENABLE TO HEALTH CARE

Infectious diseases are the ones, the deaths from which are avoidable – subject to timely intervention and well-organised monitoring, prevention and sanitary control systems. While reducing throughout Communism, infectious diseases have again become a problem for many countries during transition, especially for Asian CIS countries. One of the examples is tuberculosis, the incidence of which became more wide-spread. What is more significant is the death rate, caused by tuberculosis,

which is much higher in CIS countries, compared to both Western and Eastern European countries (Figure 12 –Figure 13).

Figure 12. Tuberculosis incidence rate for selected transition countries and EU-15 average

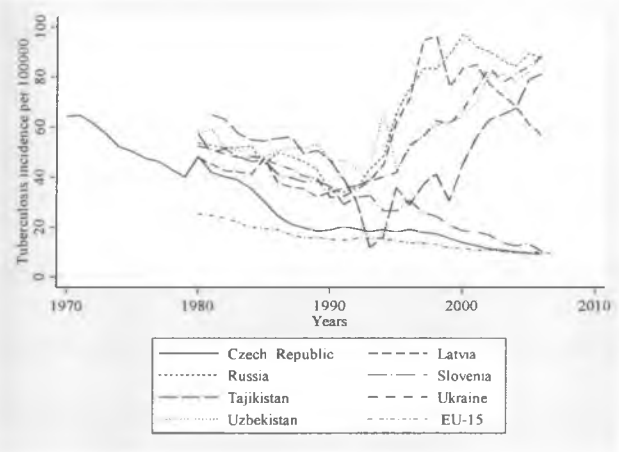
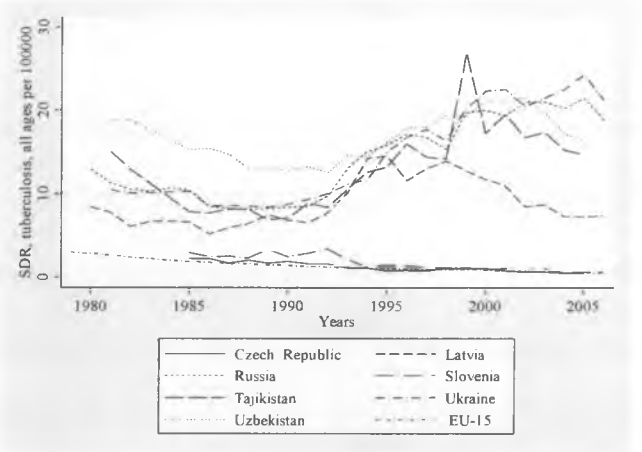


Figure 13. Death rate from tuberculosis for selected transition countries and EU-15 average (1988-2007)



The case of tuberculosis could be an example of the poor functioning of the preventive medicine and health care in general. Statistically in 2006 on average only 6 out of a hundred incidences of tuberculosis ended up with fatal outcomes in the EU-15, 8 – in the new EU members, and 21 – in the CIS countries[67]. Thus, besides the higher incidence, the *survival rate* from tuberculosis is much lower for CIS countries.

The cancer incidence rate is generally higher in the West. However, similar to tuberculosis, the survival statistics add more insight into these observations: the death rate from cancer and cancer-related diseases is much higher in Eastern Europe. Thus, around 35% of cancer cases have a fatal outcome in EU-15, 49% – in CEE and 60% in the CIS[68].

MORBIDITY-BASED INDICATORS

The mortality indicators are extremely useful for portraying and analysing the general health status of a population; they do not, however, take into account the illnesses from which people do not die, or die very seldom, but which are nevertheless an important part of human health and well-being. There is, however, not enough data available on the overall morbidity indicators. Nevertheless, according to the WHO DALE indicators, people in transition countries besides living comparatively

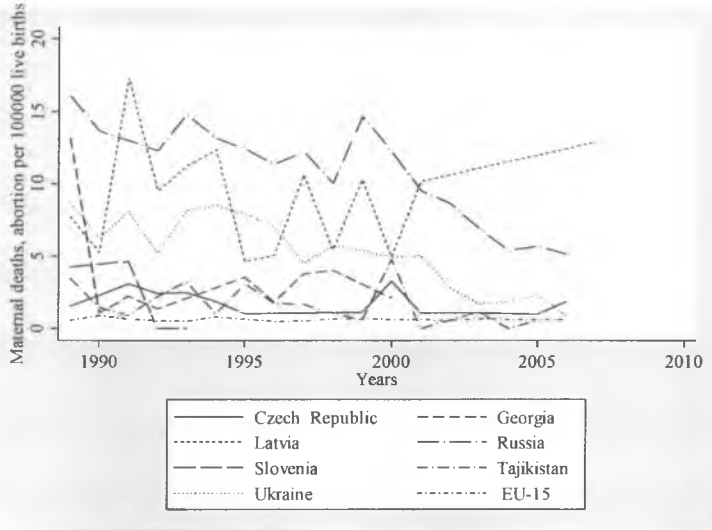
[67] Based on WHO/Europe, European HFA Database. January 2009. See Appendix II for full tables.
[68] Based on WHO/Europe, European HFA Database. January 2009. See Appendix II for full tables and details.

shorter lives, live shorter *healthy* lives. Moreover, even though the life expectancy of women is generally higher than the one of men, in transition countries women tend to live shorter in full health, comparing to men[69].

Reproductive Health

By 1980's reproductive health suddenly became a recognised serious problem[70]. For "there was no sex in the USSR"[71], people remained illiterate in questions of sexuality, reproductive health and contraception. As Barr and Field note, "in many areas of the Soviet Union, abortion was the only form of birth control available"[72]; thus it was one of the reasons for the increase of the related diseases and infertility of women. The most striking example presents the data on deaths from abortion[73] (Figure 14). Sexually transmitted diseases present a big challenge for all of the transition countries, especially CIS (Figure 15 – Figure 16)[74].

Figure 14. Death rate from abortion for selected CEE countries and average for EU-15



[69] Nolte; McKee; Gilmore. Morbidity and Mortality in the Transition Countries of Europe. 2005. p.164

[70] Serbanescu, Florina; Goldberg, Howard; Morris, Leo. Reproductive Health in the Transition Countries of Europe. In Macura, Miroslav; MacDonald, Alphonse L; Haug, Werner (Eds.). *The New Demographic Regime: Population Challenges and Policy Responses*. United Nations. Geneva, 2005. pp.177-198.

[71] A famous catchphrase from the TV show "US-Soviet Space Bridge" of 1980's when, asked about sex in Soviet Union, a Soviet woman answered: "There is no sex in the USSR... there is love". The last part of the quote was, however, omitted.

[72] Barr, Donald A.; Field, Mark G. The Current State of Health Care in the Former Soviet Union: Implications for Health Care Policy and Reform. *American Journal of Public Health*. Vol.86. No.3. 1996. p.308.

[73] On more data on reproductive health see Appendix II.

[74] However, it should be taken into account, that before the fall of Soviet Union, the registry system of these illnesses was ineffective, thus the sudden rise could be partly attributed to the improvement of the states' statistic agencies and registry of such illnesses.

Figure 15. Syphilis incidence rate for selected transition countries (1988-2007)

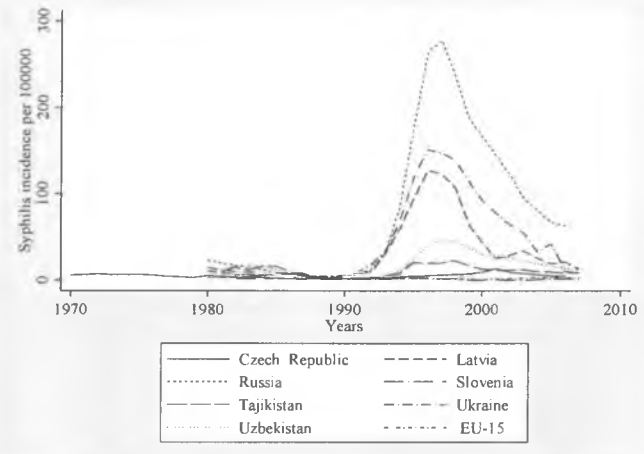
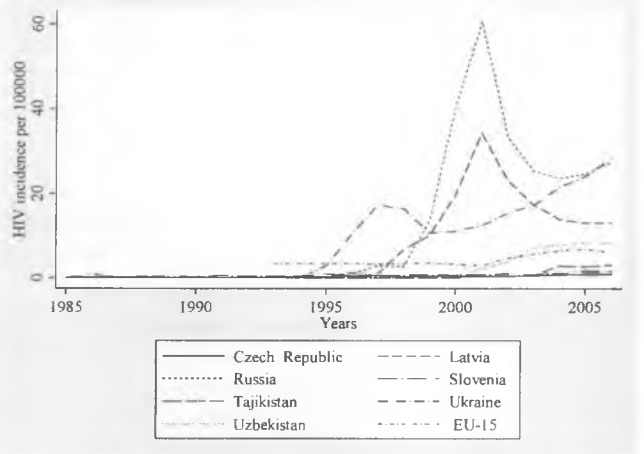


Figure 16. HIV incidence rate for selected transition countries (1988-2007)



All in all, there does exit a gap in health outcomes between the transition countries and the West. Moreover, the diversity *within* the transition countries has been increasing. It is often argued that the health decrease in the 1960-70's was partially due to the health care systems in place in the countries of interest.

HEALTH CARE SYSTEMS AND HEALTH POLICIES

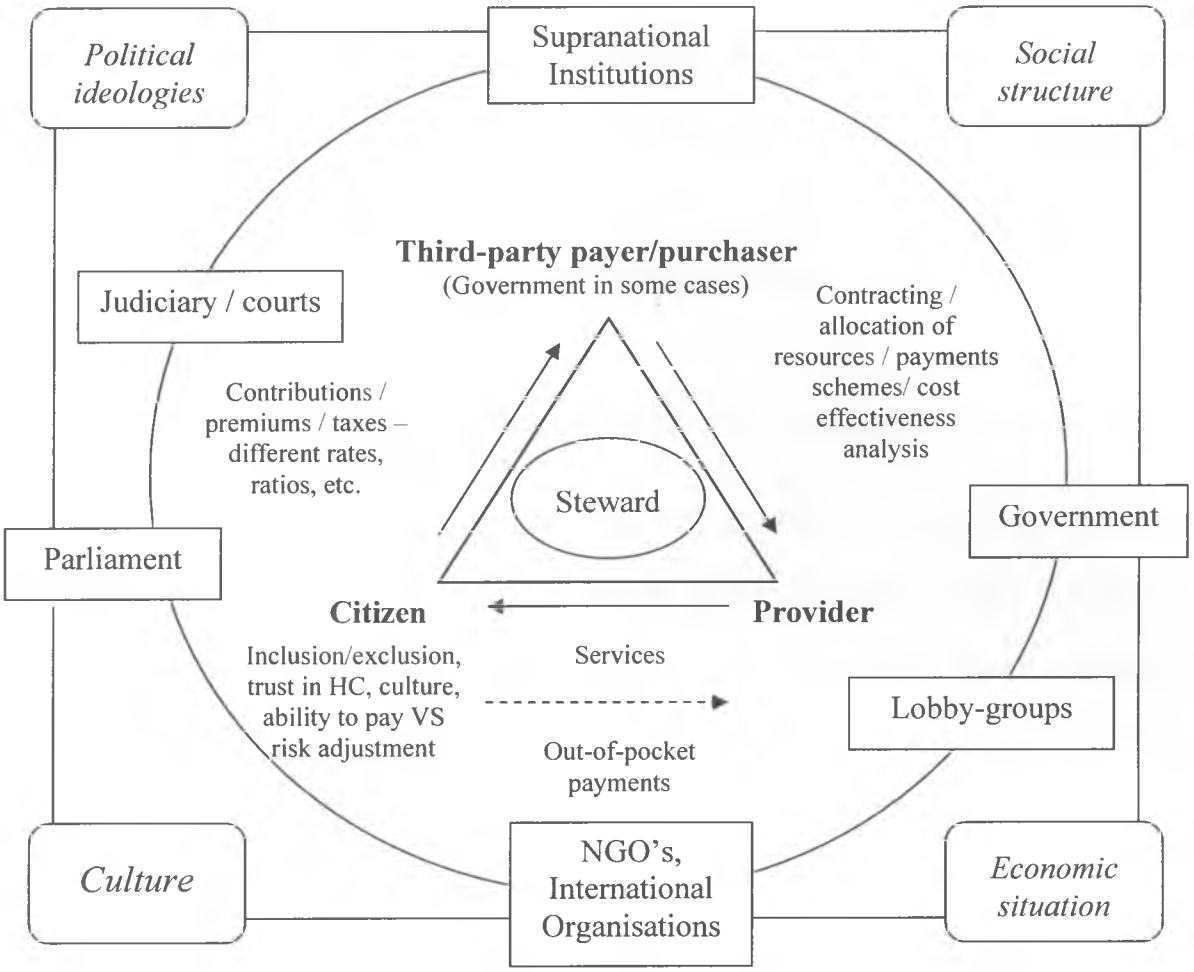
THEORETICAL OVERVIEW

Health care systems are complex entities as there are many actors involved. The simplification of the structure of the health care system is the classical 'health care triangle'[75], which describes the processes of financing and allocation of resources within the medical sector. There are *citizens*, who need health services; *third party payer* (or government), who collects the revenues and contracts the *providers*, which in turn provide services for the population. The scheme is very simple in theory; there are, however, more complicated relations behind this. Political decision-making, socio-economic concerns and ideologies, power politics, the macroeconomic situation, culture – all influence the decisions on laws, policies, structures and financing of health care[76] (Figure 17).

[75] Mossialos, Elias; Dixon, Anna; Figueras, Josep; Kutzin, Joe. *Funding health care: options for Europe*. Copenhagen: European Observatory on Health Care Systems. Open University Press: Buckingham. 2002. p.2

[76] As it was already noted, this paper concentrates mostly on the narrow understanding of the health care system (financing and delivery of medical services).

Figure 17. The adjusted health care triangle[77].



According to Colin Palfrey, all policies in the process of adoption and implementation go through a certain allocation of values[78], specific to the society, culture, political and economic situation. The priorities, set up by the government in a certain sphere, determine the direction of reform and change. The transition countries always had a source of referral to the different traditions and views of the Western countries, when deciding on their own way of transformation. However, their long and variable histories under Communist rule should not be ignored while trying to comprehend the irregularities of the transition processes.

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[77] Adapted by the author from Mossialos; Dixon; Figueras; Kutzin. *Funding health care: options for Europe.* 2002. p.2; and Saltman, Richard B.; Busse, Reinhard; Figueras, Josep. *Social health insurance systems in western Europe.* Copenhagen: European Observatory on Health Care Systems. Open University Press: Maidenhead. 2004. p.35

[78] Palfrey. *Key Concepts in Health Care Policy and Planning.* 2000. p.4.

HEALTH CARE IN THE COMMUNIST ECONOMY

In the beginning of the 20th century many countries of Central and Eastern Europe have been influenced by the reform of health care in Germany introduced by Bismarck. Peter Mihalyi argues that at that time there was an explicit rivalry between the German and Russian Social Democracies, and after the introduction of the Bismarckian type of insurance with almost a universal coverage in Germany,

> "...the revolutionary vision of the Russian party was a 100% coverage *plus* the abolition of the insurance contribution levied on wages"[79]

The People's Commissar Nikolai Semashko developed a fully centralized model of health care system funded by the state budget in 1918[80]. The main challenges for the system at that time were dictated by the worsening health facilities and outcomes during that time. Table 1 presents a short summary of the priorities, policies and characteristics of Soviet-type health care systems, which were partially shaped by these challenges.

Priorities, Policies and Structural Characteristics

The ideological grounds influenced the main priorities set by the government in the sphere of health and health care:

> [Soviet medicine] "tended to be dominated by the Marxist perception that illness was a product of a "sick" (i.e. capitalistic) society and that socialism would rid society of the pathologies of the old order, such as alcoholism, prostitution, drug abuse, and poor industrial hygiene"[81].

Thus, *firstly*, the preventive measures were taken solely towards infectious diseases, while the system itself was forming as curative and relying mainly on inpatient care. Accordingly, for example, social counselling has never been developed in most Communist countries.

Secondly, health protection was proclaimed to be the right of every citizen of the USSR, with the state offering the universal, "free and professional medical services"[82] to the population. The

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[79] Mihályi, Peter. *De-Integration and Disintegration of Health Care in Post-Communist Countries*. CEU Department of Economics Working Paper, WP5/2004. p.3

[80] Marrée, Jörgen; Groenewegen, Peter P.. *Back to Bismarck: Eastern European Health Care Systems in Transition*. Aldershot: Avery. 1997.p.7

[81] Barr; Field. The Current State of Health Care in the Former Soviet Union. 1996. p.307

[82] Article 42 of 1977 Soviet constitution in Rowland, Diane; Telyukov Alexandre V. Soviet Health Care from Two Perspectives. *Health Affairs*. 1991. p.75

policies brought about by this priority included those related to providing free medical care at the point of contact, funded by the state budget[83]. *Thirdly*, government took all responsibilities for the health of the population and created a highly centralised system of health care, where decision-making, financing and resource allocation were concentrated in the hands of the central Ministry of Health. *Fourthly*, the health of the working class became a priority – thus special health care facilities were established at plants and factories.

Originally the system was created as a four-level administrative system[84]: this was introduced as democratic multi-level planning. This, however, remained on paper, as health management on lower levels was fully dependent on and constrained by the decisions and allocations of the federal Ministry[85]. Thus, the allocation of resources was *centrally planned and rather supply-side and input oriented*, did not account for the real needs of the population.

Education of staff started on a high speed in medical schools, which were separated from universities[86]. In the beginning of the creation of the Soviet health care, women were recruited into the training, thus the major part of the medical profession was comprised of women, who often did not get enough education and the social status of doctors and their salaries were low[87].

In 1913 throughout the Russian Empire there was one doctor for 6900 people and 1.3 hospital beds per 1000 people[88] with high inequality in the geographic distribution of facilities[89]. Thus, due to the scarce number of facilities, as well as a very uneven spread of them, one of the priorities in the Soviet medicine was *building new hospitals and polyclinics* – with often only 'feldsher'[90] level staff, thus the quality of such practices could be quite low.

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[83] Tragakes; Lessof. *Health care systems in transition: Russian Federation.* 2003. p.23
[84] Rowland; Telyukov. Soviet Health Care from Two Perspectives. 1991. p.77
[85] Ibid. p.77
[86] Mihályi. *De-Integration and Disintegration of Health Care in Post-Communist Countries*. 2004. p.5
[87] Cockerham, William C. Health and Social Change in Russia and Eastern Europe. London: Routledge. 1999. p.156
[88] For a comparison, the modern average numbers for the EU are: one doctor per 311 people and 5.7 hospital beds per 1000 population. (calculated from WHO/Europe, European HFA Database. January 2009)
[89] Tragakes; Lessof. *Health care systems in transition: Russian Federation.* 2003. p.22
[90] "A feldsher is a mid-level practitioner with responsibility for immunizations, primary care, normal childbirth, and minor surgery" (Rowland; Telyukov. Soviet Health Care from Two Perspectives. 1991. p.80)

"Increasing the supply of health providers and facilities has been a priority in Soviet health planning, with greater emphasis on quantitative rather than qualitative goals"[91].

At the same time, the problem of the uneven spread of the facilities was never properly solved, creating many inequalities in access to health care[92].

Last, but not least, the *health status and health-related problems* of the population of the Soviet Union did have an impact on the priority setting in health policy in the 1920's. World War I, revolution and civil war, along with famine, epidemics and typhus fever, which took 3 million lives alone[93], took their toll on a long-term decrease of health status. In 1919 Vladimir Lenin himself acknowledged the scope of the health problems, when at the peak of typhus epidemics he exclaimed: "Either the louses defeat socialism, or socialism defeats louses"[94]. Thus, the 'sanitary epidemiological stations' were created throughout the country, which were responsible for sanitary control.

Financing

The budget of the health care sector of the Soviet Union was strictly planned and almost fully funded by the state's budget. Due to the main aims of the USSR of industrial growth and development, and later – of increasing military and nuclear power, the health sector was severely overlooked in funding resulting in severe under-financing[95]. According to official statistics, by 1980 health spending comprised 3% of the GDP[96] of the Soviet Union, and continued to *decline* thereafter[97]. However, even in the Soviet Union the public share of funds comprised 85.1% in 1960, decreasing to 76.9% by 1980 of the total health care spending. The rest was composed (officially) by trade unions contributions and factories themselves, thus, some sort of social insurance remained in place[98]. The Bismarckian type health insurance remained on much higher scale in Central European countries, rather than in the Soviet Union republics.

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[91] Rowland; Telyukov. Soviet Health Care from Two Perspectives. 1991. p.78
[92] Ibid. p.78
[93] Tragakes; Lessof. *Health care systems in transition: Russian Federation.* 2003. p.22
[94] Lebina, Natalia. Style of Life. 20th century: everyday used words (*Stil zhizni. XX vek: slovar' povsednevnosti*). *Rodina.* No.9. 2005. http://www.istrodina.com/rodina_articul.php3?id=1709&n=89 [Access: 17.02.2009]
[95] Barr; Field. The Current State of Health Care in the Former Soviet Union. 1996. p.308.
[96] For a comparison: the lowest indicator of total health expenditure as percent of GDP for western European countries was 5.3% for Spain and Portugal, with 8.9% - the highest for Sweden and Denmark, and average of 6.96%. (WHO/Europe, European HFA Database. January 2009. Offline version).
[97] Rowland; Telyukov. Soviet Health Care from Two Perspectives. 1991. p.81.
[98] Mihályi. *De-Integration and Disintegration of Health Care in Post-Communist Countries*. 2004. pp.6-8.

Diversities: Communist versus Soviet and East versus West

Many differences emerged between the CEE and USSR countries. *First*, and foremost, the private sector remained present in many countries of the CEE[99]. *Second*, most of the CEE countries preserved a greater degree of social insurance[100]. *Third*, the South-Eastern European countries of the former Yugoslav Republic have never established the Semashko model of health care and remained mostly with variations of SHI systems.

Table 1. Soviet-type Health Care System

Pre-Conditions	Priorities	Policies "Semashko plan"	Outcomes
Marxist theoretical approach, Communist ideology	Government responsibility for health	Centralisation of all resources and facilities; rationing in allocation of resources	Highly centralised finance, under-supply of drugs, equipment, etc. Ignoring the changes in the needs of the population. Non-existent individual responsibility for health.
	Universal access to HC – free and equal (proclaimed)	Overall universal coverage (on paper)	Universal access – but not always free and equal
	Working class health	Creation of clinics at plants etc	Creation of parallel systems of health care
Insufficient number of doctors and facilities	Quantity – staff	Medical Schools and Institutes, separate hospitals within medical schools	Separation from Universities – parallelisms Big number of doctors
Low spread of health facilities in pre-Communist (esp. USSR)	Geographical spread and coverage	Building new policlinics, small practices	Low quality – often just 'feldsher' level at some posts
Bad health outcomes	Infectious diseases Preventive measures Epidemic control	Immunization Introduction of Sanitary Epidemiological stations	Good results in the beginning of the 20th century, but not sufficient by the end
* *Though variations between countries still existed in private / public mix, spread, organisation*			

In general, while the Communist countries preserved the systems nearly unchanged till the late 1980's, the West all along acknowledged the need for restructuring and amending according to the *populations* needs. Thus, the crucial difference between West and East has been the patient orientation and output-based systems in the West. With the use of new technologies, introducing long-term care and extending the variety of services to all population, Western European countries managed the new challenges of the 1970's in a more efficient way.

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[99] For example, in Poland, primary care mostly remained privately owned (Kuszewski, Krzysztof; Gericke, Christian. *Health Systems in Transition: Poland.* Ed. Gericke, Christian; Busse, Reinhard. Copenhagen: European Observatory on Health Care Systems, Vol. 7 No. 5. 2005. p.7).

[100] For example some sort of social insurance share of health expenditures reached 46% in Hungary in 1968 (Mihályi. *De-Integration and Disintegration of Health Care in Post-Communist Countries*. 2004. p.8).

Outcomes of the Communist Health Policy

All the observed priorities and policies created certain peculiarities of the systems, inherited by the transition countries. *Firstly*, the chronic under-financing of the system resulted in shortages and lack of resources. *Secondly*, the emphasis on quantity worsened the overall quality of facilities and doctors' training, encouraged overstaffing. *Thirdly*, the Semashko plan produced a highly centralised unequal (opposite to the beliefs) system with preferential treatment of certain class groups. *Fourth*, the actual needs of the population in the age of the spread of the non-communicable diseases were ignored. In this form the health systems in CEE and SU were unable to meet the new challenges emerging in the 1970's.

There were, additionally, several unexpected but important peculiarities of the systems across most countries of the post-Communist area. *Firstly*, the parallelisms of the systems emerged. The regional and district hospitals existed along with the occupational and medical schools facilities. *Secondly*, the state-paternalistic culture encouraged the citizens' irresponsiveness for their own health – one of the major issues in the CEE and FSU area.

Third, the informal and illegal payments[101] became widespread – firstly due to little choice the official system provided[102]. Secondly, as by design, doctor's wages and status were often low[103]. Thus, doctors sought other sources of funding.

This rigid system did not manage to face the new health challenges that societies faced from the 1960's – 1970's: the raising burden of chronic rather then infectious diseases. The policies were not directed at treating the *new diseases*, but rather to continuing the preoccupation with preventive medicine of *infectious diseases*. In this distorted, unwieldy, under-performing shape, the health care

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[101] "[D]irect payments by patients for services they are entitled to for free, usually in a public health system" (Allin, Sara; Davaki, Konstantina; Mossialos, Elias. Paying for 'free' health care: the conundrum of informal payments in post-communist Europe. In Kotalik, Jana; Rodriguez, Diana (Eds.). *Global Corruption Report 2006*. Transparency International. Pluto Press: London. 2006. p.63).

[102] According to Cockerham, in Poland, for example, the quality of primary care was considered to be very low by patients and they preferred to consult with specialists directly, thus in order to get more personalised care, gratitude payments corrupted the system (Cockerham. Health and Social Change in Russia and Eastern Europe. 1999. p.162).

[103] For example, in Russia by 1987 the average salary of a medical worker was about 71% of the country's national average wage (Cockerham. Health and Social Change in Russia and Eastern Europe. 1999. p.31).

system entered transition with most countries realising the importance of a thorough administrative and institutional reform at the beginning of the 1990's[104].

Health Care in Transition

Despite many similarities of the health care systems during the Communist rule, significant differences still existed, which due to the uneven assistance of the international community, diverse reforms and ideologies, only widened throughout transition. Health care transition was often neglected by the policy-makers in the beginning of the 1990's due to significant difficulties of economic and political development. Thus the health care transition often started spontaneously and when the plans were finally adopted, they often were not fully implemented.

As Sophie Witter and Tim Ensor note, the reform of the health care system in transition countries was from the start very different from anything ever experienced by the Western countries[105], thus the advice was not always timely. While Western European governments gradually extended coverage from 'zero' to universal[106], in CEE the promise of free services has already been made and the countries faced a different dilemma – "how to provide a *stable funding base*"[107]. Thus, combining the cultural differences and these difficulties, most countries had to try sometimes opposite strategies and learn from their own mistakes.

Priorities, Policies and Structural Changes

The most important overall aim of the governments in many transition countries was to get as far away as possible from the Soviet-based economic and health care systems, which by that time proved to be inefficient and ill-functioning (See Table 2 for summary).

For some countries under-financing of the system was seen to be the main problem, thus the main priority was to increase health care expenditures. Witter and Ensor note though that, without

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[104] However, the Semashko plan can claim some achievements. The rapid reforms in health care could be one of the main reasons for the fast improvements in overall health status of the population during the initial stages of the plan's implementation – both in the Soviet Union and Eastern European countries.

[105] Witter, Sophie; Ensor, Tim (Eds). *An Introduction to Health Economics for Eastern Europe and the Former Soviet Union*. University of York. Eskdale Publishing: York. 2002. p.38

[106] Ibid. p.38.

[107] Ibid. p.39

further reform of the *structural elements* of the system, there were a couple of obstacles to this aim. Firstly, obtaining additional revenue was itself problematic in all post-Communist countries, and secondly, the unreformed system could not use the additional revenues efficiently in any case[108]. Thus, the increase of spending had to go along with other *structural reforms* of the health care systems.

Table 2. Health care in transition.

Initial conditions	Priorities	Policies
No competition, strict budgeting and planning, centralised administration	Market elements	Liberalisation; Privatisation; Decentralisation; Transparency
State financed – in the majority of countries Under-financing of health care system Health workers salaried, very low social status	Strengthening financing Increasing financing	Policies addressing informal payments and corruption Creating effective health insurance scheme, which would increase funding available. Defining the basic benefit packages and providers payment schemes
Long stays in hospital, acute care only-ignorance to changing conditions	Continuum of care –long term	Restructuring acute care into long term care
State responsible for health Medicine still curative in nature, aimed at infectious diseases, real needs ignored, facts hidden	Emphasis on public health Customers satisfaction – linking the community; individual responsibility	Promotion, healthy lifestyle, diet, sport etc
Access for all, but not always equal	Equity and equality of access	Everyone's right to health care
Parallel systems, bureaucratic, low technology	Increasing efficiency	IT, technologies etc
Many doctors and hospitals, often low quality	Quality of care rather than quantity	Emphasis on training

The first attempts undertaken in all sectors of the economy were *liberalisation, decentralisation and privatisation.* In many countries the medical sectors were *liberalised* via introducing the right of free choice of provider. *Decentralisation* underwent by transferring decision making to the regional, district and municipal authorities. *Privatisation* went in many different ways in the countries of transition – in some countries most hospitals still remain under the ownership of the state or regional authorities (for example, Russia, Belarus, Lithuania), while in others the ownership is mixed – some hospitals are privatised, others remain state-owned (for example, Czech Republic, Estonia, Slovakia). Privatisation played a major role in insuring *competition* between providers. The first and fastest sectors to be privatised were the pharmaceuticals and dentistry.

[108] Ibid. p.172.

One of the serious issues that all the transition countries faced was one of the legacies of the Communist era – the *widespread corruption and informal practices* within the health care sector[109]. In general health care systems are prone to corruption, due to uncertainty in health care markets, uneven access to information and the complexity of the health care systems[110]. Informal payments have become a particular cultural and historical phenomenon of the post-Communist countries[111]. Some countries acknowledged the existing problem of corruption and created policies aimed at increasing *transparency*, *accountability*, *personal responsibility* of staff and improving *providers' payments schemes*. Slovenia and Czech Republic seem to be most successful in this regard, and have the smallest evidence of informal payments comparing to the other transition countries[112]. At the same time in Russia, for example, corruption and informal payments still seem to be treated as only a side-problem of the 'real' issues of the medical sector[113].

Financing health care – revenue collection and fund pooling.

New methods of *financing* were probably the crucial and main reforms for transition countries in terms of health care. Financing of health care systems can be divided into revenue collection, fund pooling and purchasing[114]. Strengthening financing in transition countries assumes creating strong mechanisms not just for collecting revenues, but also for fund pooling – to ensure all the population to be covered. There are several possible funding sources: taxes, social health insurance contributions, private insurance premiums, direct fee-for-service, personal savings accounts, and aid and loans[115].

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[109] Lewis, Maureen. *Who is Paying for Health Care in Eastern Europe and Central Asia?* Human Development Sector Unit. Europe and Central Asia Region. The World Bank. Washington, D.C. 2000

[110] Ensor, Tim; Duran-Moreno, Antonio. Corruption as a challenge to effective regulation in the health sector in *Regulating entrepreneurial behaviour in European health care systems*, ed. Richard B. Saltman, Reinhard Busse, Elias Mossialos. Copenhagen: WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies. 2002. pp.106–124.

[111] Ensor, Tim. Informal payments for health care in transition economies. *Social Science and Medicine.* No.58. 2004. pp. 237–246.

[112] Lewis. *Who is Paying for Health Care in Eastern Europe and Central Asia?* 2000. p.1.

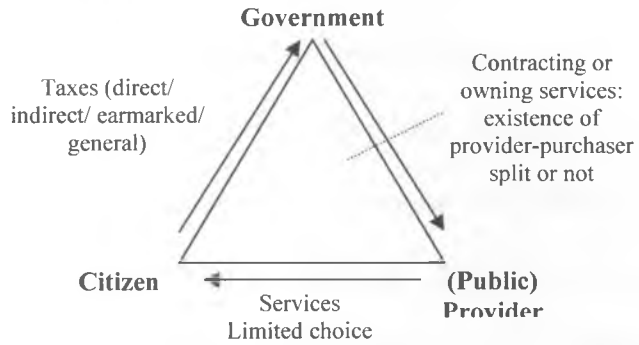
[113] Indeed, the National Priority Project "Health" does not include the fight with corruption in the health care sector among its main challenges. The project "Health" is a part of the wider programme of Priority National Projects, which also include Education, Housing and Agriculture. The Projects were launched by Vladimir Putin in 2005 and led by Dmitry Medvedev. Website: http://www.rost.ru/ (Prioritetnye Natsionalnye Proyekty (National Priority Projects). Zdorov'ye ("Health"). V chyom osnovnye problemy otechestvennoy sistemy zdravookhraneniya? (What are the main problems of our system of public health service?) http://www.rost.ru/projects/health/p01/p12/a12.shtml [Access: 07.04.2008])

[114] Mossialos; Dixon; Figueras; Kutzin. *Funding health care: options for Europe.* 2002. p.6.

[115] Ibid. p.4.

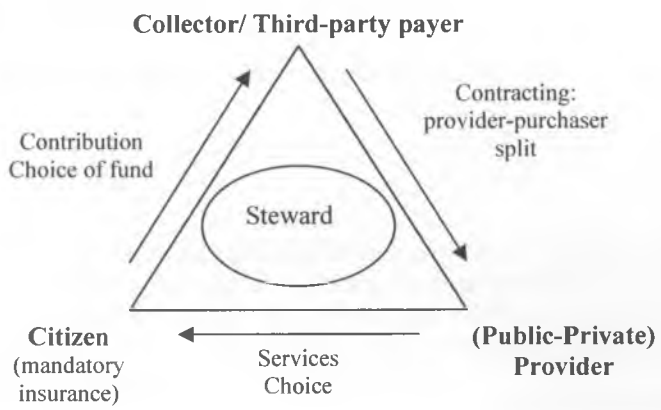
In tax-based systems (based on the Beveridge ideas) the government pools funds through taxation – direct or indirect, earmarked or general, regional or national. It can then provide services directly or through a provider-purchaser split. A variety of this type of system is possible.

Figure 18. Tax-based system in theory[116].



The social health insurance (SHI) provides a broader base for differentiation, as the number of players and their functions is increased. Government can act as a steward or a collector of (mandatory) contributions, which are usually wage-based; while purchasing health services is usually left to insurance funds. Private health insurance is based on voluntary insurance and the premiums are paid directly to an insurance fund, which in turn contracts provider of health services. Voluntary health insurance (VHI) is often used to supplement the SHI or tax-based systems.

Figure 19. Social health insurance (SHI) systems in theory[117].



The main options considered by the countries in transition, which mostly had to attempt to sustain the 'free services available for all', were the tax-based or the social health insurance systems. Many countries, especially in CEE area, chose the *SHI system* – e.g. Czech Republic, Hungary,

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[116] Adapted from Busse, Reinhard. *Health Care Systems in Europe.* Presentation. Technische Universitat Berlin. 2005.
[117] Ibid.

Poland, Slovakia, Slovenia[118]. All the systems, despite a common name, are quite diverse. But even more differences are added to the transition area, as some countries (mainly the CIS – e.g. Armenia, Ukraine, Belarus, Azerbaijan, Uzbekistan) preferred the *tax-based system* of health care financing[119]. At the same time, many of the Caucasus and Asian republics (both SHI and tax-based) – in the circumstances of pervasive tax evasion, have met the difficulty of pooling enough funds to provide even the basic care[120]. Thus in most of them private spending – usually in the form of fees for services, both formal and informal – became the most common source of funding[121]. It is however commonly accepted that there are no clear divide between health care financing systems. Moreover, countries in transition, which besides the different choices *between* countries, also changed *within* during the years of often extreme 'pick and choose' strategies[122].

Resource Allocation and Providers' Payment Schemes.

Other important spheres that needed immediate attention in the transition countries were the *coverage of population*, *allocation of resources* and *payment of providers*. Many countries faced a situation of shortage of funding and had to deal with uneasy questions of *coverage and resource allocation*. Firstly, the resources are now allocated in many countries based on the 'demand-side' capitation rather than 'supply-side'[123], as it used to be in the Soviet Union. Secondly, some transition countries chose full coverage to all citizens; others had to specify only certain groups eligible for free

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[118] In transition countries the systems of financing rely mainly on payroll taxes levied usually by the governments and managed by insurance funds or organisations, this type of financing could also be referred to as the social health insurance system (Dixon, Anna; Langenbrunner, Jack; Mossialos, Elias. Facing the challenges of health care financing. In Figueras, Josep; McKee, Martin; Cain, Jennifer; Lessof, Suszy (Eds). *Health systems in transition: learning from experience.* Copenhagen: European Observatory on Health Care Systems, 2004. p.53).

[119] In most countries the principles of health care finance stayed almost unchanged from the Soviet type system.

[120] Hakobyan, Tatul; Nazaretyan, Mihran; Makarova, Tatyana; Aristakesyan, Movses; Margaryants, Hovhannes; Nolte, Ellen. *Armenia: Health system review. Health care systems in transition.* Eds. Nolte, Ellen; Richardson, Erica. Copenhagen: European Observatory on Health Systems and Policies, Vol. 8. No. 6. 2006. p.43.

[121] In Armenia, for example, in 2005 formal and informal out-of-pocket payments comprised 65% of total health care expenditure (with 93% informal) (Ibid p.43).

[122] Thus, Latvia presents an interesting example, as till 2004 it had a hybrid SHI system with earmarked pay roll tax, collected centrally by government, transferred to the social insurance organisation for purchasing health care. It has been changed in 2005 to the health care system being financed through general taxation, though the social health insurance organisation still acts as a purchaser (Tragakes, Ellie; Brigis, Girts; Karaskevica, Jautrite; Rurane, Aiga; Stuburs, Artis; Zusmane, Evita. *Latvia: Health system review. Health care systems in transition.* Ed. Avdeeva, Olga; Schäfer, Marco. Copenhagen: European Observatory on Health Systems and Policies.Vol. 10 No. 2. 2008. p.61).

[123] Dixon, Anna; Langenbrunner, Jack; Mossialos, Elias. Facing the challenges of health care financing. In Figueras; McKee; Cain; Lessof. *Health systems in transition: learning from experience.* 2004. pp.67-68

health care services, or certain services, provided for all[124]. The *providers payment schemes* were in many transition countries a very important issue. At the same time, this sphere of policy is a usual dilemma for most health care systems with no immediate solution. The options available are diverse and usually are used in combination – fee-for-service, capitation, global budgets, salary, per case and per diem payments.

Restructuring of health care.

During Communist times the quality of ambulatory and especially primary health care (PHC) was very low due to badly-trained staff and the lack of attention towards PHC. Thus, *restructuring the delivery and organisation* of health care was crucial. Some countries introduced GP's as gatekeepers to other medical facilities – thus trying to increase the systems' efficiency. Inpatient facilities also had to go through reforms, as the number of hospital beds was high, while the funding scarce: the overall quality of inpatient care provided was rather low. Thus, one of the policies involved reducing and restructuring the number of acute hospital beds, for example transforming into continuum long-term care facilities. The transitional experience was once again diverse.

The other improvement that happened with the change to democracy in some – but not all – transition countries was the raising awareness of *promoting individual responsibility for health.* Along with other health care reforms, the attitudes and unhealthy lifestyles created historically had to be changed – otherwise the reforms could have lingered.

EMPHASIS ON QUALITY.

Last, but not least, important progress in some countries has been made in the area of *improving quality of health care* – increasing efficiency of services, concentrating on customer

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[124] In Czech Republic, for instance, the health care benefits package is very broad under the compulsory health insurance. It covers basically all possible services, which are considered to be required for the cure of an illness or for health status improvement of an individual – thus it can include spa-facilities and over-the-counter drugs, if they are prescribed by a doctor (Rokosová, Martina; Háva, Petr. *Health Systems in Transition: Czech Republic.* Copenhagen: European Observatory on Health Care Systems, Vol. 7 No. 1. 2005. p.33). On the other hand, in Azerbaijan, only groups of society considered vulnerable or who have some privileges – pensioners, disabled, pregnant women, military, education workers – are eligible for free health services (Holley et al. *Health care systems in transition: Azerbaijan.* 2004. p.23)

satisfaction, emphasizing health outcomes and focusing on health care system performance in general[125]. These reforms could be noticed primarily in the CEE countries of the EU.

All in all, the diversity of *paths* taken by the countries in transition is evident. It is commonly acknowledged that the health care transitions bear some degree of Communist legacy, and have a strong impact on the diverging health outcomes in the post-Communist area. However, the role of the health care in forming these health differences is not often analysed. Taking the diverse patterns of health care development throughout transition as a starting point, it is increasingly interesting to investigate the effect these changing and sometimes radically different pathways have on the health status. To do so, we need to distinguish these certain paths and classifications.

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[125] McKee, Martin; Fidler, Armin. Reforming the continuum of care. In Figueras; McKee; Cain; Lessof. *Health systems in transition: learning from experience*. 2004. p.85-86.

CHAPTER 3. HEALTH SYSTEMS IN TRANSITION: CLASSIFICATION

The diversity of transitional health care systems, introduced in Chapter 2, requires a more in-depth analysis in order to arrive at an empirically realisable and conceptually useful system of classification. Thus, Chapter 3 proceeds as follows. First, the assumptions for classification have to be made. Second, the theoretical base of systems' classification and the conceptual frameworks of Hsiao – Heller and Starfield – Shi are revisited. Third, the criteria of classification used for this paper are outlined and located in the transition context. Fourth, principally through a detailed cluster analysis based on structural characteristics and its further qualitative assessment the main classification patterns are arrived at.

ASSUMPTIONS FOR CLASSIFICATION

Due to the complexity and subjectivity of the topic of analysis, some simplifying assumptions have to be made. *First and foremost*, any classification – even the most detailed one – bears a degree of simplification, thus has to be treated with caution. The reality of any health care system is more complex and beyond perfect representation, even by the most sophisticated subjective assessments.

Second, the systems in *transition* are extremely difficult to analyse, as indeed they are constantly situated in a process of transition – *change*. Thus, for a detailed exploration, one would need to create a certain scale, which could change value for each country almost every year. Even if such work could be done (which is itself doubtful), this would not add much value to our analysis of the influence of health care systems on health, as these minor changes would not have a direct impact on overall health outcomes. Thus, it has been decided to create a classification of health care systems in an indicative *static* form with an assumption that most reforms throughout transition – one way or another – resulted in *achievement* this static health care system.

Third, timing matters. If health care systems and policies do affect health outcomes, the efficiency of the transmission mechanisms, through which the affects become operational, are sure to

vary over both time and place. For the purposes of this research, analysis of the classification of the health care systems is rooted in the years 2004 – 2005. Of course, most countries do continue the reforms but (arguably) these reforms do not substantially influence the major structures[126].

Fourth, most SHI systems of the CEE and CIS are hybrid systems. As we do not include any other countries for analysis besides the transition countries, they are also classified as SHI.

Fifth, it is indubitably that the political processes in any country have an impact on the health care policy. We implicitly assume that the change of political ideas and decision-making is implemented in the policy directly and endogenously shapes health care policy formulation.

Sixth, the fall of the Communist regime brought changes in borders, sovereignty and ambitions in the post-Communist world, but while some of the countries managed to go through these new processes peacefully (e.g. separation of Czech and Slovak Republics), other countries (e.g. Balkan states) have endured violent ethnic conflicts. In order not to duplicate the effect of civil unrest and due to its direct link with health, it is not analysed within the health care systems classification, but rather will be taken into account during the health production function formulation in Chapter 4.

Seventh, the ethnic conflicts created several 'unrecognised states', which *de jure* are part of certain countries, but *de facto* are governed by unrecognised authorities within them – Transnistria, South Ossetia, Abkhazia and Nagorno-Karabakh. These regions are excluded from the analysis of the health care systems. Likewise, several countries of the transition area have also been excluded from the analysis: Kosovo was excluded due to its recent independence; Serbia and Montenegro were excluded due to absence of any comprehensive qualitative information on health care systems; Bosnia and Herzegovina have been excluded due to their internal complexity and diversity[127] which the country level data available does not allow for.

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[126] One country should specifically be mentioned. Latvia had some structural changes in 2005, when the earmarked tax of SHI was abolished and the general taxation was introduced as the main financing source of the health care system. Therefore, the analysis of Latvian health care system refers to the year 2005 – the shape that the system formed until present day.

[127] Cain, Jennifer; Duran, Antonio; Fortis, Amya; Jakubowski, Elke. *Health Care Systems in Transition: Bosnia and Herzegovina*. Eds. Cain, Jennifer; Jakubowski, Elke. Copenhagen: European Observatory on Health Systems and Policies, Vol. 4, No. 7. 2002.

Last but not least, country 'initial conditions', as discussed in Chapter 2, have varied across the transition countries and it is empirically difficult to fully account for this within the scope of this work[128]. Parallel systems created during Communist times in many countries[129] will not be taken into consideration when analysing and classifying health care systems in this work.

With this simplifying rubric in mind, we now revisit the theoretical basis for 'systems classification'.

EXISTING FRAMEWORKS FOR CLASSIFICATION

HSIAO – HELLER CONCEPTUAL FRAMEWORK

Classification of the health care systems according to structural characteristics has, to our knowledge, not been done for any region. However, there are several works to refer to. William Hsiao and Peter Heller[130] develop a framework for analysis of health care systems. They distinguish five major categories, which systems could be characterized with: *financing, organisation, payment or incentive structure, regulation* and *persuasion* (see Figure 20 below). Hsiao and Heller argue that the means of the health care systems influence the intermediate outcomes – access, quality and efficiency of the health services, which in turn influence the main objectives of health care existence – improving health status of the population, ensuring financial risk protection and public satisfaction.

PRIMARY CARE SYSTEM ANALYSIS FRAMEWORK OF STARFIELD – SHI

Starfield and Shi analyse *primary care systems* in terms of r*egulation, financing, primary care provider, access, longitudinality, first contact, comprehensiveness of services, coordination, family-centrism, and community-orientation*[131]. Even though they analyse solely the *primary care*, their qualitative classification is important for analysis of health care systems as a whole. Firstly, primary

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[128] For example, countries of the Socialist Federal Republic of Yugoslavia did not acquire the Semashko model during Communism, but rather had a fragmented SHI implemented.

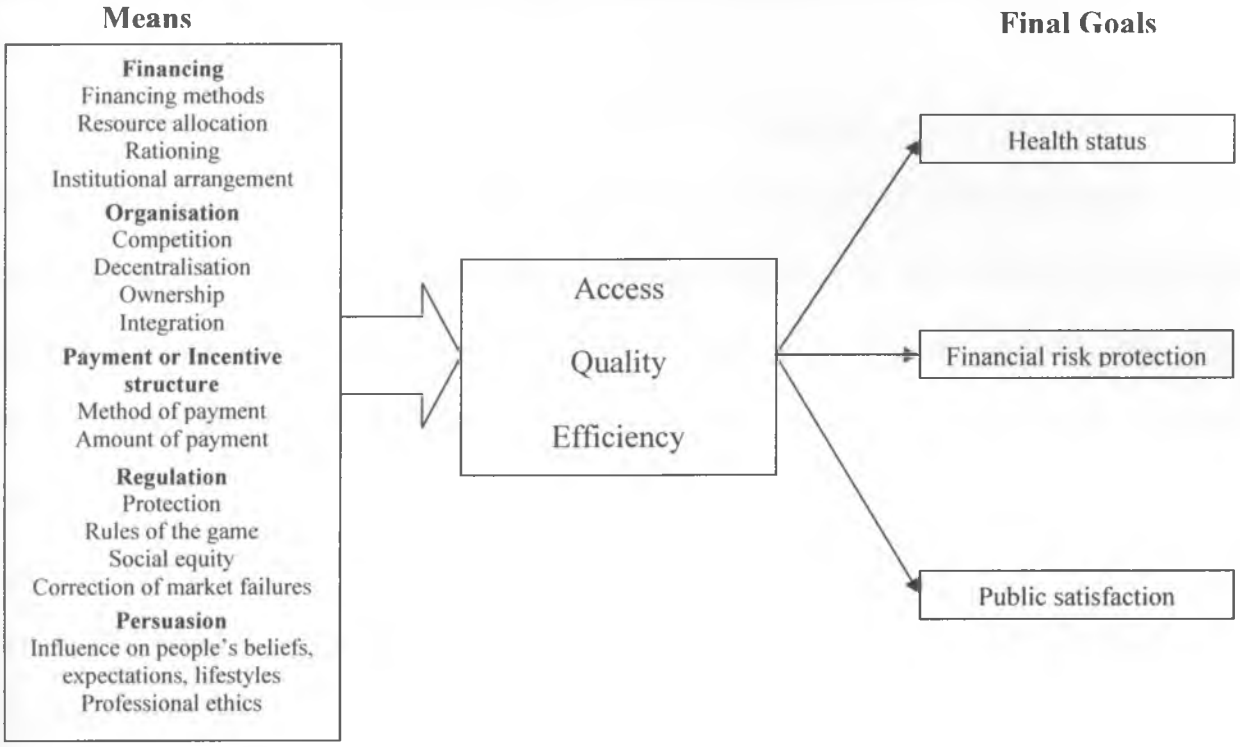
[129] 23 out of 25 countries still have functioning parallel systems of various ministries and big corporations, organisation and financing of which differs greatly between and even within countries.

[130] Hsiao, William; Heller, Peter S. *What Should Macroeconomists Know about Health Care Policy?* IMF Working Paper. International Monetary Fund. WP/07/13. 2007.

[131] Macinko; Starfield; Shi. The Contribution of Primary Care Systems to Health Outcomes 2003. pp.838-843.

care is one of the most significant components of health care systems, especially in transition countries. Secondly, many characteristics – such as regulation, access to services, first contact, comprehensiveness of services, coordination (e.g. between different levels of health care) – are essential for health care systems in general. Thus, the Starfield-Shi framework will be incorporated into this analysis.

Figure 20. Health care systems classification and performance framework according to Hsiao-Heller[132].



DEVELOPING CLASSIFICATION FRAMEWORK

In arriving at a classification system for this research, we combine the Hsiao-Heller and Starfield-Shi frameworks, and augment them with additional characteristics, especially important for the countries in transition – for this we consider only *structural characteristics* of the health care systems (i.e. not physical ones). Thus, the main criteria include *financing*, *organisation*, *payments*, *primary care*, *patient-orientation*, *regulation* and *persuasion*. Table 3 (below) summarises the most important characteristics within this defining framework.

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[132] Adapted by author from Hsiao; Heller. *What Should Macroeconomists Know...* 2007. pp.35–39.

Financing is one of the most complex, but nevertheless most easily quantifiable aspects of classification. It can also be argued, that financing has been at the forefront of the most significant reforms of health care in transition. For ease of classification, the criteria were divided into sub-components, therefore within the broad term of financing we can distinguish different financing methods (SHI or tax-based), resource allocation techniques (redistribution and risk adjustment of pooled funds) and diverse institutional arrangements of the financing structures (collecting and pooling of funds, purchasing services).

A significant sphere of any health care system is the *organisation* of it. Organisational reforms had to be high on the agenda of transitional countries, because without structural changes – as was argued in Chapter 2 – any financing reforms would be ineffective, or less effective than they could have been. The sub-components for analysis would include ownership and sectoral structures, the presence of competition, decentralisation, coordination and the spread of the health information systems.

The next significant criteria for classification are the *provider payments schemes and incentives structure*. This could be of particular importance for the transition countries, where informal payments as a form of financing health care systems and corruption are particularly widespread, thus incentives for medical personnel could radically improve the situation (at least on the supply-side).

Primary care is included as a component for analysis for specific reasons pertaining to the peculiarities of the health care of the Communist period. As outlined in Chapter 2, the countries under the Semashko model (mostly) have concentrated on curative care, largely at the expense of primary care. Thus, the special attention of reforms towards primary care might be considered especially important for achieving better results in health care transition. Within the classification, the preventive services, primary care structure and the role of GPs are distinguished.

Another criteria which is important is the *patient-orientation*. Within the Semashko model, individual patient or practitioner roles were little; systems in general were input-oriented rather than output. Thus, a re-orientation towards the patient is a significant element in improving the functioning

and efficiency of the post-communist health care systems. Within this criterion, access to health care, longitudinality and comprehensiveness of services can be analysed, along with the methods of paying hospitals (input- or output-oriented).

The other criteria – *regulation*, *persuasion* and *multi-sectoral approach* – can be assessed only qualitatively and yet seem to be of increasing importance. Firstly, many countries encountered difficulties of selecting uniform vector of reforms of health care and of regulating them throughout transition. Secondly, it can be argued that unhealthy life-styles are some of the main reasons for the poor health developments of the post-Communist countries. Thus, health education and promotion are significant components of the health care systems. And finally, it can be argued that health of the population is influenced by many factors of socio-economic reality, thus the co-operation between health and other sectors – such as environmental or transportation takes on particular importance in the transition context.

Table 3. List of possible criteria for health care systems assessment

Criteria	Possible aspects for analysis
⇨ **Financing**	
➢ Financing methods	SHI vs. Tax-based system; Involvement of International Organisations in financing Development/share of VHI/PHI in THE
➢ Resource allocation	Presence of redistribution, risk adjustment
➢ Institutional arrangement	Private vs. public systems Collection and pooling of funds Purchasing of services Health expenditures structure Health expenditures amount
➢ Other	Privatised pharmacies Financing of dental services
⇨ **Organisation**	
➢ Competition	Competition between insurance funds, if they exist Competition between providers
➢ Decentralisation	Assessment of decentralisation
➢ Ownership	Ownership of outpatient facilities Ownership of inpatient facilities
➢ Sector structure	Capacity and usage of hospital facilities Number of medical personnel Inpatient admission and average stay Outpatient contacts
➢ Coordination	Exchange of information between levels Exchange of information between facilities
➢ Health information systems	Use of computers in medical facilities Use of IT, e-cards
➢ Other	Purchaser – provider split Existence of parallel systems Regional diversity
⇨ **Primary care**	
➢ Preventive care	Immunisations; number of preventive visits
➢ Primary care provider	The ratio of specialists to generalists in primary care
➢ First contact	GP's as gatekeepers
⇨ **Payments or Incentive structure**	
➢ Method of payment	Provider payments schemes
➢ Amount of payment	Average salary of medical personnel
➢ Other incentives	Bonuses for quality
⇨ **Patient-oriented health care**	
➢ Access	Co-payments and user charges Distribution of facilities
➢ Longitudinality	Assessment of the use of the same facilities/doctors
➢ Comprehensiveness of services	Range of the BBP Payment for drugs
➢ Family-centrism	Separation of adult and children facilities Development of family medicine
⇨ **Regulation**	
➢ Protection ➢ Rules of the game ➢ Social equity ➢ Implementation of laws	Qualitative assessment of rules, their implementation, orientation towards equity, anti-corruption efforts
⇨ **Persuasion**	
➢ Health education and promotion	Qualitative assessment of the health education and promotion efforts
➢ Reproductive health	Existence of family planning facilities
➢ Professional ethics	Role of professional organisations
⇨ **Multi-sectoral approach**	
➢ Public health ➢ Environment, transport, etc.	

INITIAL EXPLORATION

Out of the initial 28, there are 25 countries under consideration[133] in our analysis (Table 4). To assess the health care systems, the Health in Transition (HiT) Reports of the European Observatory of the World Health Organisation (WHO) were collected and carefully scrutinised according to the framework criteria identified above[134]. Before proceeding with further classification, we firstly provide some additional contextualisation of the resources used.

Table 4.

Countries under consideration
Albania
Armenia
Azerbaijan
Belarus
Bulgaria
Croatia
Czech Republic
Estonia
Georgia
Hungary
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Poland
Republic of Moldova
Romania
Russia
Slovakia
Slovenia
Tajikistan
TFYR Macedonia
Turkmenistan
Ukraine
Uzbekistan

FINANCING[135]

To start with, 16 countries were classified as SHI systems, while 10 were classified as tax-based. The distinction is often unclear and it might be inappropriate to divide countries purely according to this feature, as several countries could be classified as both. Two countries have been of particular uncertainty: Kyrgyzstan[136] (eventually classified as SHI) and Russia[137] (classified as *both* SHI and tax-based).

Within the SHI group there is a great diversity in terms of financing. The smallest contribution rate on wages towards SHI is in ex-Soviet SHI countries: Georgia, Kyrgyzstan, Lithuania, Russia, Moldova, with Albania also joining this group (2-4% of wage), while the highest rates are in Czech

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[133] Bosnia and Herzegovina was excluded for its internal complexity and diversity: the Dayton Agreement separated the country into two distinct entities – Republika Srpska and the Federation of Bosnia and Herzegovina, which possess two different health care systems, impossible to analyse within one country. Serbia and Montenegro were excluded due to unavailability of any comprehensive qualitative information.

[134] For full list of literature used for health care systems analysis, see Bibliography, Health care systems' assessment.

[135] For detailed information see Appendix III, Tables 1-4.

[136] In Kyrgyzstan the SHI contributes to only 4% of the total health expenditure (THE), thus the rest of public share of expenditure (which according to WHO HFA accounts for 39.7% in 2004) is collected from taxes. However, according to HiT Report, all public funds are pooled by the single payer – Mandatory Health Insurance Fund (MHIF), which acts as a purchaser of services – therefore, Kyrgyzstan was classified having SHI system. (Meimanaliev, Adilet-Sultan; Ibraimova, Ainoura; Elebesov, Bolot; Rechel, Bernd. *Health Systems in Transition: Kyrgyzstan.* Eds. Rechel, Bernd; McKee, Martin. Copenhagen: European Observatory on Health Care Systems, Vol. 7. No. 2. 2005)

[137] While SHI contributions compose approximately 16% to the THE, the rest of the public spending (totalling 59.6% according to WHO HFA) is contributed from taxes *directly* to providers by municipal, regional, and on a smaller scale, federal authorities. Thus, Russian health care system represents the unusual mix of both working SHI and tax-based systems, and was classified as both SHI and tax-based.

Republic, Hungary, Slovakia and Slovenia (13.5-14%). The contributions share split between employer and employee are also diverse, and even opposite in some cases. Most countries have one insurance fund with regional offices, with Russia, Slovakia and Czech Republic providing for choices of SHI health insurance funds for their population. An important further difference between countries occurs in the share that the SHI contributes to the THE: from 4% in Georgia to 86% in Slovakia[138].

Within the tax-based group the differences also persist– in terms of the share of taxes in total health spending (from 22% in Azerbaijan and Tajikistan to 73.4% in Belarus) or the role of voluntary and private health insurance (VHI and PHI respectfully)[139]. Moreover, looking at the out-of-pocket (OOP) payments, it is evident that they play an increasingly important role in health expenditure (up to 76.5% in Tajikistan), thus these systems, even though their public health expenditure is formed primarily by tax contributions, are essentially a private-public mix, typically with a *predominant private share*.

All in all, it could be argued that the *distinction* between the SHI and tax-based systems are *not* of crucial importance for the transition countries *classification* – affiliation with one group or the other doesn't necessarily imply any deep-rooted system similarities. Firstly, most SHI transition countries in reality represent only quasi-SHI systems (which could as well be classified partly as *earmarked tax-based* with a purchaser-provider split). Secondly, in most 'taxed-based' systems, the public spending through general, regional and/or local taxes presents only a minor part of the health expenditure (thus these states possess rather private systems). Following this reasoning it could be argued that the *SHI-NHS divide* itself in transition setting does not add any value for the empirical *classification*[140]. Thus, in terms of financing, the differences in the public-private mix, organisation of financial flows

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[138] These data were collected from HiT Reports, and are presented for years 2002-2004. See Appendix III, Table 4.

[139] An interesting situation has developed in Turkmenistan, for instance, where the VHI provided by the Ministry of Health (MoH), covers almost 80% of the population and contributions of 4% are deducted from wages – thus serving as a 'voluntary SHI' (therefore, Turkmenistan could as well be classified as a 'quasi-SHI' system), but any other private insurance is forbidden.

[140] It could, however, be of interest to introduce the variable for SHI and the year of adoption in one of the models of health production function in Chapter 4.

(collecting and pooling of funds), and method of purchasing health services are deemed to be more important.

Private-public mix could still be a misleading notion. Indeed, practice indicates that we can differentiate between the emerging private *financing* and the privatising of *facilities* (this surely is overlapping with the organisational side of health care). In general, those states which were able to regulate the reforms efficiently chose to privatise *facilities* (providing more choice for both practitioners and patients), while keeping the financing primarily through public revenues – either taxes or SHI contributions – taking the issues of access and equity as fundamental (and more democratic). On the other hand, countries which were not able to sustain sufficient levels of funding of health care or regulate the market efficiently, fell into a long period of under-financing and had to rely on private household spending on health care, which resulted in the spread of the OOP payments – both official and unofficial. Thus, even looking solely at the OOP payments (and their share in private expenditure), gives a rather striking picture of the undiversified structure of financing health care[141].

It is believed that the ***purchaser-provider split*** increases the efficiency of the health care system, through introducing more accountability. In the CEE area 8 countries still do not have a divide between purchasers and providers, while Russia has a partially transformed system, where only a part of services is purchased through the insurance funds.

All in all, within the financing criteria, particular attention should be paid to the purchaser-provider split and public-private mix within the health care systems.

ORGANISATION[142]

Organisation of the health care systems is important in terms of ownership and competition, decentralisation, sector structure, coordination and information systems. ***Ownership and competition*** are closely linked in transition countries, as competition is encouraged only in those countries, where

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[141] In most countries the OOP payments form 80-100% of private expenditure. There is only one country, where we can argue that private or voluntary insurance is developed, spread and forms a bigger share in health expenditure than the OOP payments – Slovenia (with 43.9% of OOP in private expenditure), followed by Belarus and Slovakia (See Appendix III, Table 4).

[142] For detailed information see Appendix III, Tables 5-6.

privatisation of health facilities has been a major change – thus encouragement of competition within the private sector and between public and private providers have been a priority. 20 out of 25 countries have public or quasi-public inpatient facilities, while five countries present a mixture[143]. Much higher privatisation has occurred in the outpatient and especially primary care sector. There is however a clear tendency of higher privatisation in the non-Soviet countries.

Competition between insurance funds can only exist in the countries with multiple insurance funds – Czech Republic, Slovakia and Russia – this however still has to be specified even further. In Russia the health insurance system is "characterised by a lack of competition"[144]: even though there are 300 private and a number of public insurance funds, but the insurance funds are not active purchasers of health services[145], thus do not engage in competition as such.

Decentralisation of some degree has taken place in all countries of the transition area. Some countries have undergone radical decentralisation in the very beginning of the 1990's, and now returned to some centralising of the health care system again (e.g. Lithuania). The case of the Balkan states presents an interesting example of centralisation throughout transition, as during the Communist times their systems were highly fragmented and decentralised. The notion of decentralisation is however very subjective and could not be used in a very convincing way in our classification.

Regarding the rest of the organisational components for assessment of the health care systems, there is no adequate information available and they have to be assessed without any certain criteria set. ***Sectoral structure*** is diverse throughout the transition countries. We can refer to the financing of for example inpatient sector as a share of THE, but this still doesn't provide the full structure. At the same time, according to HiT Reports, some countries have been introducing reforms in the primary care sector, while others preserved the curative inpatient facilities as the priority. Most of the post-Soviet countries preserved the system sectoral structure-wise nearly unchanged: policlinics for primary and

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[143] The latter had happened in countries either intentionally via privatisation of a share of the inpatient facilities (Czech Republic, Slovakia, Estonia) or via 'self-privatisation' and inability of the state to finance the public facilities fully (Kazakhstan, Uzbekistan)

[144] Tompson, William. *Healthcare Reform in Russia: Problems and Prospects*. Economic Department Working Paper. OECD. No.538. ECO/WKP(2006)66. 2007. p.11

[145] Ibid. pp.11-12

outpatient specialist care, with separation of children and adult facilities; secondary hospitals at rayon and regional levels, and tertiary hospitals at regional and federal levels. There has been a higher degree of variation within the rest of the transition countries, but as a minimum, the separation of primary care (by introducing private practices for instance) from the rest of facilities has typically been introduced.

Exchange of information between levels depends a lot on the reforms introduced in the primary care sector. The efficient co-ordination of information between levels and facilities highly depends on the level of computerization and the use of information technologies (IT). While Estonia represents the most technologically advanced in CEE, the countries of Asian CIS are lagging behind with the use of paper methods, poor data collection and almost no exchange of information between levels and facilities. There is though, inadequate data/information on this to form an empirically operational assessment.

To sum up, the types of organisation and ownership are considered to be significant for classification, with competition characteristics and regional diversity also being able to add some value to classification.

Primary Care

Within the primary care sector, the data on ***ratio of generalists to specialists*** are difficult to obtain, but the tendency has been that the countries, which introduced major reforms in primary care – also included the retraining of personnel into generalists or family doctors. This has been happening on a big scale for example in CEE countries. In contrast, according to HiT Reports, in CIS the training of family care doctors or general practitioners (GPs) is lacking and the continuity of care for patients is often neglected. The important issue is the ***prevention services***, which are in most cases carried out by the primary care physicians. Thus, in some countries GP's are paid extra (most often on a fee-for-service basis) for the preventive services, while in others – no incentives are created for the primary care doctors to improve preventive medicine. In many FSU countries (e.g. Azerbaijan, Tajikistan, Ukraine, Uzbekistan) the introduction of a ***free choice of provider*** was understood as the right of

citizens to by-pass the primary doctors level – in many countries this, accompanied with a lack of co-ordination between levels, increases the inefficient use of resources.

PAYMENTS AND INCENTIVES STRUCTURE[146]

Payments to physicians and hospitals have taken diverse forms, both within and between transition countries. ***Payment to medical personnel*** differs by the sector (inpatient, outpatient specialist or primary). Primary care physicians' payments have experienced major changes since the start of transition, as most countries have switched to capitation or a mixture of capitation and salary or fee for service. The highest diversity though was created within the area of ***payment to hospitals***[147]. All in all, there are several countries which have not reformed their payments structure radically since the fall of Communism, relying on salaries as payment to all physicians and line-item budgeting of hospitals – Belarus, Tajikistan, Ukraine and Uzbekistan. Other – Bulgaria, Croatia, Estonia, Kazakhstan, Lithuania, Poland, Moldova, Slovenia – introduced more radical reforms and developed a system of capitation for primary practitioners, salaries for inpatient doctors and primarily diagnosis related groups (DRG) payment method (or some other variation of per case payment)[148]. Russia again falls into an interim category[149].

The ***size of official salary*** received by the health personnel is particularly important in the transition countries, as it influences the social status of health workers, and the informal payments extortion. The data on the amount of payment to doctors is not officially available, as the official salaries are extensively supplemented, firstly, by a bonus structure, and secondly, by informal payments – on a higher scale in some countries, and lower in the others. The HiT Reports, however,

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[146] For detailed information see Appendix III, Table 7.

[147] It has to be stressed again, that the methods of payment were simplified and generalised, otherwise most countries would have completely diverse methods. We distinguished some certain similarities or general schemes.

[148] This is true for 2004. Most of these countries have tried different methods of payment throughout transition.

[149] The new methods of payment were introduced in Russia only partially. Those hospitals, contracted with insurance funds and companies, receive about half of its budget through DRG, quarter – through per diem system and some smaller part based on line item budget. This however is true only for the 80% of hospitals contracted with the social health insurance system, and varies greatly throughout the country. (Tragakes; Lessof. *Health care systems in transition: Russian Federation.* 2003. p.165)

give some indication in terms of doctors pay relative to the average salary level in each country[150]. There is a huge diversity in the *formal (official)* salaries (incomes) of medical personnel – from 28% of the national average in Azerbaijan, to 75.4% of the average pay in Russia, and they earn twice or even four times (primary care physicians, who are mostly self-employed) the average in the Czech Republic.

Patient-orientation, Regulation and Other Characteristics[151]

The ***co-payments and/or user charges*** have been introduced in most countries, with the exception of Belarus, Czech Republic, Russia and Lithuania[152]. The reform was intended to decrease the level of informal OOP payments or *formalise* them. This has not, however, given the same results in all countries. While it was rather effective in Kyrgyzstan[153], in Georgia and Armenia it only increased the household spending on health, thus propagated systems inaccessible to many people. However, the *introduction* of co-payments does not necessarily mean negative effects in terms of outcomes, as it is rather efficient in some countries (e.g. Croatia, Estonia), thus this characteristic (of *introduction* of co-payment) is found to be impossible to be used for a health systems *classification*[154].

The ***comprehensiveness of services*** could be one of the possible ways to understand the diverse results given by the introduction of co-payments. Where the publicly provided basic benefits package (BBP) has been extensive, and thus the co-payment is only a small user-charge or a fee for a service above the BBP (which is rare, as the BBP is extensive), then the co-payment is bearable for patients. On the other hand – highly restricted BBP forces patients to pay for services that are often basic for

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[150] As most countries are situated on a very diverse scale of economic development, it might be less informative to compare the wages between the countries in real terms.
[151] For more information see Appendix III, Table 8.
[152] As of 2004. Czech Republic has introduced user charges in 2008 for one year.
[153] Kutzin, Joseph; Chakraborty, Sarbani et al. *Kyrgyz Republic Public Expenditure Review. Fiscal Policies for Growth and Poverty Reduction.* Volume I: Main Report. Report No. 28123-KG Poverty Reduction and Economic Management Unit. World Bank. 2004.
[154] It is however crucial to account for the *level* of OOP in the THE, while the existence of OOP in itself is a misleading notion.

health, such as maternal services[155]. The impossibility to pay for these services decreases access to health care, worsens the health of the population in the long run and increases the health care amenable mortality. Moreover, the restrictive BBP could be accompanied by a very restricted *access* to this BBP in general – thus the share of population covered could restrict the access to health services even further. However, while it is possible to distinguish a very limited and more or less comprehensive basic benefit packages, the further distinctions could not be clearly made without a detailed exploration – which is impossible within this research.

All the problems with BBP, co-payments and equity seem to fall into the category of badly implemented, planned or regulated reforms. This brings the analysis to the importance of ***regulation*** in the health care sector. The concept of 'regulation' can not be adequately interpreted in a quantitative way; moreover, it is almost impossible to create a scale for it. In general, the countries could be divided into possessing strongly hierarchical regulatory power as a Soviet legacy and contractual and rather democratic one, transformed during transition.

One of the characteristics deemed important is the ***regional diversity*** of health care systems within a country. One of the most diverse in terms of health care provision, organisation of health care delivery and financing was found to be Russia, where the regional authorities are decisive in allocation of recourses, establishing insurance funds and companies, introducing fees for services and so on. Moreover, the moneys (from insurance funds and taxation) are transferred to medical facilities on the regional level – thus the regions, which are more economically developed, have much higher health care spending.

The other characteristic that was found to be very different between the countries, was the ***role of professional organisations***. These include associations and chambers which work for improving the quality of doctors' education and training, for example[156]. In some systems the MoH has transferred some of its obligations to professional organisations, such as licensing, registering and quality

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[155] For example, in Kyrgyzstan till 2001 women in childbirth were not exempt from official payments, which were quite high, and 80% of women were not insured by state for services related to delivery. (Meimanaliev et al. *Health Systems in Transition: Kyrgyzstan.* 2005. p.38)

[156] Trade unions (which do exist in most countries – in some as Communist legacy) are not included in this criterion.

assessment – thus the role of professional organisations is high (Slovenia, Czech Republic, Latvia); while in some countries – Azerbaijan and Uzbekistan – they do not exist at all.

Longitudinality is difficult to track in the situation of little computerisation of health care and, in general, badly functioning information systems. ***Access*** to health care is also very difficult to analyse, as besides the economic ability to pay necessary in some countries in order to receive health services, the situation of distribution of facilities is a major problem in some countries and areas. The last, but not least – ***health promotion and education*** can not be assessed precisely. The differences in all these characteristics are subjective, thus they can not be assessed in comparison.

In sum, through initial detailed exploration some of the potential structural criteria for classification have been eliminated (e.g. the SHI/NHS divide, introduction of co-payments)[157]. However, it is clear that there are a potentially large number of characteristics that can define our classification and so we now move to cluster analysis, informed by our detailed system exploration, in order to establish some meaningful empirical groupings within the transition region.

Cluster Analysis

Cluster analysis as a method is considered useful for initial data mining and for identifying similarities when the hypotheses are not a-priory set[158], useful in a complex setting. Cluster analysis does not provide any explanation or interpretation, but rather simply sorts the objects into groups, in which they are most similar, while groups formed would be dissimilar between each other[159].

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[157] This, however, does not mean that these characteristics are not significant for structural characterization of each system. What is important is that some characteristics can not form the *classification* of the health care systems, because they do not imply the same structural outcomes, or some definite similarities.

[158] StatSoft, Inc. Electronic Statistics Textbook. "Cluster Analysis" Tulsa, OK: StatSoft. 2007. WEB: http://www.statsoft.com/textbook/stathome.html [Access: 04.04.2009]

[159] Tan, Pang-Ning; Steinbach, Michael; Kumar, Vipin. *Introduction to Data Mining*. "Chapter 8. Cluster Analysis: Basic Concepts and Algorithms". Pearson Addison Wesley. 2005. p.490-91.

VARIABLES USED FOR CLUSTER ANALYSIS

For the cluster analysis *only* the *structural characteristics* are used (or the ones that could *reflect* structure), thus the 'real terms' variables are not included, i.e. health expenditure in purchasing power parity dollars (or any other currency)[160] or the number of doctors, nurses, etc[161].

Due to the fact, that cluster analysis is strongly dependent on the variables used for it, the set/s of them has/have to be strictly and clearly defined. Thus, after initial trials and several models built, three sets of variables have been chosen for further assessment and comparison. *Firstly*, cluster analysis using all the set of created variables; *secondly*, structural variables *excluding* the SHI/NHS divide and co-payments variables (as argued in the initial exploration); and *thirdly*, the latter set was supplemented with the variables of health expenditure and public health expenditure as a share of GDP[162]. The variables were created as *dummy variables*, in the cases where several possible options were available, the categorical non-binary variables were transformed into a series of binary. The details and descriptive statistics are provided in Table 5, while the exact values could be drawn from the Appendix III tables.

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[160] It is not claimed that the health expenditures in real terms (PPP for instance) are not important determinants of health care or health, however for *structural* classification they are considered to be the *outcomes* of it (the structure and organisation of health care along with economic situation influence the amount of HE), thus are not included into determining *classification*.

[161] The latter are not incorporated into the main cluster analysis in order not to disturb the procedure with high numbers, measured on a completely different scale. Initially the physical characteristics of the systems have been used for a second tier of cluster analysis in order to determine the groupings according to the resources levels of each country, but were not taken into consideration, as firstly, they are considered to be the inputs of the health care systems, which they *developed through structural changes*, and secondly, the variables had major differences in scale they were measured on, and this greatly disturbed the results, making it impossible to perform cluster analysis.

[162] The *shares* of GDP are considered to be structural – they provide a vivid illustration of the *public-private mix* of the health care system, rather than express the spending in real (currency) terms (which in turn are considered to be the outcomes of the structural characteristics of health care).

Table 5. Details and descriptive statistics for the variables used in cluster analysis.

Variable	Sub-variables	Description	Measure	Mean	Standard Deviation
Financing					
SHI		System classified as SHI *(only Set 1)*	1-yes, 0-no	0.64	0.489898
Tax		System classified as tax-based *(only Set 1)*	1-yes, 0-no	0.4	0.5
Co-payments		Existence of co-payments/ user-charges *(only Set 1)*	1-yes, 0-no	0.84	0.374166
HE		Health expenditure as a share of GDP *(only in Set 3)*	% of GDP	6.264	1.419765
PbHE share		Public health expenditure as a share of GDP *(only in Set 3)*	% of GDP	3.712	1.664161
		Used in all Sets:			
IO		International Organisations play some role in financing	1-yes, 0-no	0.56	0.506623
Risk adjustment		Risk adjustment by age or age and gender	1-yes, 0-no	0.16	0.374166
Collection		Collection of funds	1-non-state, 0-state	0.16	0.374166
Pooling		Pooling of funds	1-non-state, 0-state	0.56	0.506623
Purchaser-provider split		Existence of purchaser-provider split	1-yes, 0-no	0.68	0.476095
Bonus to doctors		Bonuses to doctors for quality	1-yes, 0-no	0.2	0.408248
Bonus to hospitals		Bonuses to hospitals for quality	1-yes, 0-no	0.08	0.276888
Private pharmacies		Pharmacies mostly private	1-yes, 0-no	0.76	0.43589
VHI	Exists	The role of VHI/PHI	1-yes, 0-no	0.76	0.43589
	On paper		1-yes, 0-no	0.2	0.408248
	No		1-yes, 0-no	0.04	0.2
Organisation					
Inpatient organisation		Type of inpatient organisation	1-Public (or Quasi-Public), 0-Mixed	0.8	0.408248
Outpatient organisation	Public	Type of outpatient organisation	1-yes, 0-no	0.48	0.509902
	Mix		1-yes, 0-no	0.32	0.476095
	Private		1-yes, 0-no	0.2	0.408248
Regional diversity		Existence of some or almost no regional diversity	1-yes, 0-no	0.6	0.5
Parallel systems		Existence of parallel systems	1-yes, 0-no	0.92	0.276888
Competition of insurance funds	One fund	Competition between funds	1-yes, 0-no	0.56	0.506623
	Multiple funds		1-yes, 0-no	0.12	0.331663
	No funds		1-yes, 0-no	0.32	0.476095
SHI in Communism		Existence of SHI before transition	1-yes, 0-no	0.12	0.331663
Payment or Incentive Structure					
Primary physicians	Salary	Payment of primary physicians	1-yes, 0-no	0.32	0.476095
	Capitation		1-yes, 0-no	0.36	0.489898
	Mix		1-yes, 0-no	0.32	0.476095
Outpatient specialists	Salary	Payment of outpatient specialists	1-yes, 0-no	0.6	0.5
	FFS		1-yes, 0-no	0.24	0.43589
	Mix		1-yes, 0-no	0.16	0.374166
Hospitals	DRG	Payment of hospitals	1-yes, 0-no	0.4	0.5
	Line item		1-yes, 0-no	0.28	0.458258
	Global budgets (other)		1-yes, 0-no	0.08	0.276888
	DRG and per diem		1-yes, 0-no	0.16	0.374166
	DRG, line item, per diem		1-yes, 0-no	0.08	0.276888
Primary care					
GP as gatekeeper	No	GP acts as a gatekeeper to the system	1-yes, 0-no	0.28	0.458258
	On paper		1-yes, 0-no	0.44	0.506623
	Yes		1-yes, 0-no	0.28	0.458258
Patient Orientation					
Payment for dentistry	Private	Payment for dental services - by patients or other sources	1-yes, 0-no	0.4	0.5
	Emergency		1-yes, 0-no	0.16	0.374166
	BBP specified		1-yes, 0-no	0.44	0.506623
Payment for drugs	Private	Payment for outpatient drugs - by patients or subsidised	1-yes, 0-no	0.16	0.374166
	Limited coverage		1-yes, 0-no	0.4	0.5
	Partly		1-yes, 0-no	0.44	0.506623
BBP		The scope of the basic benefit package	1-Comprehensive, 0-Limited	0.6	0.5
Persuasion					
Role of professional organisations	No	The role of professional organisations in decision-making, licensing, etc. (No – organisations do not exist; Minor – exist, but have a very limited role)	1-yes, 0-no	0.08	0.276888
	Minor		1-yes, 0-no	0.64	0.489898
	Big		1-yes, 0-no	0.28	0.458258

CLUSTER ANALYSIS METHODS

Cluster analysis seems to be a simple procedure, however to get more robust results, many characteristics of data and theoretical issues have to be taken into account prior to choosing a method of cluster analysis. Assuming that health care systems can be divided into smaller and broader groupings, it is possible to argue that our clusters are somewhat nested, thus hierarchical cluster analysis has been chosen. It also provides some simplicity of understanding and illustration, and could be the best option in a case of not having an exact theory regarding the number of groupings (which is requirement of *k-means* partitioning cluster analysis[163]).

The linkage rules have to be chosen according to the data type, the sort of clusters we want to distinguish (for example, based on similarity or diversity) and some a-priori knowledge of the theoretical assumptions of groupings. The weighted pair-group average method (WPGMA[164]) has been chosen for our analysis for several reasons. Firstly, it works better than unweighted pair-group average method (UPGMA) in cases where there are significantly different clusters in sizes[165] (and we can expect that some countries can form separate clusters by themselves). Secondly, it can spot outliers better.

As we have different types of data used for the analysis (both categorical and numerical), different distance measures have been used. The first and second cluster analyses were performed using binary data; moreover, the combination (1, 1) was considered to be of more importance than (0, 0), as in all observations '1' stands for 'having the characteristic' and matching according to existing characteristics is deemed to be of higher importance. Thus, data was considered asymmetric and for simplicity the Jaccard[166] measure of similarity was used[167]. The third analysis was performed on mixed data, and the only relevant was found to be the Gower measure of dissimilarity.

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[163] Tan; Steinbach; Kumar. *Introduction to Data Mining*. 2005. p.497-515.
[164] Sneath, P. H. A.; Sokal, R. R. *Numerical taxonomy.* San Francisco: W. H. Freeman & Co. 1973. Referred in StatSoft 2007. [Access: 04.04.2009]
[165] StatSoft. 2007. [Access: 04.04.2009]
[166] Moreover, using other relevant distance measures (e.g. Dice), gave the same results.

CLUSTER ANALYSIS RESULTS[168]

The first and perhaps expected result of the cluster analysis, is the repeated divide in to the biggest two, dissimilar, clusters. Excluding the Balkan states, it is possible to notice that most ex-Soviet countries form one group (the only exception is Moldova), while the new EU members join together in the other cluster. Thus, even according to cluster analysis, there is some difference between post-Soviet and post-Communist.

Table 6. Clustering of the CEE and CIS countries according to structural characteristics of the health care systems as determined by cluster analysis.

1	2	3	4	5
Azerbaijan	Georgia	Russia	Macedonia	Czech Republic
Tajikistan			Slovenia	Slovakia
Turkmenistan			Romania	Estonia
Uzbekistan			Croatia	
Ukraine			Poland	
Kazakhstan			Bulgaria	
Belarus			Hungary	
Albania			Latvia	
Kyrgyzstan			Lithuania	
Armenia			Moldova	

1	2	3	4	5	6
Azerbaijan	Georgia	Russia	Poland	Czech Republic	Macedonia
Tajikistan			Bulgaria	Slovakia	Slovenia
Turkmenistan			Hungary	Estonia	Romania
Uzbekistan			Latvia		Croatia
Ukraine			Lithuania		
Kazakhstan			Moldova		
Belarus					
Albania					
Kyrgyzstan					
Armenia					

All in all, according to the stopping rules (Duda and Hart Je(2)/Je(1) index) we can identify either five or six clusters (Table 6), some of which were unexpected. However, there were some expected results: the least reformed since the fall of the Soviet Union Tajikistan, Azerbaijan, Turkmenistan, Uzbekistan, Kazakhstan have formed one distinct group. It should be stressed once again, that only structural (largely subjective) characteristics have been used for this clustering, and

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[167] Húsek, Dušan; Pokorný, Jaroslav; Řezanková, Hana; Snášel, Václav. *Data Clustering From Documents to the Web*. Project of the Program of the Information Society. Institute of Computer Science. Academy of Sciences of the Czech Republic. 2006. p.7-8.

[168] For cluster analyses details – dendrograms, tests and clusters' separation – see Appendix IV.

moreover no *weighting* have been imposed on any variables (thus none are considered more 'important'), so interpreting the results merits further qualitative comment.

Initiating from these cluster groupings, we tried to critically evaluate them according to other qualitative characteristics, which could not be included in the analysis. Such characteristics included regulation, the strength of regulative framework and empowerment, the use of IT and exchange of information between levels, and other criteria discussed throughout initial exploration.

QUALITATIVE ASSESSMENT

The initial indications from the cluster analysis suggest that there might not be explicitly distinct and balanced groupings. They rather form clusters within clusters, while some countries could not be classified with any other countries (e.g. Russia and Georgia)[169], or pairs could be distinguished (See Figure 21). Thus, we created several 'different-level' and 'different-characteristics' classifications in order to see how different structural characteristics could be influential on health outcomes. Overall, such detailed exploration, which considers above all characteristics not used in the cluster analysis, confirms that, though with some exceptions and changes[170], surely, cluster analysis did identify some structurally similar health care systems.

First, an easily identified group unites Azerbaijan, Turkmenistan, Tajikistan, Kazakhstan and Uzbekistan, joined by a slightly different Ukraine (Sub-Group 1.1). This cluster represents the least reformed health care systems, which remained more or less untouched since transition. Very often the main reforms included renaming, dismissing ministers and other superficial changes. All of these countries are tax-based (even though we didn't include this in the classification procedure, it is still a common feature) with no purchaser-provider split, thus all funds are collected, pooled and distributed by the state, which predominantly is an owner of facilities. All facilities are public, and medical

[169] This has been partially expected, as the reservation for nesting and outliers has been done in cluster analysis methodology.

[170] For example, through qualitative assessment, Estonia was found to be less similar to the countries it was classified with during cluster analysis procedure – Czech and Slovak Republics – than to the other CEE countries.

personnel are salaried, while the hospitals are paid based on line-items[171]. The system is strictly hierarchical and centralised, and with often 'executive style of government', planning is decided by presidential powers, while the *empowerment* of regulations is extremely weak and corrupt. The other particular feature of the systems is a complete lack of management training – this explains the usage of old methods in management and planning. The BBP is very limited (mostly includes only basic primary care) with high official payments, and drugs have to be paid for by patients. Professional organisations do not have a say in the system, international organisations are often active in these countries. Taking primary care into consideration, there is a free choice of provider (which often can not really be exercised by the patients) and GPs do not serve as gatekeepers, the overall quality of PHC is very low and doctors still have very low social status and salaries. Ukraine can also form either a separate model or be united with Sub-Group 1.1 – it has however a 'broader' BBP and comprehensiveness of coverage. It does as well present some differences in a form of less centralised and 'executive' regulation.

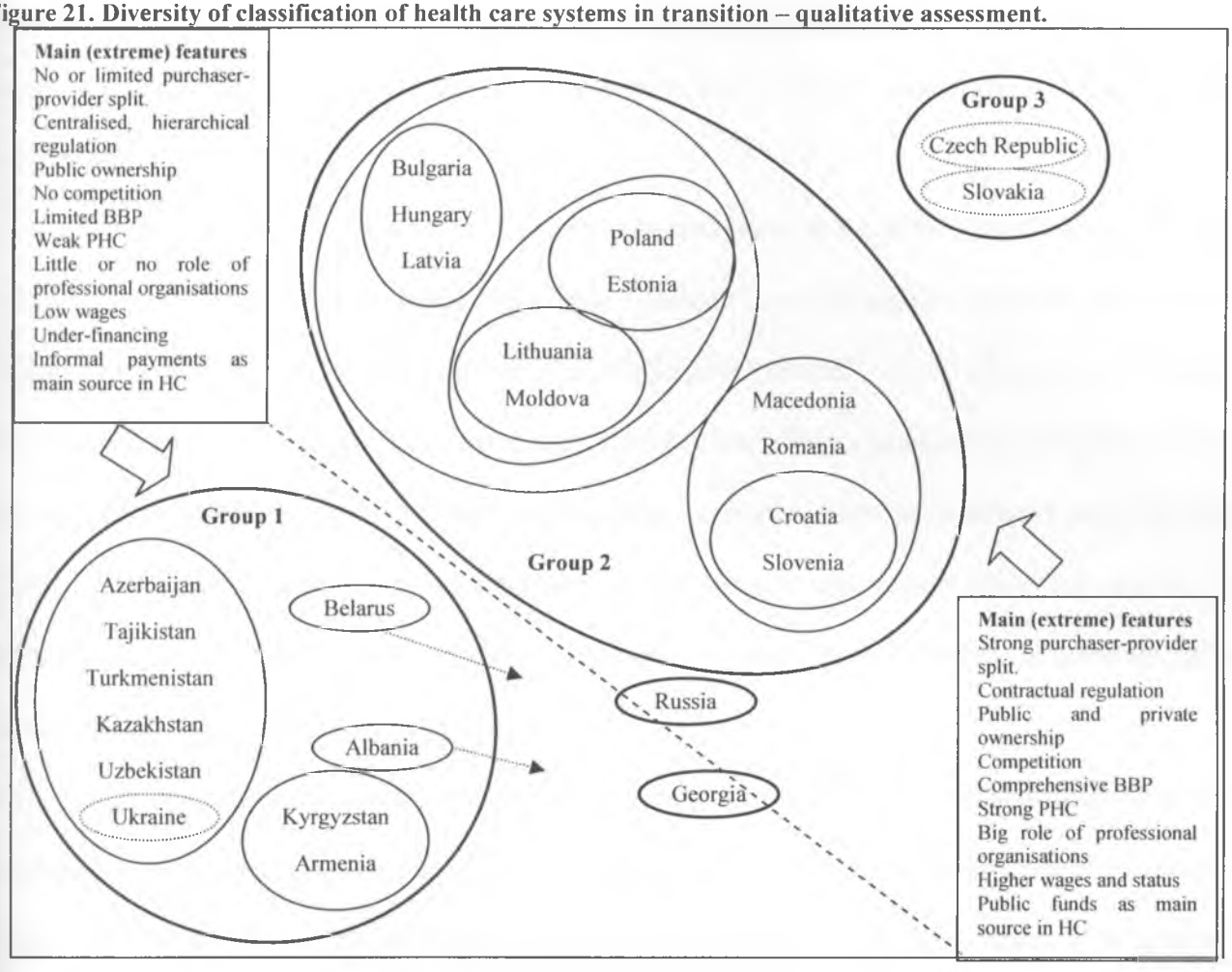
Belarus – in a more broad classification – can join these countries as well. It is similar in terms of not many reforms undertaken, and preserving the same structures as in Soviet times. The major differences of Belarus are, however, a very *extensive* BBP for all population, non-existence of OOP and *universal population coverage*. The doctors are better skilled and paid, more emphasis is paid to prevention and immunisation. It could be argued, that in Belarus the Semashko model preserved without the radical under-financing of the Sub-Group 1.1, and could present a hypothetical development model of Soviet health care, as if transition never happened.

Another pair of countries – Armenia and Kyrgyzstan (Sub-Group 1.2) – represent more differences within this broad group. Both Armenia and Kyrgyzstan – on opposite from Sub-Group 1.1 – have a purchaser-provider split[172], the efficiency of which is questionable. Both have very centralised and hierarchical decision-making and regulation, similar to all other countries in Group 1. They have very narrow BBP packages – limited to primary care – similar to Sub-Group 1.1. They suffer from

[171] Kazakhstan being an exception as it has introduced DRG
[172] Kyrgyzstan has introduced SHI and Armenia has not, it however created the State Health Agency as a single payer.

severe under-financing, and even though contracting is officially in place, the rates for reimbursement and payments are set at the national level and are usually much lower than the real costs of services.

Figure 21. Diversity of classification of health care systems in transition – qualitative assessment.



Albania also presents a separate case from either Sub-Group 1.1 or 1.2, as it introduced the SHI system in 1995, however the Health Insurance Institute is only responsible for medical personnel salaries, thus does not present the full purchaser-provider divide. The regulation there is less hierarchical, but mainly due to the difficult political situation and impossibility to concentrate authorities and power. Nevertheless, most of the characteristics remain similar to many countries discussed above, with slightly more similarities with Sub-Group 1.2. All in all, all of the countries discussed above could be united into a *broad* '***Group 1***'.

The next broad group (***Group 2***) that could be distinguished is the CEE countries (excluding Czech Republic and Slovakia) with Moldova joining them. This group still presents considerable variation within it. The countries are predominantly SHI systems (Latvia is an exception), all with

clear functioning purchaser-provider split and (mostly) strong empowerment of regulation. Inpatient facilities are mostly public, while outpatient – mostly privatised by now. The payment structures to doctors do vary slightly, while the hospitals in all of them are paid through per case system (if we add some degree of simplification). All of these countries provide a universal coverage for their population.

Within this broad group, however, several sub-groups could be easily distinguished. One (Sub-Group 2.1) is formed by Macedonia, Slovenia, Croatia[173] and Romania. They do present some differences as well, but are similar in terms of a "single payer system" – in which most of the finances go through the insurance fund. They have a very strong role of GPs as gatekeepers and primary care in general, and it might be working better than in other countries. State pays directly only for public health and capital investments; relationships in the sector are very contractual (rather than hierarchical), negotiations determine prices, which are only after that controlled by government; and the regulation of volume of services is effective.

The rest of the countries within Group 2 have less strong roles for GPs and more hierarchical regulation – even though contracting is indeed present. Very similar to the Sub-Group 2.1 in terms of "single payer system" are Sub-Groups 2.2 (Estonia and Poland – in accordance with qualitative assessment, contrary to cluster analysis) and 2.3 (Lithuania and Moldova). Estonia and Poland present systems with official *bidding* for contracts and low influence of professional organisations in health care management and decision making. Sub-Group 2.3 is somewhat different from the rest of Group 2 countries. In Lithuania and Moldova, the role of professional organisations is very little. They represent SHI systems with the lowest SHI contributions rates and somewhat combine the characteristics from Group 1. For example, the facilities (contrary to the rest of Group 2 countries) are mostly in public ownership and privatisation hasn't reached even the primary care, only dental services and pharmaceuticals. The organisational structures have predominantly stayed as they were within the

[173] Croatia is the only country in transition region, where even officially patients do not have a free choice of provider and are assigned to PHC practitioner according to geographical proximity. This has to be mentioned, but can not be influential for classification.

Soviet models, with some reforms in primary care. Regulation is more hierarchical, and the role of MoH and central level is significant.

Sub-Group 2.4, formed by Latvia, Hungary and Bulgaria, is similar to Group 2 countries in many characteristics, but presents only partially "single payer system", with some small share of funding transferred directly from taxes. At the same time, bidding for contracts is not allowed and the purchaser has to contract with *all* providers eligible. The role of professional organisations is considerably higher and the MoH transferred the functions of accrediting and licensing to them (Bulgaria is however and exception). All in all, Group 2 can be formed based on many similarities between the countries, while keeping in mind that it contains *considerable* diversity within as well.

The next easily identified group is formed by Czech and Slovak Republics (***Group 3***). They present probably the most liberalised systems since the start of transition, with the highest degree of market elements implemented. Firstly, they are SHI systems with multiple insurance funds: citizens have a free choice of insurance company or provider. Insurance companies contract with providers themselves, thus there is a clear purchaser-provider split. Secondly, they have the highest share of privatised facilities even in the inpatient sector, while outpatient sector is almost completely privatised. Both have very extensive BBP for their population and provide universal coverage. The relationships in the sector are very contractual. Professional organisations are active in contracting, decision-making and licensing, and the membership in them is obligatory. Payment schemes are complex. The doctors have acquired much higher social status and salaries. All in all, this is one of the most distinct groups within the transition area.

The Russian Federation presents a separate case according to many criteria. Both the features of old and new systems are preserved there, as if the reforms were very indecisive, which created a very partially transformed system. It has a comprehensive BBP – similar to Group 2 countries or Belarus. On the one hand, it provides a 'quasi' purchaser-provider split (in the form of multiple insurance funds), on the other hand, medical facilities receive funding (and are partially paid for services) directly from taxes – usually regional. The methods of payments did change – about half of

contracted hospitals expenditure is covered by DRG, some through per diem system, some – line-item budgets. It has very high regional variation within the country itself, which influences accessibility, equity and outcome greatly. Thus, it was considered not to fit in the frames of any other group and had to stand alone.

Georgia is another country that presents considerable variation from any other state – but in a different way than Russia. It does have an official purchaser-provider split (which is questionable); the BBP is very limited – similar to Sub-Group 1.1 with only basic primary care included. Interestingly enough, it has one of the highest shares of HE from GDP (similar to that of Slovenia – 8.5%), but also the lowest public spending (only 0.9% of GDP), thus it presents a health care system with the prevailing OOP as a source of payment. The payment methods are often fee for service – both to physicians (for primary care practitioners it is combined with some capitation) and hospitals. It has undergone some privatisation and the system could be considered quite mixed – uniting both public and private facilities. At the same time, the empowerment of laws and regulations is very weak; it seems the reforms have been taking place on its own – without considerable supervision.

Several remarks should be added before moving to building health production functions. Firstly, *regional diversity* didn't play a major role in classification, as the only country which was found to have significant influence of this characteristic was, of course, the biggest country in the region – Russia. Secondly, according to some characteristics, it was only possible to divide countries in two major groups (with some countries being somewhere in between, but that is difficult to distinguish)[174]. Thirdly, characteristics such as centralisation, regional diversity, use of IT are, by their nature, very subjective and thus of questionable use in aiding our classification.

To sum up all the arguments, we take Figure 21 (which partially derived from and is grounded on the revisited cluster analysis and Table 6) as a basis for creating our final classification. As the strictly defined classification was found impossible to create due to high differences and ambiguities of the health care systems (presence of nested clusters and different levels and sub-levels – as per Figure

[174] For example, having not much information on salaries, the groups could be divided into doctors earning average (or more than the national average), and less.

21), several classifications have to be defined, which will be separately introduced into the models of health production. This can also shed some light on which structural characteristics (by which classifications might differ) are more significant in determining health outcomes in transition countries. Moreover, as cluster analysis, and qualitative analysis techniques are subjective in nature, we need to investigate different versions of possible outputs of them. Thus, taking Figure 21 as a starting point, we carefully provide possible classifications in Table 7, where the 'Broad' classification reflects distinct *'paths' of transitions* and is based on the 'Group' level classification. The paths still resulted in considerable differences, and the 'Detailed' classifications reflect this. In Chapter 4 they will be implemented into the health production functions in an attempt to account for the *structural diversity* of the health care systems in transition.

Table 7. Final classifications of health care systems in transition.

Classification	1	2	3	4	5	6	
Broad/Paths – according to the 'Groups' level or 'Paths' of transition, plus Belarus and Russia	Azerbaijan Tajikistan Turkmenistan Uzbekistan Kazakhstan Ukraine Belarus Albania Armenia Kyrgyzstan	Macedonia Slovenia Romania Estonia Croatia Poland Bulgaria Hungary Latvia Lithuania Moldova	Czech Republic Slovakia	Georgia	Russia		
Detailed 1 – more detailed according to a 'Sub-Group' level	Azerbaijan Tajikistan Turkmenistan Uzbekistan Kazakhstan Ukraine	Armenia Kyrgyzstan	Lithuania Moldova	Hungary Latvia Bulgaria	Czech Republic Slovakia	Russia	M S R
Detailed 2 – according to one of the possible variations at the 'Sub-Group' level	Azerbaijan Tajikistan Turkmenistan Uzbekistan Kazakhstan Ukraine	Armenia Kyrgyzstan Albania	Lithuania Moldova Estonia Poland	Hungary Latvia Bulgaria	Czech Republic Slovakia	Russia	M S R
Detailed 3 – according to 'Sub-Group' level	Azerbaijan Tajikistan Turkmenistan Uzbekistan Kazakhstan Ukraine	Armenia Kyrgyzstan Albania Georgia	Lithuania Moldova	Hungary Latvia Bulgaria	Czech Republic Slovakia	Russia	M S R

CHAPTER 4. TESTING HEALTH PRODUCTION FUNCTIONS FOR TRANSITION COUNTRIES.

Having incorporated structural characteristics into our system groupings in the previous chapter, we now progress to empirically explore the CEE health production functions, controlling – through the inclusion of the groupings – for the diversity of structural characteristics seen across the transition region. Chapter 4 proceeds as follows. First, drawing on the theoretical grounding of health production functions (Chapter 1), the determinants of health are distinguished, the health production function specified and the data are described. Second, the methods used are explained and the models are estimated. In the final section we discuss our results.

DETERMINANTS OF HEALTH AND MODEL SPECIFICATION

It has been discussed earlier, that health is determined by many factors – among which hereditary and individual characteristics typically play the major role. However, while it is impossible to control for these key individual-level determinants using macro level data we are able to shed light on an important range of upstream determinants of human health and in particular, drawing on the previous chapter, are able to assess the importance of the structural characteristics of health care systems. Indeed, in order to analyse the influence of health care systems on health status in transition countries, we necessarily have to account for other factors, beyond the individual, which determine health outcomes. Drawing on the studies discussed in Chapter 1, we can distinguish the following determinants of health: health care systems characteristics, socio-economic (among which societal structure, economic development, political situation are among the most important) and country-specific or regional characteristics. Table 8 summarises the determinants of health, which could be incorporated in our health production function as independent variables.

In a general form, our health production function will be presented as follows:

$$H_{it}=\alpha+\beta_1 HC\ Classification_{it}+\beta_2 HC\ Inputs_{it}+\beta_3 SocioecDeterminants_{it}+Controls_{it}+(u_{it})+\varepsilon_{it},$$

where H_{it} are the health outcomes; $HC\ Classification_{it}$ are the health care structural characteristics dummies (Chapter 3); $HC\ Inputs_{it}$ are the 'numerical' and 'physical' health care inputs, commonly used for proxies of health care systems – health expenditures, number of medical staff, hospital facilities, etc; $SocioecDeterminants_{it}$ are the socio-economic determinants of health (Table 8); and $Controls_{it}$ are controls for time and country-specific effects.

Table 8. Determinants of health.

Non-individual determinants of health		
Health care systems' variables	Structure	Structural classification
	Expenditure	THE per capita, PPP
		Public and private HE as shares of THE
		HE and Public HE (PbHE) as a share of GDP
	Physical resources	Standardised number of medical personnel
		Standardised hospital beds, hospitals, primary health care units
		Private hospital beds as a share of all hospital beds
Socio-economic determinants of health	Economic situation	GDP per capita
		Inflation
		Transition and privatisation indicators
	Political situation	Democratisation
		Civil unrest
	Social structure	Age dependency ratio
	Education	Schooling, Literacy rate
	Lifestyles	Cigarette and alcohol consumption, Smoking
		Fat and calories available
		Fruit, vegetable, meat consumption
	Environment	Air and water pollution

DATA DESCRIPTION

Most data for our health production functions have been collected from the Health for All Database of European Observatory, WHO, supplemented with specific data from World Development Indicators (World Bank), European Bank for Reconstruction and Development (EBRD), Polity IV and Major Episodes of Political Violence (MEPV) from the Centre for Systemic Peace[175]. We have gathered data starting from 1989 till 2007, where they were available, thus creating a cross-country time-series panel dataset. There are data on 25 countries for 17-19 years of transition.

[175] Major Episodes of Political Violence (MEPV) and Conflict Regions, 1946-2008). And Polity IV Project. Political Regime Characteristics and Transitions 1800-2007. Integrated Network for Societal Conflict Research (INSCR). Center for Systemic Peace. http://www.systemicpeace.org/inscr/inscr.htm [Access: 10.04.2009]

The time dimension merits special mention. Countries of CEE and CIS started their transitions at different times, however, all of them had to undergo similar processes of democratisation, liberalisation, privatisation. Thus, it could be considered that some countries had some advantage in their transition. To even up this disparity, we have adopted 'transition years', the years since transition started, to capture the temporal dimension of our models, thus making it possible to compare actual *transition* processes of countries, rather than calendar-based processes. Therefore, for countries in CEE area the 'transition year 1' is 1989, while for countries of CIS and FSR Yugoslavia – 1991. To maintain a balanced panel we thus utilise data covering the periods 1989-2003 and 1991-2005.

DEPENDENT VARIABLES – HEALTH OUTCOMES

As discussed in Chapter 1, there are different proxies available for the complex concept of health. Firstly, the most commonly used are the mortality-based indicators – life expectancy and mortality rates. Among these, *life expectancy at birth(LEB), life expectancy at the age of 45, overall mortality* and *infant mortality* were initially considered in our health production functions, however, for simplicity, we only present LEB across all models. Nevertheless, as we noted in the earlier discussion, even though the data on e.g. LEB is the most reliable (and most available and frequently used), it fails to adequately reflect the quality of life lived and so, we argue, it is important to explore the robustness of the findings through the inclusion of some morbidity-based characteristics.

Therefore, secondly, we include mortality rates and incidences from certain key illnesses as additional proxies for the quality of the health care provision[176]. The choice has been informed by the analysis of health outcomes in Chapter 2, and identifies several groups: (i) communicable and infectious diseases have been increasing in scale in some transition countries – thus *mortality from infectious and parasitic diseases* is considered; (ii) non-communicable diseases form a major challenge since 1960-70's – thus *mortality rates from ischaemic heart diseases* are also included; (iii) to address the problems of reproductive and sexual health, *maternal mortality*; (iv) last, but not least, it can be argued that in many countries in transition the deterioration of health care caused the worsening of

[176] As the DALE and similar indicators are not available for more than four years, we had to look for some alternatives.

prevention and vaccination services and so the *incidence of hepatitis B* is included as a health outcome in our health production function. Hepatitis B is an illness which could be prevented with vaccination and is included in the list of essential childhood immunisations worldwide by WHO[177] (See Table 9).

Table 9. List of dependent variables and descriptive statistics (HfA Database WHO).

Variable		Mean	Std. Dev.	Number of obs.	Description
LEB	overall	70.63998	2.960731	428	Life expectancy at birth, in years
	between		2.718489	25	
	within		1.368608		
LEB, male	overall	66.45673	3.559264	428	Life expectancy at birth, in years, male
	between		3.254749	25	
	within		1.595456		
LEB, female	overall	74.85126	2.630358	428	Life expectancy at birth, in years, female
	between		2.515748	25	
	within		1.114816		
MM	overall	28.64322	22.22797	454	Maternal mortality (Maternal deaths per 100000 live births)
	between		17.89263	25	
	within		13.59456		
SDR, infectious	overall	17.2071	14.87577	420	SDR, infectious and parasitic disease, all ages per 100000
	between		15.36489	25	
	within		5.838889		
Syphilis, incidence	overall	31.07814	49.18891	456	Syphilis incidence per 100000
	between		33.64863	25	
	within		36.05013		
Hepatitis B, incidence	overall	17.79014	21.92946	430	Viral hepatitis B incidence per 100000
	between		13.69144	25	
	within		17.30372		
SDR, ischaemic heart, 0-64	overall	81.25549	33.18646	421	SDR, ischaemic heart disease, ages 0-64, per 100000
	between		31.51317	25	
	within		13.74754		

INDEPENDENT VARIABLES – DETERMINANTS OF HEALTH

There is a rich literature pinpointing the determinants of health outcomes. For this research we cull the most common 'causal' factors, across a range of social, political, economic and health system categories, and seek to incorporate them in our analysis.

Socio-economic factors

It is well-established that the socio-economic situation and economic development have strong connections with health (sometimes not straightforward or one-way[178]). One of the most widely-used

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[177] Immunization against diseases of public health importance. Fact sheet 288. March 2005. World Health Organisation. http://www.who.int/mediacentre/factsheets/fs288/en/index.html [Access: 30.04.2009]

[178] This was well documented in different research. E.g. Deaton, Angus. *Global Patterns of Income and Health: Facts, Interpretations, and Policies.* Working Paper 12735. National Bureau of Economic Research. Cambridge. 2006. http://www.nber.org/papers/w12735; Sala-i-Martin, Xavier. On the Health-Poverty Trap. In Lopez-Casasnovas, Guillem; Rivera, Berta; Currais, Luis. *Health and Economic Growth: Findings and Policy Implications*. MIT Press. 2007.

proxies for economic development is *GDP per capita*. For our health production function we take the logarithmic value of GDP per capita from the WB WDI database, available for all years. For our data as expected we can observe strong positive correlation between LEB and GDP (Figure 22). The stability of the macroeconomic environment is another key economic factor shown to be important for development[179] within the transition countries we therefore include, as a proxy, the logarithm of *inflation.* Looking at the data for transition countries shows – as predicted – negative correlation between LEB and inflation (Figure 23). The variable on *trade and foreign exchange (Forex)* from the EBRD transition indicators has also been implemented in the models as a proxy for liberalisation and financial development and the other half of the 'stabilisation-liberalisation' reform packages, introduced in the early stages of transition.

Figure 22. LEB and GDP (log) in transition countries

Figure 23. LEB and inflation (log) in transition countries

Liberalisation reform and privatisation is also used and argued to be important by for example, Stuckler, King and McKee[180]. They however miss the importance of the other societal factors, which determine health of individuals and are becoming increasingly important in the transition area, – *lifestyle factors*. During communist times a 'healthy lifestyle' was not considered a requirement of good health, and moreover historically many of the countries under consideration have endured a

[179] Gerry, Christopher J.; Lee, Jong-Kyu; Mickiewicz, Tomasz M. *Macroeconomic Stability, Governance and Growth: Empirical Lessons from the Post-Communist Transition.* Economics Working Paper No. 89. UCL SSEES. Centre for the Study of Economic and Social Change in Europe. 2008.

[180] Stuckler, David; King, Lawrence; McKee, Martin. Mass privatisation and the post-communist mortality crisis: a cross-national analysis. *The Lancet.* Vol. 373. Iss. 9661. 2009. pp.399–407.

growing problem of alcoholism. We include *availability of fruits and vegetables*, which is quite significantly correlated with health outcomes (Figure 24)[181].

The environment, which an individual is living in, is of crucial importance for human health, especially for the spread of non-communicable diseases. Thus, a possible proxy for pollution – *CO_2 emissions* –could be included (Figure 25). It was however found to be very strongly correlated with the GDP, thus was not included into the estimation, as could significantly alter results. It could be argued, that the better economically developed countries in transition area, also are more polluted.

Figure 24. LEB and fruit consumption in transition countries

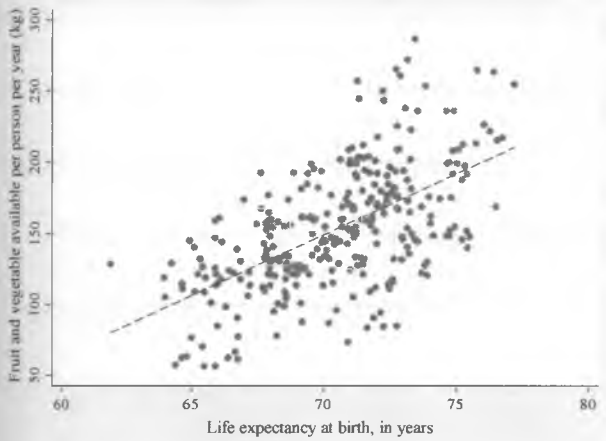

Figure 25. LEB and CO_2 emissions in transition countries

In the time of population ageing, such societal characteristics as age *dependency ratio* or the *percentage of adults older than 65*, play a significant role. This has a direct impact on the overall health of the nation (older people usually experience more problems with health) and on health care systems themselves as well – as the dependants are usually funded through taxation by the working age employed people. It was not however included into the model estimation as was found to be very highly correlated with the GDP, which in itself could be an overall proxy for 'development' – thus somewhat reflect the age dependency ratio as well. Besides, the real age-dependency ratio in most countries is different (higher) as the retirement age is 55-60 years and not 65.

[181] We have experimented with alcohol and cigarette consumption on the initial stages, but they both of the indicators were not significant or changed any of the models, thus were not included in the estimations in the end.

Political Factors

It was argued in Chapter 3 that the political situation influences policies – both in health care and overall, and thus could have an effect on health. We use '*polity*' – measured on a scale between democracy and autocracy – taken from the Polity IV Project of the Centre for Systemic Peace, as a proxy for democracy. Besides this, transition also resulted in violent confrontations and conflicts in some countries – which besides influencing the health care systems (through destruction of facilities, worsening of decision making in general, lack of attention paid to health care issues), also affect the health of population. Therefore, a proxy, also taken from the Centre for Systemic Peace on the *major episodes of political violence* (MEPV) in the form of interstate and internal violence, was included into the model estimation in order to better account for political changes in the area.

Health Care Systems Characteristics

For 'classical' health production function the health expenditures (total, public, private, per capita) and physical characteristics of health care systems (number of medical personnel, hospital beds, average length of stay, outpatient contacts per year, etc.) are normally used as health care inputs. In that spirit, we also look to include those features in our modelling. To do so, we chose a characteristic which could reflect the composition of the inpatient care, and one more to account for outpatient. We argue that, because of the 'target' driven production approach of the Soviet Union, the number of hospital beds and doctors are a particularly difficult issue in the transition are, thus the more 'qualitative' characteristics were chosen: the *average length of stay* (Figure 26) as a proxy for inpatient services and the *number of outpatient contacts* per person per year – for outpatient (Figure 27)[182]. Both of these indicators are deemed to be endogenous.

Health expenditures have to be discussed separately. Due to unavailability of data, the variables of health expenditure could not be included in our health production function. Firstly, doing so would narrow our analysis to only seven years (1998-2005), which would result in losing seven to nine of the first years of transition – probably the most crucial for transition in many ways. Secondly, knowing of

[182] For more figures, see Appendix V.

this obstacle, we have incorporated the health expenditures and public health expenditures as shares of GDP in the cluster analysis and classification in Chapter 3 – this way trying to partially account for HE and at the same time considering public-private mix a structural characteristic as well. Further, to check these assumptions, we run the regressions of health production functions (as we describe below) on the same set of countries but limiting years to 1998-2005 (or transition years 8-14). This procedure ensured that the results of regressions including separately either HE (as a share of GDP and public HE as a share of GDP) or one of the created classifications, are consistent and very similar, with significant variables keeping the same sign and having only minor differences in coefficient values (See Appendix VI, Table 1 for details). Following this, we assume our health care classification to be a possible proxy not solely for qualitative characteristics, but private-public mix as well, thus partly justifying our exclusion of health care expenditures from the health production functions – due to a severe lack of data and in order not to duplicate the effect. The HE in real terms (e.g. per capita PPP dollars) could not be incorporated into health production functions either – they were strongly correlated with GDP and thought to change the same way as the GDP per capita.

Figure 26. LEB and ALOS in transition countries

Figure 27. LEB and outpatient contacts in transition countries

The four classifications created in Chapter 3 are incorporated in the models separately one by one; each group in classifications 1, 2, 3 and 4 is created as a dummy variable (affiliation with one of the groups is equal to 1, otherwise – 0). These dummy variables are imposed for all years of transition, with an assumption that the final structure of the health care systems is the one the country has been reforming towards, thus assuming the reforms to be in line with these classifications.

The classifications reflect the structural differences between the countries. They have also been made at different levels of similarity or dissimilarity, thus presenting more broad (least similar within groups) classification and more detailed ones (uniting a smaller amount of countries, which are more similar). The 'broad classification' (Classification 1) separates countries into five groups, while Classification 2 is the most detailed – comprising of 11 groups. Classifications 3 and 4 both consist of 9 groups, separated according to different characteristics. Classification 3 distinguishes Georgia as a separate group, while Classification 4 unites it with the next most similar group comprising of Armenia, Kyrgyzstan and Albania, but separates Estonia and Poland on the one hand and Lithuania and Moldova on the other – into two different groups.

Classification 1 is presented with descriptive statistics as an example in Appendix V. The overall descriptions and statistics of the independent variables are provided in Table 10.

Table 10. List of independent variables and descriptive statistics. (HfA Database WHO, if not otherwise stated).

Variable		Mean	Standard Deviation	Number of obs.	Description
Health care systems characteristics					
Group 1,2 ...					Dummy variables. Affiliation with one of the groups in classification of health care systems.
ALOS	overall	12.43354	2.986282	424	Average length of stay, all hospitals
	between		2.152143	25	
	within		2.093966		
Outpatient contact	overall	7.138622	3.314615	450	Outpatient contacts per person per year
	between		3.17957	25	
	within		1.116477		
HE as % of GDP	overall	6.1745	1.282233	200	Total health expenditure as % of gross domestic product, WHO estimates
	between		1.205664	25	
	within		0.491556		
THE per capita	overall	483.87	392.4366	200	Total health expenditure, PPP$ per capita, WHO estimates
	between		381.9525	25	
	within		115.1106		
PbHE	overall	58.6305	20.9077	200	Public sector health expenditure as % of total health expenditure, WHO estimates
	between		21.0092	25	
	within		3.35727		
PrHE	overall	41.3695	20.9077	200	Private sector expenditure on health as % of total health expenditure, WHO estimates
	between		21.0092	25	
	within		3.35727		
Socio-economic and political determinants of health					
GDP (log)	overall	8.516426	0.834129	436	Logarithm of GDP per capita, PPP (current international $) (WB WDI)
	between		0.769095	25	
	within		0.32055		
Inflation (log)	overall	2.516712	1.76856	341	Logarithm of inflation per annum (WB WDI)
	between		0.805485	23	
	within		1.584001		
Forex	overall	3.115368	1.287817	475	Transition of trade and forex system (EBRD transition indicators)
	between		0.834272	25	
	within		0.994431		
Fruit	overall	152.1077	42.72242	312	Average amount of fruits and vegetables available per person per year (kg)
	between		36.49333	25	
	within		23.28529		
Polity	overall	3.176221	6.425742	471	Polity score. Scale: from -10 (strongly autocratic) to +10 (strongly democratic) (Polity IV)
	between		5.633868	25	
	within		3.275874		
Violent conflict	overall	0.329466	1.051263	431	Total magnitudes of violence: interstate and societal. Scale: from 0 to 10. (MEPV).
	between		0.670053	25	
	within		0.823519		

HEALTH PRODUCTION FUNCTIONS MODELS ESTIMATION

STEP I – CLASSIC HEALTH PRODUCTION FUNCTIONS

We started with estimating five distinct but related health production functions using as dependent variables: LEB, MM, SDR ischaemic heart disease, SDR infectious diseases and hepatitis B incidence; and introducing explanatory variables in a step-wise manner: first, economic and developmental characteristics; second, lifestyles and political indicators, and thirdly, health care 'physical' characteristics.

We can not be sure whether the individual country effects are correlated or not to the other regressors in the models, thus all of the models were estimated using *both* the random effects *and* fixed effects regressions (with control dummies for transition years and controlling for clustering of the country specific effects). After that, for all the random effects models the Breusch and Pagan Lagrange[183] multiplier was calculated, followed by the Hausman specification tests[184] (Table 11–Table 14).

Following this procedure, most of the models were specified with the random effects assumptions, with the exception of final models using LEB and SDR infectious diseases as dependent variables, in all the rest – the null hypothesis of individual effects not being correlated with the regressors was not rejected. However, as the Hausman test is only asymptotically valid, it has not been possible to carry it out for all intermediate models. In the final specifications, only in the models with the SDR ischaemic heart diseases and hepatitis B incidence as dependent variables were the time effects significant.

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[183] Greene, William H. *Econometric analysis*. Ed.5. Prentice Hall. 2002. pp.297-298
[184] Ibid. pp. 301-303

Table 11. Classical health production function models estimation. Dependent variable: life expectancy at birth (LEB). Reporting coefficients and standard errors.

Life Expectancy at Birth (LEB)						
	RE	FE	RE	FE	RE	FE
GDP (log)	**1.091765*** **	**1.079395*** **	**1.001065*** **	**1.307677*** **	**0.9039605** **	**1.012158*** **
	0.360586	0.410146	0.35107	0.485718	0.361397	0.504626
Inflation (log)	**-0.0940558** **	**-0.0900888** **	**-0.03183**	**-0.02754**	**-0.02112**	**-0.02256**
	0.043822	0.04383	0.048572	0.0448489	0.047974	0.043276
Forex	**-0.2854015** **	**-0.3152193*** **	**-0.2226873***	**-0.3124599*** **	**-0.2674322** **	**-0.3762582*** **
	0.116832	0.117513	0.126701	0.119528	0.127628	0.118253
Fruit	–	–	**0.003954**	**0.000587**	**0.0042605***	**0.001738**
			0.002667	0.00261	0.00261	0.002542
Polity	–	–	**0.0392952***	**0.032729**	**0.0368978***	**0.0334191***
			0.021126	0.020115	0.02071	0.019338
Violent conflict	–	–	**-0.2792861*** **	**-0.2904836*** **	**-0.2983659*** **	**-0.293387*** **
			0.067266	0.062541	0.066819	0.061256
ALOS	–	–	–	–	**-0.2336442*** **	**-0.1453832** **
					0.064659	0.064631
Outpatient contacts	–	–	–	–	**-0.1934836*** **	**-0.2394669*** **
					0.05758	0.061865
Constant	**61.13237*** **	**61.12687*** **	**62.47556*** **	**60.35984*** **	**68.10163*** **	**66.73183*** **
	3.121275	3.519575	3.042867	4.115621	3.370574	4.574096
Time effects	Yes***	Yes***	Yes***	Yes***	Yes	Yes
R2	0.1719	0.1644	0.28	0.2024	0.4619	0.3881
Number of observations	302	302	240	240	234	234
LM[185]	1245.84 (p=0)		549.64(p=0)		492.31 (p=0)	
Hausman[186]		3.16 (p=1.0)		–		111.09 (p=0)

Table 12. Classical health production function models estimation. Dependent variable: maternal mortality (MM). Reporting coefficients and standard errors.

Maternal Mortality (MM)						
	RE	FE	RE	FE	RE	FE
GDP (log)	**-12.42868*** **	**-7.724103***	**-9.304463*** **	**-1.50173**	**-9.647549*** **	**-0.66469**
	1.897562	4.246776	2.845839	5.790063	3.711547	6.206288
Inflation (log)	**-0.15836**	**-0.50247**	**-0.45046**	**-0.48397**	**-0.50671**	**-0.49618**
	0.519394	0.492046	0.536602	0.534627	0.533975	0.53224
Forex	**-0.48439**	**-0.51239**	**-1.09258**	**-1.08327**	**-0.81794**	**-0.41947**
	1.285475	1.336448	1.3618	1.42485	1.410546	1.454369
Fruit	–	–	**-0.0855976*** **	**-0.077887** **	**-0.0761079*** **	**-0.0832872*** **
			0.027581	0.031108	0.028543	0.031268
Polity	–	–	**-0.22309**	**-0.13109**	**-0.21713**	**-0.15531**
			0.223557	0.239787	0.228047	0.237831
Violent conflict	–	–	**-0.2866**	**-0.37433**	**-0.3211**	**-0.51016**
			0.734771	0.745526	0.740017	0.753373
ALOS	–	–	–	–	**0.172523**	**0.355023**
					0.69872	0.794888
Outpatient contacts	–	–	–	–	**0.74271**	**2.082592*** **
					0.612119	0.760868
Constant	**132.4771*** **	**94.822*** **	**121.8265*** **	**54.82014**	**115.3421*** **	**26.61299**
	17.2061	36.3088	25.61267	49.0608	34.90258	56.25588
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.3747	0.3367	0.4475	0.3022	0.3682	0.3253
Number of observations	324	324	240	240	234	234
LM	844.28(p=0)		469.07(p=0)		375.09 (p=0)	
Hausman		–		5.23 (p=0.99)		15 (p=0.8621)

[185] Hereafter LM – Lagrange Multiplier of Breusch and Pagan – chi-squared and p-values reported

[186] Hereafter Hausman is the specification test by Hausman on "the orthogonality of the random effects and the regressors" – chi-squared and p-values reported

Table 13. Classical health production function models estimation. Dependent variable: SDR infectious diseases. Reporting coefficients and standard errors.

SDR, infectious diseases						
	RE	FE	RE	FE	RE	FE
GDP (log)	**-10.31722*** **	**-11.03255*** **	**-8.509367*** **	**-10.06308*** **	**-1.613618***	**-11.83899*** **
	1.755123	2.047579	1.333685	2.005229	0.909394	2.185979
Inflation (log)	**0.228983**	**0.222283**	**0.027939**	**0.019867**	**0.7978344** **	**0.038689**
	0.202048	0.207304	0.194119	0.182602	0.37877	0.183348
Forex	**1.050728***	**1.06691*** **	**0.984639***	**1.141456** **	**2.581536*** **	**1.478329*** **
	0.546455	0.564702	0.505939	0.488463	0.797414	0.502387
Fruit	–	–	**-0.0312832*** **	**-0.0168**	**-0.1074981*** **	**-0.01744**
			0.010613	0.010707	0.012519	0.010877
Polity	–	–	**0.034454**	**0.122253**	**-0.3753065*** **	**0.105961**
			0.08389	0.081853	0.103355	0.081919
Violent conflict	–	–	**0.7513567*** **	**0.7455973*** **	**0.322993**	**0.6309044** **
			0.268242	0.254399	0.429035	0.259603
ALOS	–	–	–	–	**1.833388*** **	**-0.44467**
					0.254492	0.276723
Outpatient contacts	–	–	–	–	**-0.8630655*** **	**0.6755633** **
					0.178947	0.262173
Constant	**98.3692*** **	**105.0214*** **	**90.34747*** **	**101.9427*** **	**16.34098**	**116.9998*** **
	15.24572	17.66519	11.61048	16.9871	11.5892	19.8564
Time effects	Yes	Yes	Yes	Yes	Yes***	Yes
R2	0.2853	0.2858	0.3703	0.2924	0.6814	0.3457
Number of observations	295	295	236	236	230	230
LM	1200.43(p=0)		528.64(p=0)		373.79(p=0)	
Hausman		0.60(p=1.0)		283.73(p=0)		34.31 (p=0.04)

Table 14. Classical health production function models estimation. Dependent variable: SDR ischaemic heart disease. Reporting coefficients and standard errors.

SDR, ischaemic heart disease						
	RE	FE	RE	FE	RE	FE
GDP (log)	**-73.82366*** **	**-77.96662*** **	**-54.95013*** **	**-65.60684*** **	**-57.70686*** **	**-70.00658*** **
	15.55098	19.25422	13.25893	21.69462	10.73617	23.4772
Inflation (log)	**-0.66628**	**-0.78735**	**0.119361**	**0.960491**	**-4.6015**	**0.81233**
	1.980839	1.949367	2.519885	1.975575	4.471707	1.969135
Forex	**-8.867916***	**-6.79549**	**-15.26357*** **	**-3.13458**	**-42.03176*** **	**-0.49142**
	5.324706	5.310125	6.408884	5.284693	9.414157	5.395587
Fruit	–	–	**-0.15374**	**0.1937502***	**-0.9452812*** **	**0.138498**
			0.129807	0.115834	0.147792	0.11682
Polity	–	–	**-1.61519**	**-1.472919***	**4.053888*** **	**-1.52807***
			1.047422	0.885565	1.220196	0.879802
Violent conflict	–	–	**-0.64139**	**0.124229**	**-7.02799**	**0.244976**
			3.44655	2.752353	5.065132	2.788115
ALOS	–	–	–	–	**20.21469*** **	**1.954314**
					3.004493	2.971979
Outpatient contacts	–	–	–	–	**4.037761***	**6.330882** **
					2.112623	2.815711
Constant	**912.1002*** **	**949.8242*** **	**789.9013*** **	**814.8787*** **	**684.754*** **	**767.5384*** **
	134.4977	166.1129	119.4921	183.7839	136.8205	213.2557
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.2799	0.2684	0.3792	0.1829	0.6960	0.3861
Number of observations	295	295	236	236	230	230
LM	1074.48(p=0)		316.58(p=0)		305.51(p=0)	
Hausman		–		–		–

Except for the model with hepatitis B incidence[187] as a dependent variable, all the rest of the models prove the expected significance of GDP for health: the higher the GDP per capita, the better are health outcomes in the country. With the exception of SDR infectious diseases, inflation is mostly insignificant in the models. Besides, while the signs change from model to model (being mostly though insignificant), in the case of SDR infectious diseases it has an expected sign: the increasing inflation is negative for that health outcome. This could be explained through the overall worsening of the economic situation when inflation is rising, thus in general the sanitary conditions become worse, and treatment and prevention – expensive.

The relationship between health and trade and foreign exchange transition indicator is often significant but very inconsistent between the models. While it is negative for some health outcomes (LEB, SDR infectious diseases), it is positive for others (SDR ischaemic heart diseases, MM). This result was found to be intriguing and very difficult to interpret. However, it could be the case, that adding some regional variables would make these results more as expected, as for example, LEB is comparatively high in the Asian CIS, while the liberalisation is rather low – thus regional peculiarities might disturb the results. The most straightforward and expected (and mostly significant) is the positive influence of fruit and vegetable consumption on health, thus it only further proves the already recorded facts of the importance of lifestyles on health – even at macro-level research.

The variables for policy and violent conflict also present differences and ambiguities across models. In most cases the more democratic polity gives – as expected – better health outcomes (for example, LEB, MM, SDR infectious diseases), however in the case of SDR ischaemic heart diseases the polity has a significant negative impact on health. This could be explained through the rapid democratisation reforms causing higher stress, as well as simply better data collection in more democratic societies. Violent conflicts turned out to be in general insignificant, but have expected sign in the cases where they are significant (negative effect on LEB).

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[187] In this model, most of the independent variables used were found insignificant, thus it is not presented here, neither the results are discussed. The model is presented in the Appendix VI, Table 2 for further reference. It is suggested that other factors might influence the incidence of hepatitis B.

In terms of health care characteristics – though not always consistent, but in general – the higher average length of stay as a characteristic of health care system is having a negative impact on health. The same could be said about the outpatient contacts (with the exceptions of SDR infectious diseases) – it has negative effect on health status, and could be understood through the inefficient use of the health care systems resources. Thus, it takes one system use up more resources to achieve similar health outcomes with another system.

Step II – Implementing Health Care Systems Classifications

Following the brief consideration of the intermediate results of the 'classic' health production functions, the health care systems classifications created in Chapter 3 have been implemented into them. By doing so we, firstly, want to see if the previously achieved results hold or change; and secondly, how they change if they do. Classifications are dummy time-invariant variables of affiliation with certain group within classification. In order to eliminate perfect multicollinearity one group in all classifications was deliberately excluded from the regressions. The group consisting of Czech and Slovak Republics has been chosen for this purpose as it does not change throughout different classifications and provides the most stable baseline to compare other groups with.

As the classification variables are time-invariant, it was no longer possible to use the fixed effects regressions and test them against the random effects models, thus the latter was used. For simplification, only to the final 'classical' health production functions were the classifications added. Adding the dummy classification variables was in essence using the least squares dummy variable model with clustering of the dummy variables in a certain way – thus introducing some restrictions (the results are presented in Table 15 –**Table 16** only for Classifications 1 and 4 for the further explained reasons of simplification of output, while the rest of the tables are available in the Appendix VI, Tables 3–4).

Table 15. Health production function models estimation–Classification 1. Reporting coefficients and standard errors.

	LEB	MM	SDR infectious	Hepatitis B incidence	SDR ischaemic heart
GDP (log)	1.055353***	-8.926215***	-2.323332**	-4.907009***	-64.44196***
	0.25938	2.092247	0.997629	1.467286	11.92708
Inflation (log)	-0.2016263***	1.200855	0.497032	0.390412	-6.167871**
	0.093172	0.75156	0.358266	0.53864	4.28322
Forex	-0.1812	2.073309	3.678234***	-1.20971	-27.33231***
	0.212572	1.714677	0.817251	1.255489	9.770584
Fruit	0.0260431***	-0.1671083***	-0.1143572***	-0.0826497***	-0.8801128***
	0.003185	0.025691	0.012226	0.018538	0.146166
Polity	0.016876	-0.4444645*	-0.253479**	0.25719	3.217448**
	0.029242	0.235878	0.112224	0.158977	1.341686
Violent conflict	0.2684116**	-1.849742*	0.452848	-1.608957**	-2.98748
	0.120518	0.972137	0.462179	0.654419	5.525548
ALOS	-0.3632028***	-0.19347	1.609847***	-0.32286	21.98231***
	0.067181	0.541908	0.257793	0.423653	3.082028
Outpatient contacts	-0.2573419***	-0.7827736*	-0.33787	-0.32479	13.03135***
	0.058602	0.472703	0.225381	0.417637	2.694523
Group 1	-4.062153***	5.408059	11.86525***	0.961839	115.9375***
	0.723009	5.832039	2.773505	4.532952	33.15845
Group 2	-4.996481***	4.594224	9.340201***	5.359103	133.6642***
	0.591433	4.770701	2.268719	3.893099	27.12351
Group 4	-4.38659***	18.50641**	2.784357	-8.75952	207.7917***
	0.988223	7.971345	3.969098	6.190685	47.45228
Group 5	-7.895259***	27.74959***	10.46841***	24.47851***	86.16592**
	0.801768	6.467336	3.075833	4.697905	36.77292
Constant	69.59157***	126.1312	14.15133	83.00533***	489.3778***
	3.310407	26.70288	12.7109	18.74822	151.9644
Time effects	Yes	Yes	Yes**	Yes	Yes***
R2	0.7602	0.5932	0.7296	0.4796	0.7354
Number of observations	234	234	230	209	230

Group 1	Group 2	Group 3	Group 4	Group 5
Azerbaijan	Macedonia	Czech Republic	Georgia	Russia
Tajikistan	Slovenia	Slovakia		
Turkmenistan	Romania			
Uzbekistan	Estonia			
Kazakhstan	Croatia			
Ukraine	Poland			
Belarus	Bulgaria			
Albania	Hungary			
Armenia	Latvia			
Kyrgyzstan	Lithuania			
	Moldova			

Table 16. Health production function models estimation–Classification 4. Reporting coefficients and standard errors.

	LEB	MM	SDR infectious	Hepatitis B incidence	SDR ischaemic heart
GDP (log)	0.8541764**	-7.301564***	-2.845603**	-4.862037***	-14.55283
	0.347461	2.632748	1.211333	1.879821	15.30417
Inflation (log)	-0.2182976**	1.020338	0.54312	0.326891	-0.27053
	0.096532	0.731433	0.336974	0.529036	4.257383
Forex	0.11238	-3.72995*	2.243123**	-1.93224	-43.83966***
	0.270348	2.048459	0.943171	1.433757	11.91617
Fruit	0.0248284***	-0.2365226***	-0.1104228***	-0.0396677**	-0.8339718***
	0.003535	0.026786	0.012564	0.020049	0.158733
Polity	0.047739	-0.5140715**	-0.4469498***	-0.01902	0.833147
	0.033476	0.253647	0.117283	0.171995	1.481777
Violent conflict	0.3095181**	-3.168513***	-0.4795873	-1.949215***	-4.25534
	0.125806	0.953249	0.438508	0.635827	5.540177
ALOS	-0.3492007***	-1.04042	1.005108***	0.232416	24.32207***
	0.086652	0.656575	0.302574	0.515923	3.822761
Outpatient contacts	-0.260907***	-0.6113	0.087664	0.7396214*	11.88396***
	0.062218	0.471435	0.217618	0.407787	2.749418
Group 1	-3.851473***	7.915219	16.95667***	5.564287	105.8361***
	0.742807	5.628331	2.588307	4.301391	32.70108
Group 2	-4.277512***	13.37924*	11.19382***	7.669459	200.8404***
	1.007711	7.635538	3.516344	5.656318	44.42605
Group 3	-4.939004***	5.953524	11.58284***	8.415169**	222.1846***
	0.73937	5.60229	2.576543	4.105464	32.55245
Group 4	-5.501282***	7.589494	9.987035***	15.30623***	143.1571***
	0.658165	4.986985	2.29342	4.201744	28.97543
Group 6	-7.743831***	29.20528***	15.1687***	28.24414***	63.04403*
	0.812429	6.155866	2.8337	4.488153	35.80141
Group 7	-4.622606***	14.10402**	13.77163***	9.072379**	108.089***
	0.74617	5.653809	2.600126	4.316095	32.8504
Group 8	-2.778459***	-16.35019**	1.062122	-4.21428	65.19801
	0.977282	7.404971	3.407482	5.130592	43.05067
Group 9	-5.032381***	-1.46222	9.266018***	20.48769***	144.2794***
	0.772639	5.854371	2.713877	4.448518	34.28755
Constant	71.86964***	139.2485***	22.50425	52.6302***	3.581556
	4.221383	31.98589	14.72726	19.83103	186.0665
Time effects	Yes	Yes	Yes*	Yes	Yes***
R2	0.7683	0.6531	0.7844	0.5608	0.7644
Number of observations	234	234	230	209	230

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9
Azerbaijan	Armenia	Lithuania	Hungary	Czech	Russia	Macedonia	Belarus	Estonia
Tajikistan	Kyrgyzstan	Moldova	Latvia	Republic		Slovenia		Poland
Turkmenistan	Albania		Bulgaria	Slovakia		Romania		
Uzbekistan	Georgia					Croatia		
Kazakhstan								
Ukraine								

However, we found that dealing with classifications' dummies is not straightforward and as the measures of the variables are very different (including logarithmic values, standardised quantities and dummy variables), it is quite difficult to understand, how important are all the explanatory variables, and especially the classifications' variables, in explaining changes in health outcomes. Thus, for simplification, the standardised beta coefficients were also calculated for all groups in all classifications (See Appendix VI, Tables 5–8). Beta coefficients are measured by standard deviations[188], not the original measuring units, thus are more explicit in portraying the effect of independent variables on the dependent – we refer to these in our discussion below.

RESULTS AND DISCUSSION

The most straightforward results of the relationships between the socio-economic determinants and health were presented by GDP and lifestyle indicators. In all models (including all classifications) both GDP per capita and fruit and vegetable consumption have positive influence on health, and are significant. These results were expected and already well documented by previous research: lifestyle does matter for health status and is the next most important determinant of health after individual hereditary characteristics[189], and economic development and health have a complex but strong interconnection. What is interesting, adding classifications makes the fruit and vegetable consumption significant in *all* models, proving the importance of lifestyle factors for the groups of classifications as well.

The rest of health determinants present quite intriguing results. Inflation mostly has negative influence on health status, with the exception of SDR ischaemic heart diseases, when rising inflation reduces these death rates – it is however mostly insignificant. Forex is another indicator with quite an ambiguous effect on health status. While insignificant for LEB, MM and hepatitis B incidence, it has consistently significant positive relationship with SDR infectious diseases (i.e. negative for the health

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[188] Wooldridge, Jeffrey M. *Introductory econometrics: a modern approach.* Ed.2. South-Western College Publications.2003. p.183–184.

[189] Figueras; McKee; Cain; Lessof. *Health systems in transition: learning from experience.* 2004. p.136-138

status) and – opposite – negative with SDR ischaemic heart disease (i.e. positive for health). One of the explanations could be in liberalising collection of information – thus the better developed and liberalised countries report more accurate infectious diseases rates[190]. At the same time liberalisation could influence the ischaemic heart disease reduction through improvement of services and ease of every day interactions.

Political indicators also do not have a straightforward link with health. While more democratic polity is significant for reducing maternal mortality and SDR from infectious diseases, it seems to have an opposite effect on SDR ischaemic heart diseases, mostly insignificant though. Violent conflicts have a completely unexpected relationship with health outcomes. Originally it was logically expected that wars have a direct and indirect negative effect on health in general – through higher death rates during wars and worsening infrastructures and economies. This relationship holds more or less (and often significant) only in the 'classical' health production functions, but as soon as the classifications are added, it shifts in the opposite direction. This could be explained by the peculiarities of classifications, which have been made according to health care systems, but could however cluster together some other individual country-specific effects. Thus, the classifications could reflect and accidentally capture other characteristics (for example, some violent confrontations have been present in most Asian CIS, which are mostly classified into one group, together with Albania for instance[191]), which could be influencing the achieved results. An interesting relationship holds between maternal mortality and violent conflicts – which, though insignificant, is consistently negative even in classical health production functions (i.e. wars reduce maternal mortality). This could as well be explained – besides unexpected clustering of country-specific effects – through decreasing fertility during war time – thus the maternal deaths consequently decrease as well.

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[190] For example, as it was argued before, the new members of the EU, the CEE countries, have achieved significant results in data collection, computarisation and introducing IT in health care, with Estonia being one of the leading countries in this.
[191] Thus, if we check for correlations between the variables and groups (which in general were found to be uncorrelated), the violent conflicts are significantly and strongly correlated with Group 1 in all classifications, what proves our suggestion of clustering other characteristics in case of violent conflicts.

The physical characteristics of the health care systems also turned out to have inconsistent links with health, however, where significant, the increase in average lengths of stay and outpatient contacts is negatively related to health outcomes (especially LEB and SDR ischaemic heart diseases). Thus, it could be understood that the higher the numbers of physical health care characteristics – the more inefficient the health care systems are (i.e. the more resources are used to achieve the same results), the worse impact that has on health.

Therefore, implementing classifications into the models have changed them slightly, but overall the results have remained consistent with the 'classical' health production functions – with the exception of the above mentioned violent conflicts. The classifications were found significant in all models for LEB and SDR ischaemic heart diseases as dependent variables, in most – for SDR infectious diseases, and less so in other models. We now turn to explaining the groups' performances in terms of health outcomes.

For maternal deaths, LEB and hepatitis B incidence Russia (representing a separate 'group' in all classifications) after controlling for economic and political situation, is performing the worst, while the best performer in most models (LEB, MM, SDR infectious diseases, SDR ischaemic heart diseases) is the group, to which the comparisons are made – comprising of Czech and Slovak Republics. Groups 1-2 (comprising of Asian and Caucasian CIS countries, accompanied with Albania and Ukraine), after controlling for the difficult and often conflicting economic and political developments, are placed somewhere in the middle in terms of health outcomes performance. Thus, considering the much more stable, democratic and economically developed conditions of the CEE countries (Hungary, Latvia, Estonia, Poland, etc.), they should be performing better – in terms of LEB, hepatitis B incidence, SDR ischaemic heart disease, for instance. Nevertheless, Group 1 (Azerbaijan, Tajikistan, Uzbekistan, Kazakhstan, Ukraine) performs the worst in terms of infectious diseases – thus it could be argued that their under-financed health care systems are not able to provide the necessary preventive and early diagnosis services.

Belarus, which in Classifications 2–4 forms a separate group, provides an interesting example, and after controlling for its increasing autocracy throughout transition, is performing well in terms of health outcomes, and in some cases better than the most liberalised Czech and Slovak Republics – in terms of maternal mortality and hepatitis B incidence. It could however be the mistakes of the old fashioned and unreformed information-collection systems, which tended to conceal mortality and disease information during Soviet times.

All in all, it can be argued, that the classifications are found to be important in the health production functions as a reflection of structural dissimilarities, and even if they did cluster some other country characteristics, they still do account for the structural health care differences' influence on health outcomes. The achieved beta-coefficients provide strong evidence of this (Appendix VI, Tables 5–8). It is easy to notice, that the standardised coefficients are especially high in models for LEB – in all classifications, which is a strong proof that belonging to one group or the other is significant for determining life expectancy. Through most of the models and classifications Russia, representing a separate group, seems to have some of the highest beta-coefficients (with the exception of models with SDR ischaemic heart disease, where Russia as well performs comparatively better). Thus, it can be argued, that Russia indeed presents a unique case, where health outcomes are significantly lower than they should be – considering the level of economic, political and social development. Belonging to Group 7 (Macedonia, Slovenia, Romania and Croatia) also seems to be important. Overall, according to the beta coefficients, the classifications are 'important' in determining the dependent health outcomes – in some models are equally or more important than GDP and lifestyle factors. In this way, we can argue, that the classifications do certainly add value to the health production functions, even though they indeed might cluster the other individual country effects – besides health care.

To summarise the overall effect on 'health', we attempted to 'unite' the achieved results from regressions with different health outcomes as dependent variables. Thus, all the groups of

classifications were ranked in the models, from most 'successful' to the least. Then the average of the ranks was estimated within each classification. The overall results are presented in Table 17.

Table 17. Final summary of groups performance in health outcomes[192] according to classifications.

	Classification 1	Classification 2	Classification 3	Classification 4
1	**Group 3** Czech Republic, Slovakia	**Group 5** Czech Republic, Slovakia	**Group 5** Czech Republic, Slovakia	**Group 5** Czech Republic, Slovakia
2	**Group 1** Azerbaijan, Tajikistan, Turkmenistan, Uzbekistan, Kazakhstan, Ukraine, Belarus, Albania, Armenia, Kyrgyzstan	**Group 8** Belarus	**Group 8** Belarus	**Group 8** Belarus
3	**Group 4** Georgia	**Group 10** Albania	**Group 1** Azerbaijan, Tajikistan, Turkmenistan, Uzbekistan, Kazakhstan, Ukraine	**Group 1** Azerbaijan, Tajikistan, Turkmenistan, Uzbekistan, Kazakhstan, Ukraine
4	**Group 2** Macedonia, Slovenia, Romania, Estonia, Croatia, Poland, Bulgaria, Hungary, Latvia, Lithuania, Moldova	**Group 9** Georgia	**Group 9** Georgia	**Group 9** Estonia, Poland
5	**Group 5** Russia	**Group 11** Estonia, Poland	**Group 3** Lithuania, Moldova, Estonia, Poland	**Group 2** Armenia, Kyrgyzstan, Albania, Georgia
6		**Group 1** Azerbaijan, Tajikistan, Turkmenistan, Uzbekistan, Kazakhstan, Ukraine	**Group 7** Macedonia, Slovenia, Romania, Croatia	**Group 3** Lithuania Moldova
7		**Group 7** Macedonia, Slovenia, Romania, Croatia	**Group 2** Armenia, Kyrgyzstan, Albania	**Group 4** Hungary, Latvia, Bulgaria
8		**Group 3** Lithuania, Moldova	**Group 4** Hungary, Latvia, Bulgaria	**Group 7** Macedonia, Slovenia, Romania, Croatia
9		**Group 4** Hungary, Latvia, Bulgaria	**Group 6** Russia	**Group 6** Russia
10		**Group 2** Armenia, Kyrgyzstan		
11		**Group 6** Russia		

The most liberal, democratised and reformed health care systems of Czech Republic and Slovakia do indeed influence the health outcomes in a positive way. At the same time, Russia having a rigid and very partially reformed health care system, is lagging behind in improving the health status of the population considering its current stage of economic development and political stability (even if with autocratic traits). The hugely under-financed, ill-balanced and badly staffed health care systems of the Asian and Caucasus CIS republics, accompanied with long-lived economic and political crisis and instability, make one wonder – how can they reach health outcomes, which sometimes are better than in Russia, Moldova and Lithuania. But it should never be forgotten, that even though health care

[192] The reported place is the average place across all models for all health dependent variables. Thus, in all models, groups were ranked, than the average of the ranks was calculated within each classification.

is important for the *improvement* of health and *prevention* of many diseases, lifestyles and hereditary factors play a major role in *determining* health outcomes.

Thus, even though proving the importance of structural considerations when analysing "health care – health" links – reflected in the classifications, the health production functions also draw our attention to the *importance of lifestyles and hereditary factors*. Healthier lifestyles and genetic peculiarities, as well as cultural specificities indeed played their role in improving (or keeping from worsening) the health status in the Asian and Caucasian CIS countries – which have ill-organised and underfinanced health care systems and an unfavourable economic and political situation in general.

To sum up, the most efficient in terms of providing better health outcomes (not just in terms of health care, but rather overall) could be considered Czech Republic and Slovakia. Thus, arguably, increasing *market mechanisms*, *liberalising* the health care sector and at the same time keeping the democratic values of *equity and universal access* are the best reforms in terms of providing better health outcomes in each country. At the same time, in a situation of little overall democratisation and marketisation (an example of Belarus or Asian CIS), the most important feature of health care system becomes the *universal access* and *comprehensive coverage and services* (the case of Belarus) for the population – which despite the other factors such as lifestyles and socio-economic diversity undoubtedly has a favourable impact on health. It can as well be logically concluded that in transition countries (which undergo unstable economic reforms where the population is not necessarily able to access health care privately) the role of the *public sector* in financing becomes increasingly important – the higher it is, the better health outcomes can be in transition countries. All these *general* characteristics are as well determined by the detailed structural characteristics of the health care systems – the payment methods and incentives for improving quality of care, increasing competition in the sector and privatising the facilities, improving prevention services and public health, regulating the health care sector in an efficient and fair way.

Arguably, the worst feature of the health care systems *transition* could be 'partiality' and inconsistency of reforms, which have been a particular trait in health care transition in Russia (which

after controlling for lifestyle, political and economic factors is performing least well in terms of health outcomes). Many countries of Asian and Caucasus CIS have a strong influence of factors outside of healthcare systems on health – due to their uneven, inconsistent and in some cases disastrous political and economic transitions, thus it is often difficult to track the role of health care systems on health. Nevertheless, it could be argued, that improving access and coverage, preventive and primary care, could significantly improve the situation in maternal and infant mortality, and infectious diseases. Moreover, Belarus provides a clear evidence of consistent and stable development within the health care sector – even without radical reforms and transformation, and with a high degree of autocracy and poor economic development in the country, it has been able to provide its population throughout transition with some degree of comprehensive care and universal access. In Belarus, while the lifestyles, economic and political factors do not play in favour of health improvements, health care system – does, and is (*arguably*) what keeps the population *relatively* healthier. Thus, it still remains questionable to *what extent* the classifications – and thus the structural and transitional differences of the health care systems – influence the health outcomes. There is no straightforward answer to this. However, following our arguments above, it can be assumed that this influence is different in different countries.

All in all, the classifications created in Chapter 3 can indeed account for individual country characteristics, not related to health care, but it as well proved to be an efficient way of accounting for structural characteristics of health care systems.

Finally, it could be noticed that all classifications perform quite similarly within the health production functions. Even the most broad classification does add a difference and in general is significant. However, we argued that *coverage*, *equity* and *liberalisation* might be the most important characteristics of the health care systems in transition, thus Classification 4 (which unites the 'limited coverage' countries in one group instead of separating Georgia) could be considered more accurate[193]. It more appropriately unites into separate groups countries with different levels of coverage,

[193] For these reasons only Classification 4 and 1 are presented in the main text. The rest of the tables are provided in the Appendix VI.

liberalisation and equity, as well as providing some structural diversity within the broad group of CEE countries, which are rather similar according to these characteristics.

To conclude, in this Chapter we created the health production functions, specifications of which could be found robust thanks to the careful selection of variables and methods. Some of the indicators had to be excluded from the models to provide legitimacy to our specifications and results – such as pollution and age-dependency ratio, thus further research would indeed be needed for clearer understanding of the influence of these endogenous variables on health. Moreover, alcohol consumption was not found significant in any of the models (and eventually was not included) – but that could be explained by the strong necessity of the micro-level research within the sphere of lifestyle determinants of health. Nevertheless, creating and then incorporating classifications of health care systems into the health production functions – besides being a methodological innovation in itself – proved to be efficient in testing health production functions in the transition area. We, firstly, found the classifications to be significant for determining health outcomes, thus were able to specify the most significant characteristics of the health care systems and paths for a successful transition and improving health status (namely, access, coverage, liberalisation, consistency of reforms and the role of public expenditure). Secondly, introducing classifications increased the significance of other socio-economic determinants of health – namely, GDP, liberalisation, lifestyle factors. Finally, in research on determinants of health it is often forgotten that the factors which influence health are diverse and interconnected, thus have to be analysed in aggregate, all together. Therefore, arguably, our research have contributed to the existing analysis of the determinants of health, as we incorporated structural characteristics of health care systems, along with other health care, political, economic and lifestyle factors and analysed them and their influence in their totality.

CONCLUSION

In this dissertation, motivated by the decline in healthy life expectancy and experience across much of the CEE region we investigate the complex relationship between *health outcomes* on the one hand and h*ealth care policies and systems* on the other. The links between them are neither simple, nor straightforward; it must nevertheless be of crucial importance for explaining the deteriorating health outcomes in the area and for understanding the paths for future reforms. Thus, we analysed the health policy paths, transitions and health care systems, and classified them into specific groupings defined by the structural characteristics of the country health care systems. To analyse the influence of these structural differences on health outcomes, we augmented carefully developed health production functions for transition countries, using different health outcome indicators. We derived several important findings.

First, it was found that the transition countries can indeed be classified according to *structural* characteristics, *and* health care transition *paths*. Some countries (mostly CEE) did take the road of radical reforms in the attempt to liberalise the health care sectors and introduce market mechanisms. This resulted in different reforms and strategies by different countries, but the path is rather clear. The second path was rather the opposite – an attempt to preserve the old system. This path led to diverse systems and results as well – as some countries managed to sustain more or less functional health care systems (Belarus, Ukraine), while others did not (Asian CIS). The third path which was taken by some countries could be described as uncertain and partial reforms, which resulted in confusing and partial systems (Georgia, Russia). This general classification on paths was reflected in a 'broad' classification, while the bigger diversity within the paths was implemented in more detailed classifications.

Second, the '*physical characteristics*' of the health care systems, usually used in the 'classic' health production functions, are negative for health in the *transition* setting: they can be expressed as the inefficiencies of the health care systems – the more resources are used to achieve similar results, the more inefficient the system could be.

Third, using the structural groupings in health production functions we conclude that *health outcomes* can indeed be partially explained by the *structural differences* across health care systems. Even though it was noticed that the classifications could cluster some other country-specific effects, it was nevertheless found that they are indeed significant in explaining the health inequalities in the transition area. According to these classifications and their role in determining the health inequalities, we as well were able to determine, which health care characteristics might be of higher significance for improving the health status.

Thus ***fourth***, it was determined, that the most successful transitions of health care – where success is expressed in terms of *health status improvements* – managed to keep the *equity*, *access*, *comprehensive* basic benefits package and *universal coverage* of the whole population as the main features. Further, introduction of the *market mechanisms* and *liberalisation* were found next important. The least successful transition feature was found to be *partiality* and *inconsistency* of reforms – which in Russia, supplemented with unhealthy lifestyles, resulted in the worst health outcomes in the area.

Consequently, ***fifth***, it was once again proven by our analysis that *lifestyle factors* do matter for health, and might be of very high (if not *crucial*) importance. Moreover, adding structural classifications sharpened our results on, for instance, fruit and vegetable consumption – this could also prove that there *are* regional diversities in the lifestyle patterns. Thus, the Asian CIS countries – having considerably healthier lifestyles –perform better in terms of health outcomes than, for example, Russia – even despite better economic, political and health care situation in Russia.

Therefore, ***sixth***, it was found that the *significance* of health care systems can be *different* for different countries as well – depending on the economic, political, societal, environmental and lifestyle factors. Thus, in Belarus the health care impact might be more significant than in the Asian CIS countries.

Seventh, as expected *economic development* is a robust, positive and significant determinant of differing health outcomes in the area. Looking at the more *transition specific 'causes'* is more controversial, perhaps because of the diversity of systems and the rapidity of change. Controversial

issues were raised by analysing the important transitional indicators and their impacts on health. While *macroeconomic instability* (proxied by inflation) was found to have mostly negative impacts on health, liberalisation of trade and foreign exchange markets – as a proxy for overall *liberalisation* – has more ambiguous affects.

Finally, it is clear that the transition area is hugely diverse. It can as well be argued, that due to the complexity the notion 'health' presents within itself, it might be a simplification to treat the determinants of health as 'good' or 'bad' for health: the relationship is more complex and interconnected. Thus, our analysis, providing robust and important findings, also points in the direction for further research. For example, the *extent*, to which health care influences health outcomes, is a question, which is particularly difficult to answer in the transitional setting. Moreover, it is extremely difficult – due to the magnitude of research and unavailability of information – to track the influence of the health care systems *change* on health outcomes. Thus, further research might suggest including the initial starting conditions of transition as a base for analysis of transitional developments. This very often is possible only at the micro-level analysis, as many key mechanisms driving health outcomes are indeed situated at the individual and micro-level. Moreover, the effects of environmental factors should also be considered in the future research.

All in all, the research that had been performed in this dissertation proved that structural classifications of health care systems do add value to the existing health production functions, and in this way – through the introduced methodological innovation – our analysis does add to the existing research in the field. Moreover, it contributes to the explanations of the health inequalities in the transition area countries, their diverging paths and possibly, suggests the reforms in health care, namely in the direction of health care coverage and access.

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APPENDIX I.

SUMMARY OF LITERATURE ON HEALTH PRODUCTION FUNCTION

Author/s and work	Data, countries covered, methods	Dependant variables/outputs	Independent variables/inputs	Results, conclusions
Berger, Mark C.; Messer, Jodi. Public financing of health expenditures, insurance, and health outcomes. 2002.	20 OECD countries 1960-1992 Data: OECD Health Database, UNESCO, Deininger and Squire Cross-section, time-series regression in log form	Health expressed by mortality rate per 1000 population	Health care inputs – health expenditure per capita, female labour participation rate; health behaviours – tobacco consumption per capita, alcohol consumption per person, consumptions of fats and oils; other market goods – GDP per capita, Gini; demographic factors – share of population aged 65 and above; level of education – percentage of population aged 25 and above with post-secondary education; health care system differences – share of total health care expenditures that are publicly financed; percentage of population eligible for inpatient/ambulatory care benefits under a public scheme; controls for years and country-specific effects.	Higher health expenditure, better health behaviours and higher education found to be associated with lower mortality rates. Higher public share of health expenditure is associated with higher mortality rates which lead to the conclusion that "…increases in public financing may lead to a less productive mix of services or less efficient provision of services" (p.2111). Higher level of public insurance coverage tends to lower mortality rate, with ambulatory being statistically significant.
Bobak, Martin; Pikhart, Hynek; Rose, Richard; Hertzman, Clyde; Marmot; Michael. Socioeconomic factors, material inequalities, and perceived control in self-rated health: cross-sectional data from seven post-communist countries. 2000.	7 CEE countries: Russia, Estonia, Lithuania, Latvia, Czech Republic, Hungary and Poland 1996-1998 New Democracies Barometer (NDB), New Baltic Barometer (NBB), New Russia Barometer (NRB) Logistic regression	Self-rated health – binary variable (poor vs. not poor health)	Perceived control (over life, work choices), education (primary, vocational, completed secondary, completed university), marital status, material deprivation, inequality index, Gini coefficient	Consistent with mortality rates, the rate of poor health in CEE countries is high. Education and material deprivation are important for self-rated health. Inequality was not significant predictor for self-rated health. Perceived control is strongly associated with self-rated health, might be reverse causation.
Cremieux, Pierre-Yves; Ouellette, Pierre; Pilon, Caroline. Health care spending as determinants of health outcomes. 1999.	10 Canadian provinces 15 years: 1978-1992 Data: Health Canada, Statistics Canada, Sante Quebec Generalized least squares regression analysis	Gender-specific infant mortality rates, life expectancy	Health expenditures; number of physicians per capita; density of provincial population; educational level – number of bachelor graduates; poverty – percentage of households using more than 56.2% of their income on food, housing, clothing; alcohol use – per capita alcohol consumption; tobacco use – percentage of regular smokers; nutrition data – weekly spending on meet and fat separately; dummy variable for provinces	Most socio-economic indicators had very nuanced effects – no firm links. GDP, health expenditures and number of physicians found to have a strong relationship with health outcomes.

Eikemo, Terje Andreas; Bambra, Clare; Judge, Ken; Ringdal, Kristen. Welfare state regimes and differences in self-perceived health in Europe: A multilevel analysis. 2008.	21 European countries 2002 and 2004 European Social Survey (ESS) data Multilevel modelling: MQL, PQL, MCMC	Subjective health: self-perceived health, longstanding illness	Age, gender, socio-economic status (education, occupation, income, social support, social network), welfare regimes (5 types - dummy)	90% of the variation of the self-reported health was at the individual level, country-level characteristics account for around 10%. Half of between-country variation is explained via welfare regimes characteristics. Anglo-Saxon and Scandinavian welfare regimes have advantage compared to Southern and Eastern European countries.
Elola, Javier; Daponte, Antonio; Navarro, Vicente. Health Indicators and the Organization of Health Care Systems in Western Europe. 1995.	17 OECD European countries – Portugal excluded 1979-1991 OECD Health Database, Wagstaff and Van Doorslaer, World Bank Simple regression analysis	Infant mortality rates, life expectancy at birth, PYLL specified by gender	GDP per capita, health care expenditure per capita, percent of population covered by health care system, public health expenditures as percent of total health expenditures, health care system type – dummy variable for NHS and SHI.	Significant relationship only between infant mortality and independent variables was found. Authors found that lower infant mortality can be predicted for countries with NHS rather than SHI. In general the article concludes that NHS systems are more efficient comparing to SHI.
Hitiris, Theo; Posnett, John. The determinants and effects of health expenditure in developed countries. 1992	20 OECD countries 28 years: 1960-1987 OECD Database, UN Linear and log-linear regressions	Total health expenditure per capita, mortality rates	GDP per capita, proportion of population over 65, public finance share, country dummy variables	There are differences in expenditure functions for different countries. Although suggested to be treated with caution, the crude mortality rate is found to be higher in the UK. Confirms the positive significant relationship between health spending and GDP
Joumard, Isabelle; André, Christophe; Nicq, Chantal; Chatal, Olivier. Health Status Determinants: Lifestyle, Environment, Health Care Resources and Efficiency. OECD. 2008	23 OECD countries, time period 1981-2003 OECD Health Data 2008 Panel data regressions and data envelopment analysis (DEA)	LE at birth, males and females; LE at 65, males and females; premature mortality (adjusted for external causes); infant mortality. For DEA output: LE at birth of the total population	Health care resources (in monetary or physical terms); tobacco, alcohol consumption; diet; air pollution; education For DEA inputs: health resources, Economic, Social and Cultural Status (ESCS), lifestyle variable (diet)	Health care spending does not produce the same value for money in different countries. Population health status could be improved, at the same time keeping inputs invariable. There is no relationship between relative efficiency performance and the amounts of health spending. The results of the DEA and panel data regressions analysis broadly coincide.

Macinko, James; Starfield, Barbara; Shi, Leiyu. The Contribution of Primary Care Systems to Health Outcomes within Organization for Economic Cooperation and Development (OECD) Countries, 1970–1998. 2003	18 OECD countries 28 years (1970-1998) OECD Health Data 2001 Time series analysis - fixed effects regression	Age and sex-standardised mortality, premature mortality, PYLL cerebrovascular, heart, asthma, pneumonia	Primary care (score on 10 dimensions from 0 to 20), number of physicians, alcohol, smoking, income, number of doctor visits, GDP, proportion of elderly in the population	At the national level organisation of the primary health has an impact on health outcomes. Gender differences are significant. Alcohol and smoking influence thought to be stronger. Results can not be generalized onto other countries. Health reform has not uniformly targeted primary care.
Nixon, John; Ulmann, Philippe. The relationship between health care expenditure and health outcomes. Evidence and caveats for a causal link. 2006.	15 EU countries 16 years: 1980-1995 OECD Health Database Fixed-effects model subject to stochastic disturbances	LE at birth, female, male; infant mortality	Total per capita health expenditure ($PPP); health exp as proportion of GDP; number of physicians; number of hospital beds; in-patient admission rate; average in-patient length of stay; population coverage of health care system; unemployment rate; alcohol consumption (litres per capita); expenditure on tobacco; fruit consumption; nutrition – protein per capita; environmental pollution; country dummy variable.	Health expenditure and number of physicians are important determinants of all dependent variables. Health care expenditure is only one of many quantitative and qualitative factors influencing health outcomes.
Perlman, Francesca; Bobak, Martin. Socioeconomic and Behavioral Determinants of Mortality in Posttransition Russia: A Prospective Population Study. 2008.	Russian Federation, 38 towns 1994-2002 Russian Longitudinal Monitoring Survey (RLMS) data Cox proportional hazards analysis	Standardized mortality ratio (SMR)	Age, education, material measures (income, expenditures), health behaviours (smoking, alcohol intake), geographic area	Both for men and women, education, smoking and frequent drinking found to be significant determinant of mortality. Income was not found to be significant. Policy implications: besides improving low incomes, addressing poverty and health behaviours, education problems should also be taken into consideration.
Puig-Junoy, Jaume. Measuring health production performance in the OECD. 1998.	21 OECD countries 3 decades: 1960's, 1970's, 1980's OECD Health Database DEA and regression analysis of DEA	DEA: gender-specified LE at birth Regression: DEA efficiency scores – overall technical efficiency (OTE) and pure technical efficiency (PTE)	DEA: number of physicians, number of non-physician personnel, employed in health sector per 1000 and number of hospital beds per inhabitant, tobacco consumption, alcohol consumption, proportion of individuals under 65. Regression: human capital – average years of schooling of the population over 25; proportion of health care expenditure privately financed; GP's as gatekeepers – dummy variable	DEA: Most efficient –operating on frontier: Austria, Greece, Italy, Japan, Portugal, United Kingdom Least efficient: Denmark, Finland, Sweden, Norway Regression: Schooling is negatively associated with efficiency "[T]echnical inefficiency in health production decreases with an increase in the proportion of health expenditures financed privately" (p.258)

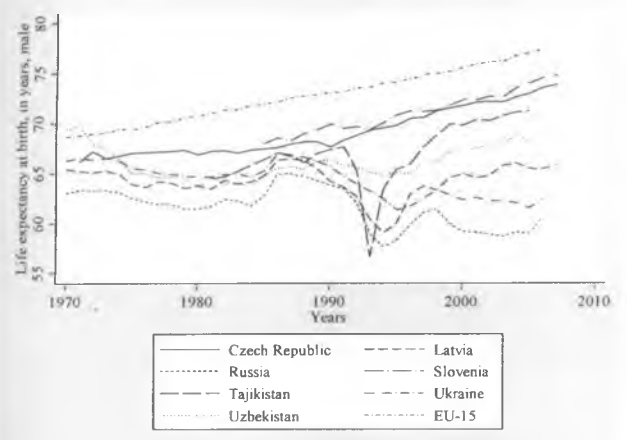
Self, Sharmistha; Grabowski, Richard. How effective is public health expenditure in improving overall health? A crosscountry analysis. 2003.	191 countries Cross-sectional for different years (specific to certain variable, due to data availability) WHO database, UNDP Simple Regression analysis	Disability Adjusted Life Expectancy (DALE)	Private sector HC spending and PVT squared (for 1997 in 1985 dollars); public sector HC spending and PUB squared (1997 in 1985 dollars); schooling – log of average schooling attainment between 1960 and 1985; GDP per capita (1997); dependency ratio – proportion of population under 15 and over 65 (1997); the daily supply of calories (1996); the ratio of urban population to total population (1997); LE in 1970; dummy variable for Africa.	The authors found that the developed countries have a 'virtuous circle': "they are healthy because they are healthy" (p.841) Increase of public health expenditures are found to be ineffective in developed countries, but quite efficient in middle-income and less developed countries. Diminishing returns of public health spending irrespectfully of countries economic situation were also proven.
Wagstaff, Adam; Moreno-Serra, Rodrigo. Europe and Central Asia's Great Post-Communist Social Health Insurance Experiment: Impacts on Health Sector and Labor Market Outcomes. WB. 2007.	28 Central and Eastern European Countries (including Turkey) 1990-2004 SHI status from HiT Reports; WB World Development Indicators; Health for all database WHO Regression based generalization of the difference-in-differences method	Health outcomes variables; hospital activity and capacity indicators; health spending. Labour market outcomes variables	SHI adoption, country and time specific controls	SHI adoption increased health and government spending and salaries as a percentage of government spending. SHI adoption has not caused significant improvements in health outcomes. Increase of unemployment is associated with SHI adoption.

APPENDIX II

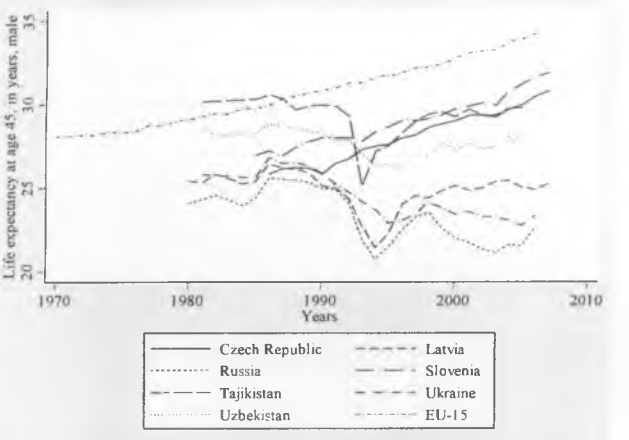
HEALTH OUTCOMES

MORTALITY-BASED INDICATORS

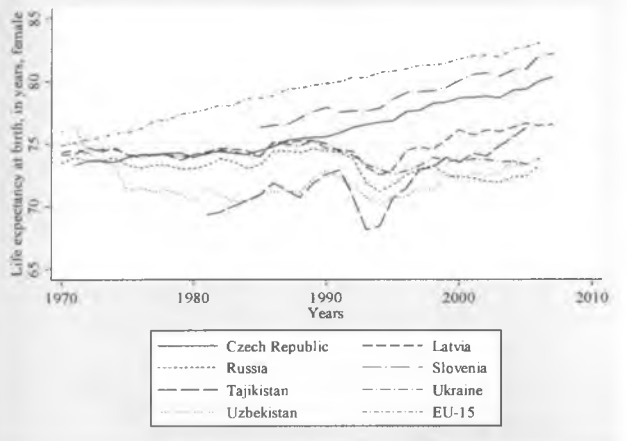
Life expectancy at birth, male, for selected CEE countries and EU-15 average



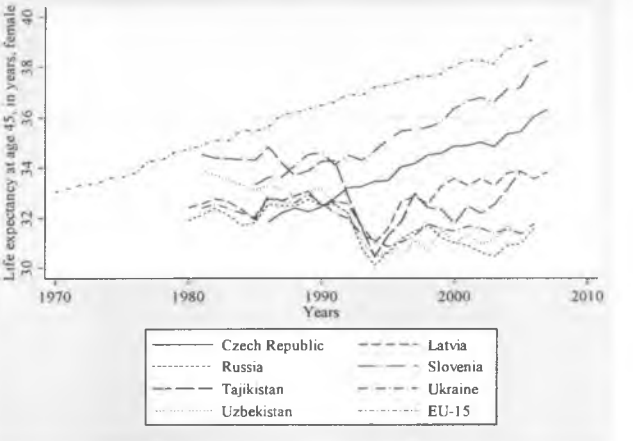
Life expectancy at age 45, male, for selected CEE countries and EU-15 average (1988-2007)



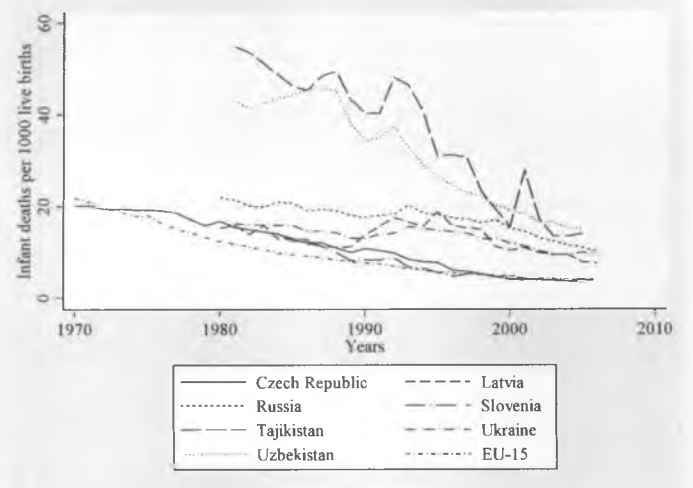
Life expectancy at birth, female, for selected CEE countries and EU-15 average



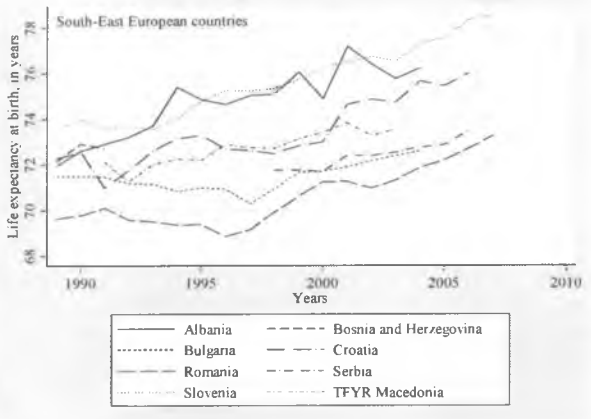
Life expectancy at age 45, male, for selected CEE countries and EU-15 average

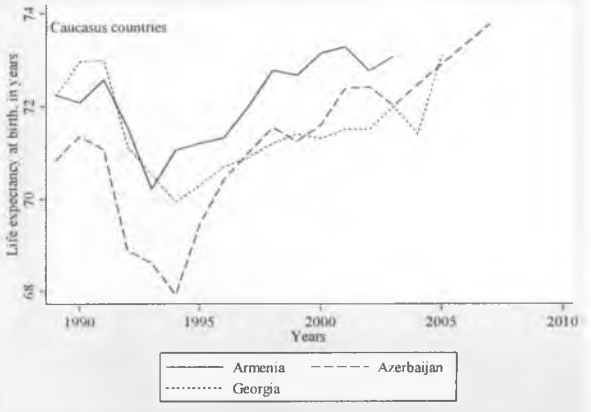


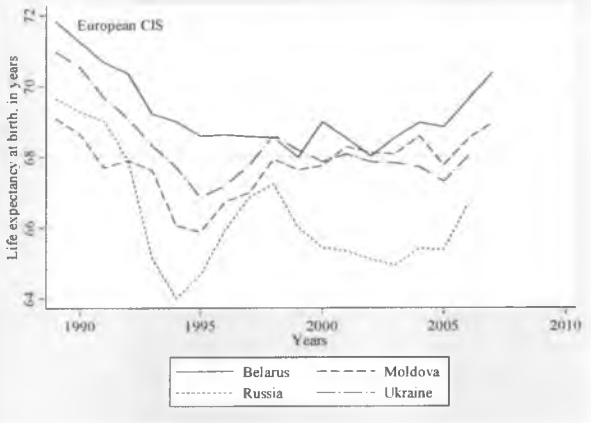
Infant mortality for selected transition countries and EU-15 average

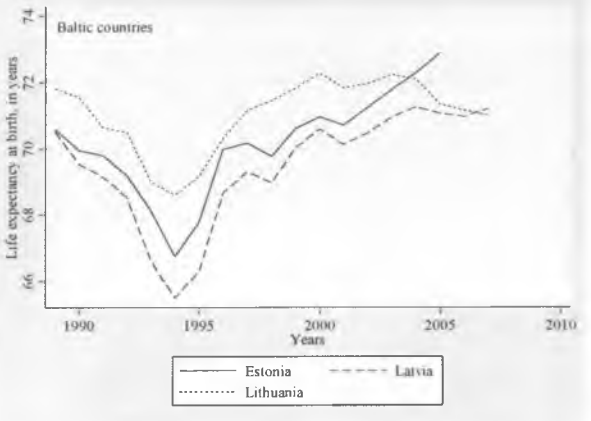


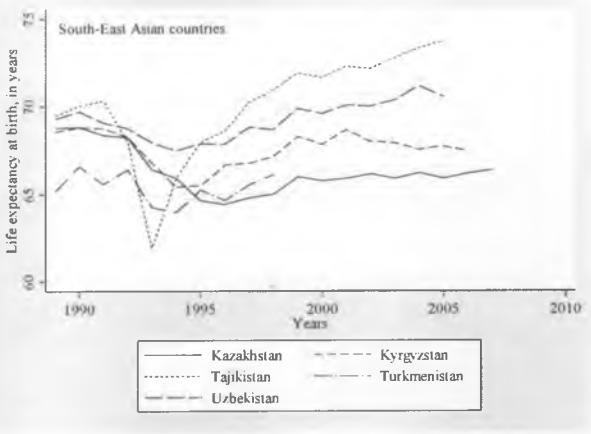
Life expectancy at birth for CEE and CIS countries, by region (1989-2007).

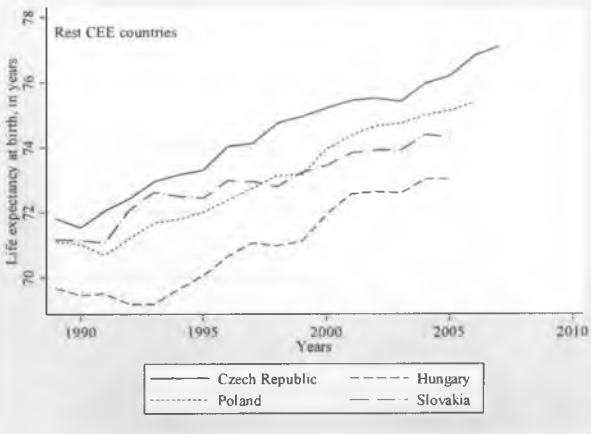




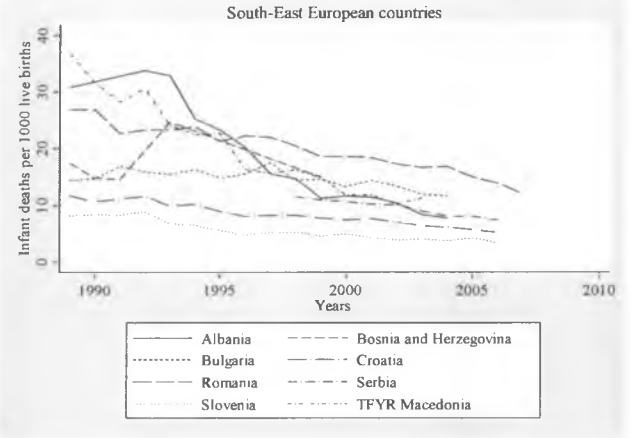


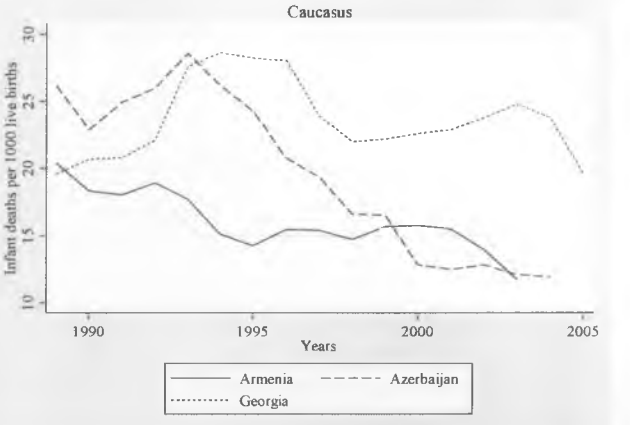


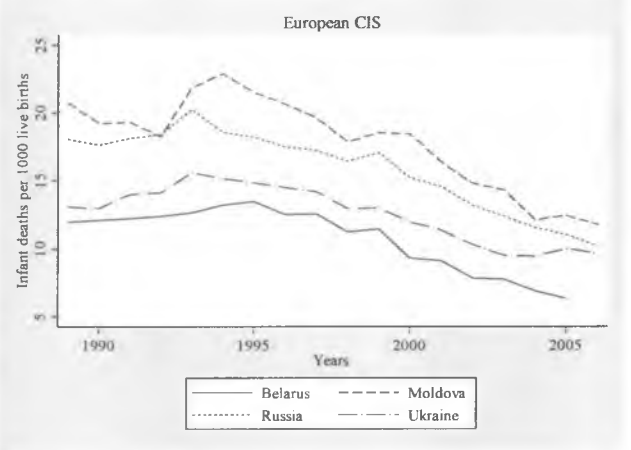


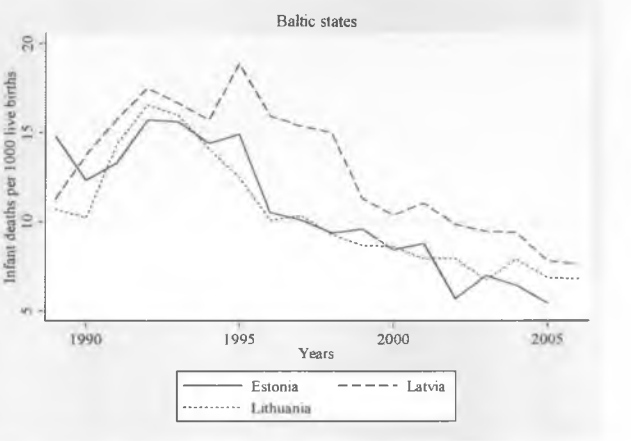


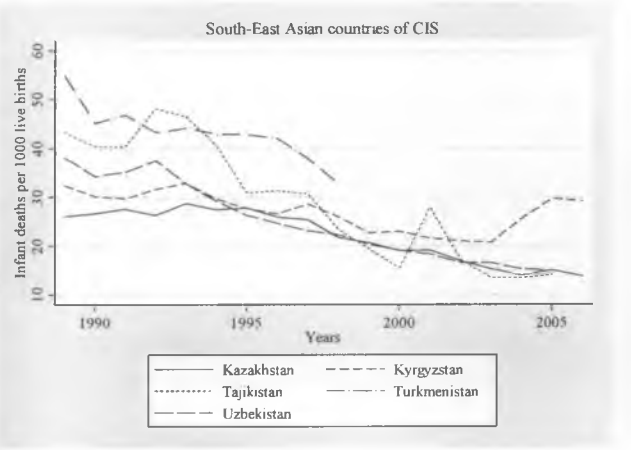
Infant mortality by region for selected transition countries 1988-2007)

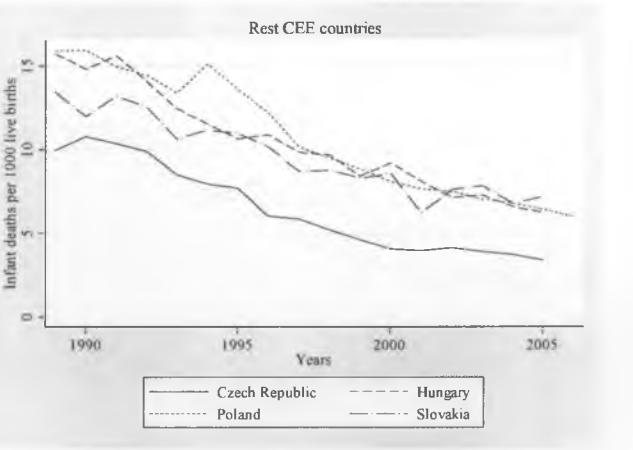




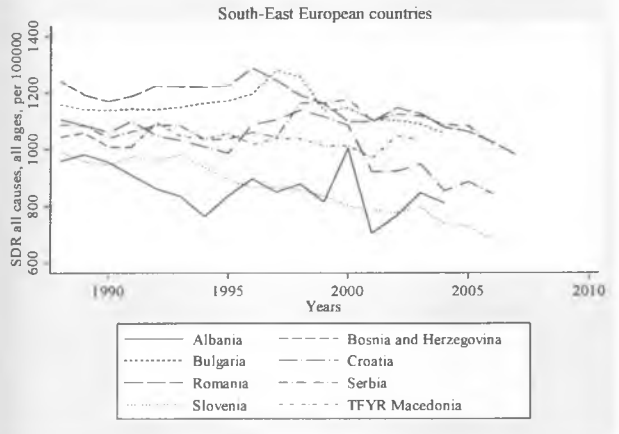


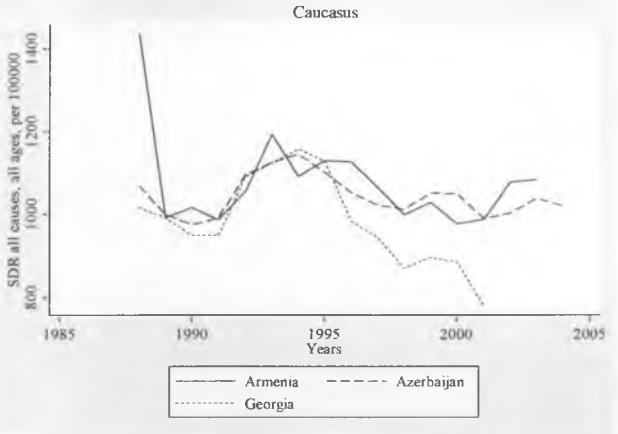


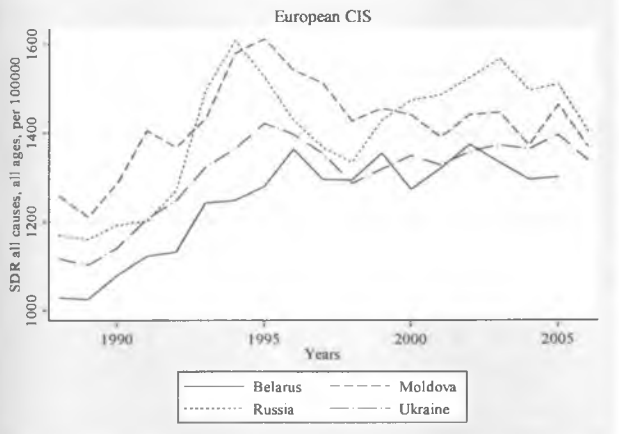


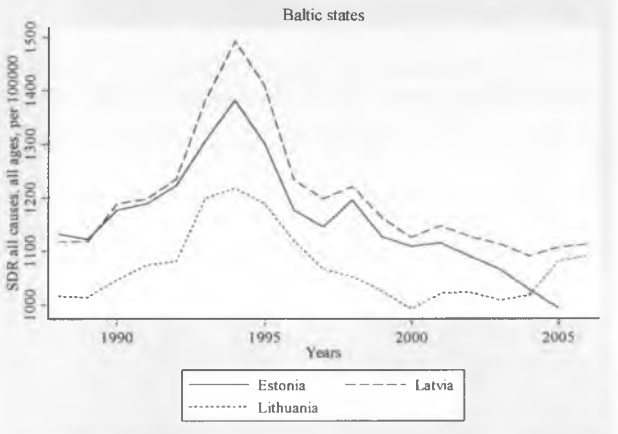


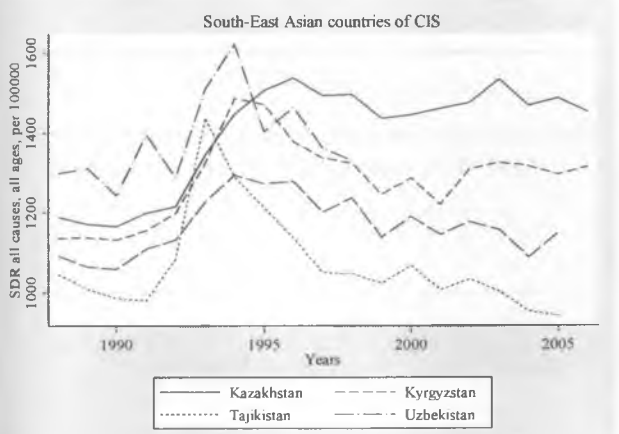
Mortality rates by region for selected transition countries (1988-2007)

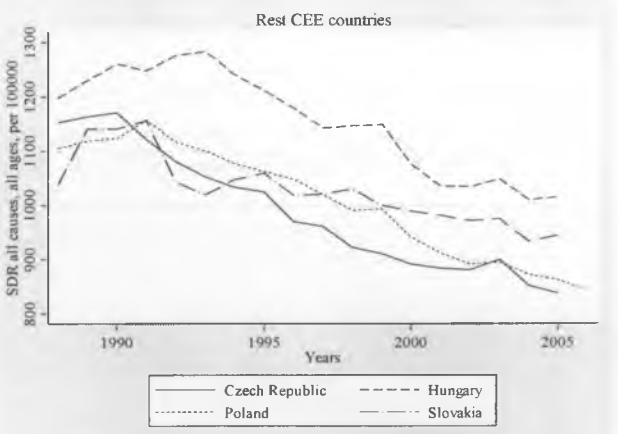






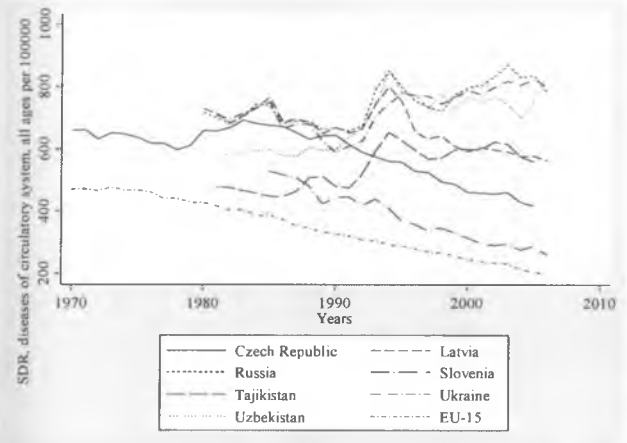




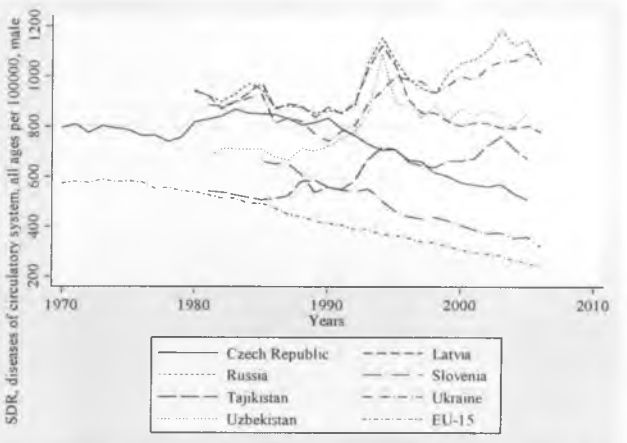


IMMEDIATE CAUSES OF DEATH

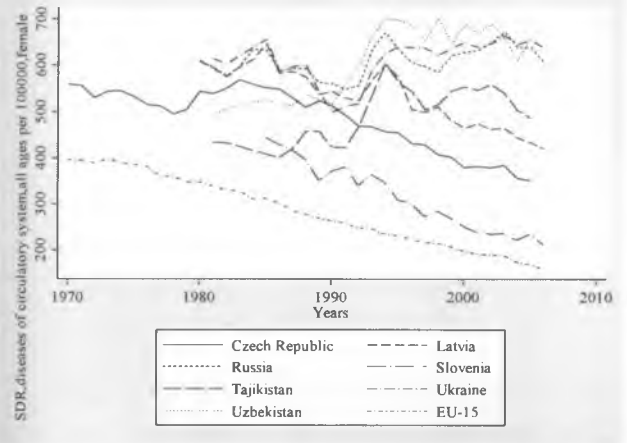
Death rate, circulatory system diseases, for selected CEE countries and EU-15 average (1988-2007)



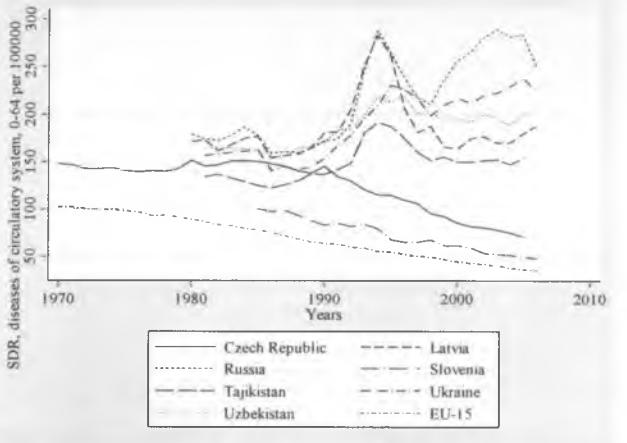
Death rate, circulatory system diseases, male, for selected CEE countries and EU-15 average (1988-2007)



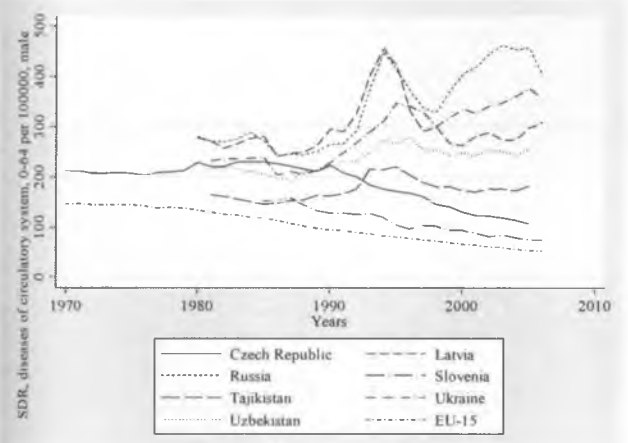
Death rate, circulatory system diseases, female, for selected CEE countries and EU-15 average (1988-2007)



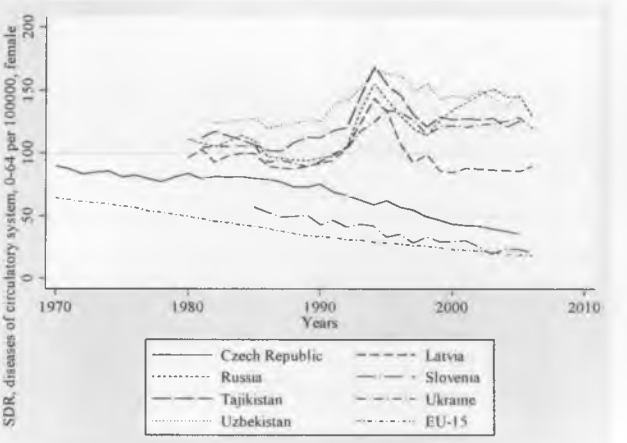
Death rate, circulatory system diseases, ages 0-64, for selected CEE countries and EU-15 average (1988-2007)



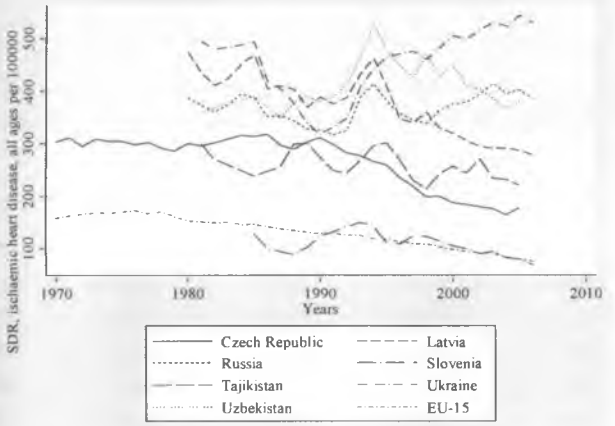
Death rate, circulatory system diseases, ages 0-64 male, for CEE countries and EU-15 average (1988-2007)



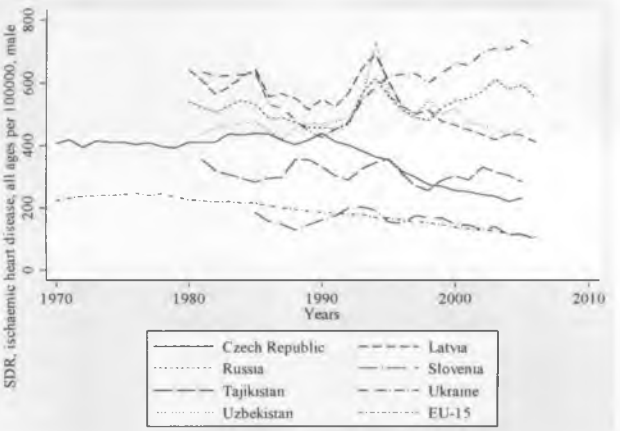
Death rate, circulatory system diseases, ages 0-64 female, for CEE countries and EU-15 average (1988-2007)



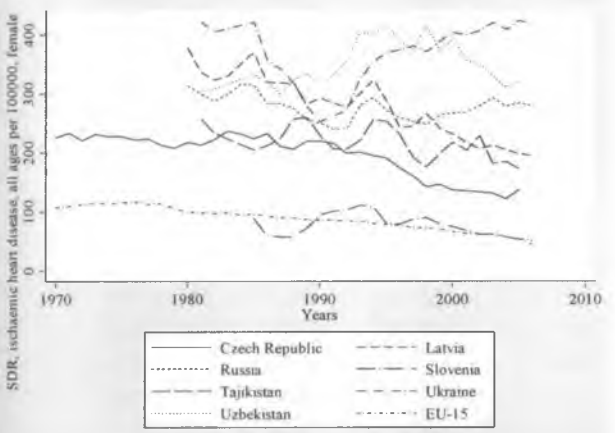
Death rate, ischaemic heart diseases, for selected CEE countries and EU-15 average (1988-2007)



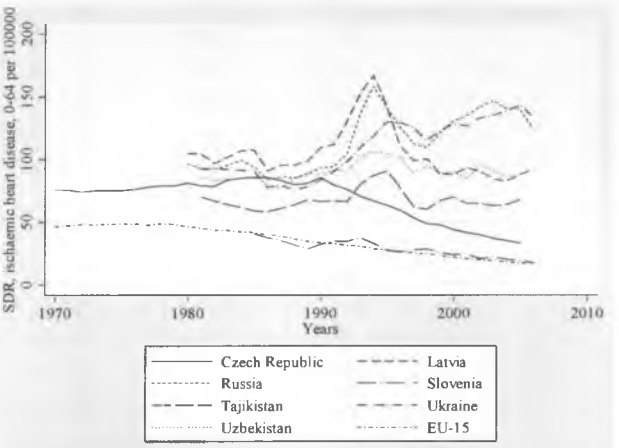
Death rate, ischaemic heart diseases, male, for selected CEE countries and EU-15 average (1988-2007)



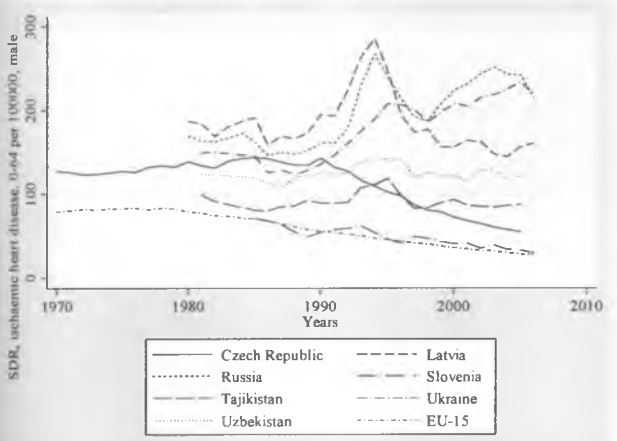
Death rate, ischaemic heart diseases, female, for selected CEE countries and EU-15 average (1988-2007)



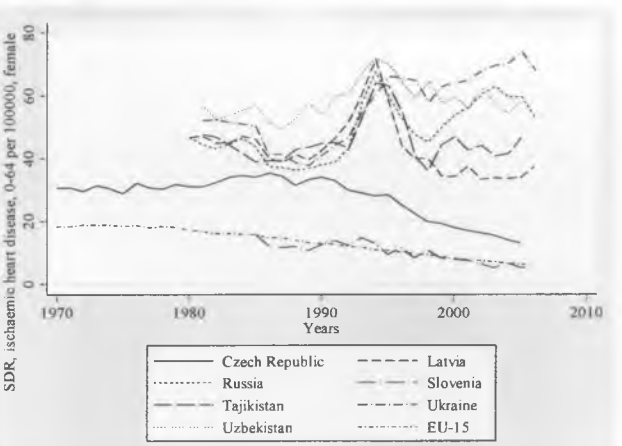
Death rate, ischaemic heart diseases, ages 0-64, for selected CEE countries and EU-15 average (1988-2007)



Death rate, ischaemic heart diseases, ages 0-64 male, for selected CEE countries and EU-15 average (1988-2007)



Death rate, ischaemic heart diseases, ages 0-64 female, for CEE countries and EU-15 average (1988-2007)

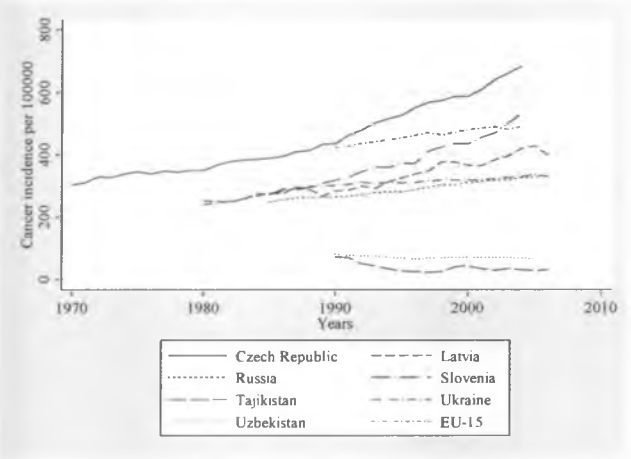


Tuberculosis: incidence and death rate

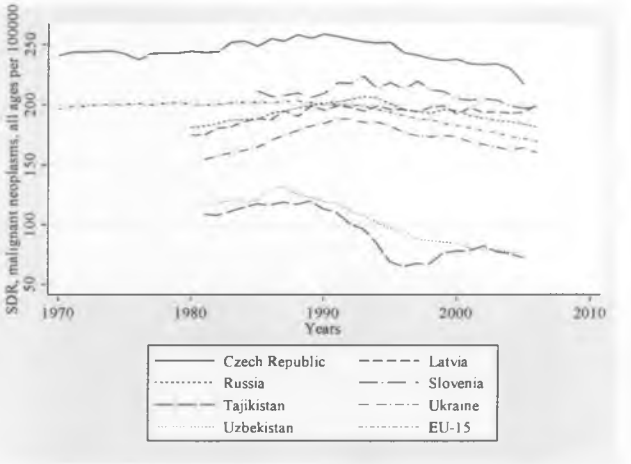
	SDR, tuberculosis, all ages per 100000	Tuberculosis incidence per 100000	Survival Rates	SDR, tuberculosis, all ages per 100000	Tuberculosis incidence per 100000	Survival Rates	SDR, tuberculosis, all ages per 100000	Tuberculosis incidence per 100000	Survival Rates
Year	EU members before May 2004			EU members since 2004 or 2007			CIS		
1980	2.870	25.210	0.886	6.980	58.690	0.881	–	56.220	–
1981	2.670	24.510	0.891	6.390	55.330	0.885	12.220	55.530	0.780
1982	2.410	23.560	0.898	6.090	54.150	0.888	11.620	53.660	0.783
1983	2.280	21.900	0.896	6.080	53.140	0.886	11.340	52.800	0.785
1984	2.050	19.900	0.897	5.600	50.290	0.889	11.350	52.470	0.784
1985	1.920	19.450	0.901	5.480	48.570	0.887	11.060	48.340	0.771
1986	1.840	18.990	0.903	4.980	46.320	0.892	9.450	50.540	0.813
1987	1.650	17.040	0.903	4.820	44.570	0.892	9.210	49.280	0.813
1988	1.630	15.760	0.897	4.700	43.540	0.892	8.960	47.120	0.810
1989	1.510	15.880	0.905	4.710	41.070	0.885	8.910	44.960	0.802
1990	1.440	15.150	0.905	4.920	42.260	0.884	9.100	37.130	0.755
1991	1.310	14.760	0.911	5.050	42.620	0.882	9.360	37.340	0.749
1992	1.240	15.450	0.920	5.360	46.320	0.884	10.290	37.970	0.729
1993	1.240	15.540	0.920	5.710	49.490	0.885	12.770	43.770	0.708
1994	1.100	15.330	0.928	5.760	52.690	0.891	14.400	48.200	0.701
1995	1.090	14.580	0.925	5.860	52.320	0.888	16.380	56.250	0.709
1996	1.010	13.690	0.926	5.550	53.130	0.896	18.180	66.490	0.727
1997	0.940	13.570	0.931	5.550	52.850	0.895	18.280	76.470	0.761
1998	0.930	13.180	0.929	5.220	54.040	0.903	17.460	78.640	0.778
1999	0.860	11.610	0.926	4.780	50.370	0.905	20.290	83.330	0.757
2000	0.780	11.570	0.933	4.580	50.650	0.910	20.430	89.270	0.771
2001	0.720	10.670	0.933	4.640	51.250	0.909	20.030	88.440	0.774
2002	0.680	10.780	0.937	4.320	51.560	0.916	20.460	90.710	0.774
2003	0.670	10.340	0.935	4.190	49.230	0.915	20.350	87.000	0.766
2004	0.580	9.660	0.940	3.820	47.320	0.919	19.650	87.020	0.774
2005	0.580	9.950	0.942	3.490	44.130	0.921	20.550	91.140	0.775
2006	0.550	9.850	0.944	3.320	41.990	0.921	18.450	90.440	0.796
2007	–	9.150	–	3.180	39.450	0.919	–	89.450	–

Cancer: incidence and death rate

Cancer incidence for selected transition countries and EU-15 average (1988-2007).



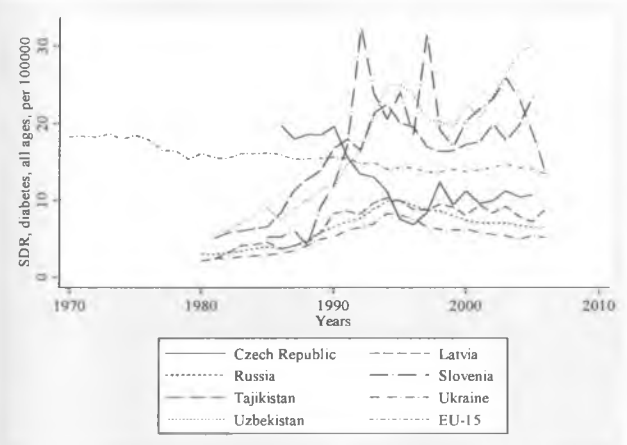
Death rate from cancer for selected transition countries and EU-15 average (1988-2007).



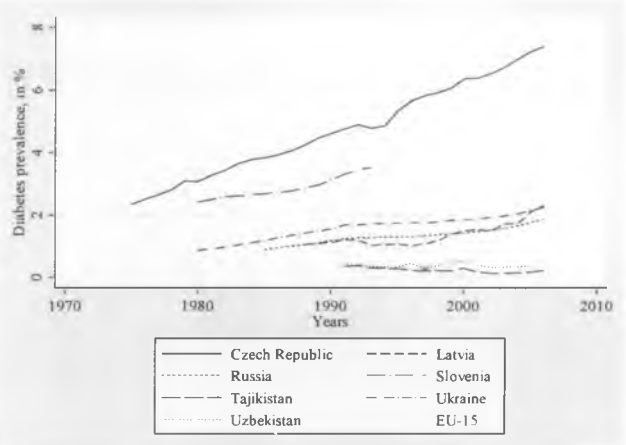
Years	SDR, malignant neoplasms, all ages per 100000	Cancer incidence per 100000	Survival ratio	SDR, malignant neoplasms, all ages per 100000	Cancer incidence per 100000	Survival ratio	SDR, malignant neoplasms, all ages per 100000	Cancer incidence per 100000	Survival ratio
Year	EU members before May 2004			EU members since 2004 or 2007			CIS		
1988	203.41	–	–	200.79	245.26	0.181318	181.39	236.7	0.233671
1989	201.98	–	–	200.97	241.56	0.168033	182.99	235.74	0.223763
1990	199.91	422.95	0.527344	202.05	238.45	0.152653	184.01	237.35	0.224731
1991	200.29	426.96	0.530893	203.91	250.61	0.186345	184.91	237.28	0.22071
1992	199.9	436.51	0.542049	204.58	266.28	0.231711	184.8	238.46	0.225027
1993	198.86	440.6	0.548661	206.65	270.57	0.236242	184.54	240.07	0.231308
1994	196.13	448.15	0.562356	207.52	285.97	0.274329	182.88	240.65	0.240058
1995	193.51	452.26	0.572127	208.63	286.5	0.271798	178.48	239.49	0.25475
1996	191.14	460.49	0.58492	207.83	305.12	0.318858	173.83	243.95	0.287436
1997	188.04	469.77	0.599719	207.53	315.85	0.342948	171.42	248.36	0.309792
1998	187.52	461.98	0.594095	207.56	333.28	0.37722	169.95	253.31	0.329083
1999	184.68	470.98	0.607881	206.58	349.53	0.408978	171.42	253.27	0.323173
2000	182.64	479.47	0.619079	207.21	359.15	0.423054	169.57	255.96	0.337514
2001	180.67	483.49	0.626321	207.72	386.49	0.462548	165.85	257.74	0.356522
2002	178.44	488.46	0.634689	207.84	392.93	0.471051	164.15	260.48	0.369817
2003	176.42	480.3	0.632688	206.96	403.11	0.486592	162.43	261.39	0.378591
2004	173.56	488.56	0.644752	205.84	411.54	0.49983	160.83	266.79	0.397166
2005	171.7	488.56	0.648559	201.9	419.24	0.518414	158.88	268.02	0.407208
2006	169.49	–	–	201.22	423.96	0.52538	156.46	270.52	0.421632

Diabetes

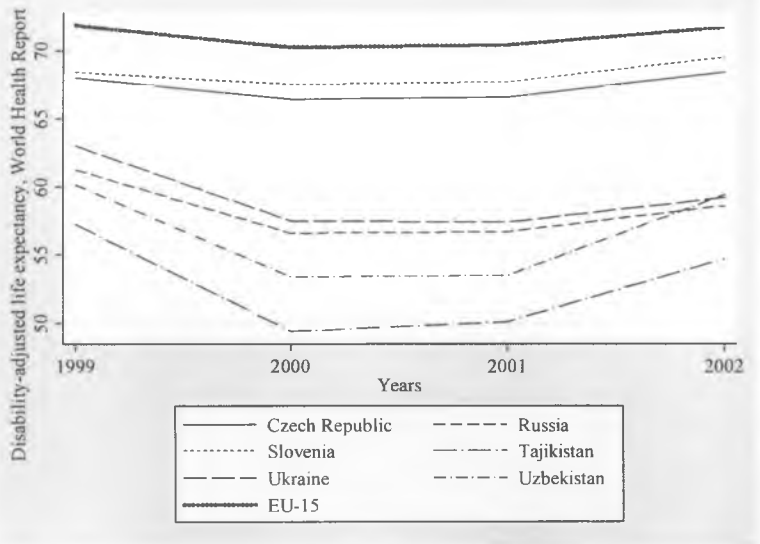
Death rate, diabetes, for selected transition countries and EU-15 average (1988-2007)



Diabetes prevalence in selected transition countries and EU-15 average (1988-2007)



DALE for selected transition countries and EU-15 average (1999-2002)



APPENDIX III

INITIAL EXPLORATION OF HEALTH CARE SYSTEMS (SUMMARY)

Table 1. Basic financial descriptions of the countries of CEE and CIS with the SHI systems (2002-2004)

Country	Year of introduction of SHI	SHI contribution on wage, %	Employer-employee share of the contribution	SHI % in total HE	Number of Insurance Funds/ Companies	VHI/PHI	VHI % in total HE	OOP as share of HE	NGO's & IO's play role in financing	Risk Adjustment[194]
Albania	1995	3.4	50-50	8.7	1 with regional offices	Legalised on paper[195]	61.3	57.2	Yes	No
Bulgaria	1999	6	80-20	28.1	1 with regional offices	Exists	0.7	38	No	No
Croatia	1945, 1993[196]	15	100-0	72.5	1 with regional offices	Exists	–	18.1	Yes	No
Czech Republic	1993	13.5	66-33	80.5	Multiple	Exists	0.1	10.4	No	Yes
Estonia	1992	*13*	100-0	66.2	1 with regional offices	Exists	–	21.3	No	No
Georgia	1995	4	75-25	–	1 with regional offices	Exists	–	77.6	Yes	No
Hungary	1990	14	78-22	63	1 with regional offices	Exists	0.2	24	No	No
Kyrgyzstan	1997	2	100-0	4	1 with regional offices	Legalised on paper	–	39.6	Yes	No
Lithuania	1997[197]	3	100-5	66.3	1 with regional offices	Exists	23.2	31.9	No	No
Poland	1999	8.25[198]	0-100	–	1 with regional offices	Exists	–	28.1	No	No
Moldova	2004	4[199]	50-50	–	1	Exists	1.7	41.4	Yes	No
Romania	1998	13.5	52-48	82.7	1 with regional offices[200]	Legalised on paper	–	25.4	Yes	Yes
Russia	1993	3.6[201]	100-0	~16	Multiple	Exists	–	33.2	No	No
Slovakia	1995	14	71-29	85.9	Multiple	Exists	–	19.2	No	Yes
Slovenia	1945, 1991[202]	13.45	53-47	85	1 with regional offices	Exists	11.6	11.6	No	Yes
Macedonia	1991	–[203]	–	–	1 with regional offices	Legalised on paper	–	29.2	Yes	No

[194] By age or age and gender.
[195] Does not necessarily mean that VHI/PHI is functioning and is wide-spread.
[196] Officially the mandatory health insurance system was established in 1945 on all territory of the Socialist Federal Republic of Yugoslavia, over the years it fragmented and developed differently for each locality. In 1993 the HZZO – Croatian Health Insurance Institute was established, which centralised resources and unified the system.
[197] In Lithuania the State Social Insurance Agency was established in 1991. It covered however only pharmaceuticals and spa facilities. The State Sickness Fund, which was a purchaser of health care was established in 1992, it was funded by the Ministry of Health. The year of 1997 is considered the establishment of the SHI system, as that is when these two institutions merged and the social insurance scheme for all health services was created.
[198] SHI contribution rate in Poland have been increasing since 2002 from 7.75% by 0.25% a year to reach 9% in 2007. Though as we are taking the year 2004 as a year of referral (for the reasons presented in Chapter 3), the rate is stated at 8.25%.
[199] SHI contribution rate in Moldova has been increasing to 6% in 2008, however the year of referral is 2004.
[200] Some countries have separate insurance funds within their parallel systems – Romania is one of them – but they are not competitive with the statutory funds, and as we do not analyse parallel systems separately, their insurance funds should not be taken into account either.
[201] In Russia the unified tax has been introduce in 2001, the share on health expenditure was the equivalent of 3.6% on wage, however in 2005-2006 this has been reduced to 2.8%. However, as mentioned above, the year of reference is 2004, which allows us for some lag to be taken into account.
[202] In Slovenia the Bismarckian type insurance was first established in 1888, and the system of health insurance never disappeared, even though went through many changes – within the Socialist Federal Republic of Yugoslavia and then in 1991 in the independent Slovenia. 1945 stands for the year of introduction of social insurance in SFR Yugoslavia, during reforms of 1954-55 the health insurance was separated from social insurance.
[203] "–" Missing information.

Table 2. Basic financial descriptions of the countries of CEE and CIS with the tax-based systems (2004-2005)

Country	Direct taxes	Indirect taxes	Taxes as % of HE	VHI / PHI	OOP as % of THE	NGO's & IO's play role in financing	Risk Adjustment	SHI existed
Armenia	Yes	Yes	30	Exists	68.7	Yes	No	–
Azerbaijan	Yes	Yes	22	Exists	63.1	Yes	No	–
Belarus	Yes	–	73.4	Legalised on paper	18.2	No	No	–
Kazakhstan	Yes	–	60.4	Exists	39.6	Yes	No	1996-1998
Latvia	Yes	Yes	58.6	Exists	40.6	No	No	1997-2004
Russia	Yes[204]	Yes	~44	Exists	33.2	No	No	1993-...
Tajikistan	Yes	–	21.4	Does not exist	76.4	Yes	No	–
Turkmenistan	Yes	–	66.6	Exist/Does not exist[205]	33.4	Yes	No	–
Ukraine	Yes	Yes	56.8	Exists	39.1	Yes	No	–
Uzbekistan	Yes	Yes	46.1	Exists	52.4	Yes	No	–

[204] Russia is presented in both tables due to her ambiguous structural system.
[205] VHI is present in Turkmenistan and is provided by the MoH, but the PHI is formally forbidden.

Table 3. Further information on financing in health care in CEE and CIS (2004-2005)

Country	Collecting of funds	Pooling of funds	Purchaser - provider split	Pharmaceutical industry	Pharmacies	Outpatient drugs for patients	Dental services	Dental clinics	Co-payment
Albania	State	State	**No**	(Mostly) private	(Mostly) private	Positive list, partially covered	Emergency	Private	Yes
Armenia	State	State	Yes	(Mostly) private	(Mostly) private	Mostly private	(Mostly) private	Private	Yes
Azerbaijan	State	State	**No**	(Mostly) private	Mixed	Mostly private	(Mostly) private	Mixed	Yes
Belarus	State	State	**No**	(Mostly) public	Mixed	Limitedly covered by public resources	(Mostly) private	Mixed	No
Bulgaria	State	Non-state	Yes	(Mostly) public	(Mostly) private	Positive list, partially covered	BBP-specified	Mixed	Yes
Croatia	State	State	Yes	(Mostly) private	(Mostly) private	Positive list, partially covered	BBP-specified	Mixed	Yes
Czech Rep	Non-state	Non-state	Yes	(Mostly) private	(Mostly) private	Covered if prescribed	BBP-specified	Mixed	No
Estonia	State	Non-state	Yes	(Mostly) private	(Mostly) private	Positive list, partially covered	BBP-specified	Mixed	Yes
Georgia	State	State	Yes	-	(Mostly) private	Mostly private	(Mostly) private	Mixed	Yes
Hungary	State	Non-state	Yes	-	(Mostly) private	Positive list, partially covered	BBP-specified	Mixed	Yes
Kazakhstan	State	State	**No**	(Mostly) private	(Mostly) private	Mostly private	Emergency	Private	Yes
Kyrgyzstan	State	Non-state	Yes	(Mostly) private	(Mostly) private	Mostly private	(Mostly) private	Mixed	Yes
Latvia	State	Non-state	Yes	(Mostly) private	(Mostly) private	Limitedly covered by public resources	(Mostly) private	Private	Yes
Lithuania	State	Non-state	Yes	(Mostly) private	(Mostly) private	Mostly private	BBP-specified	Mixed	No
Poland	State	Non-state	Yes	Mixed	Mixed	Positive list, partially covered	BBP-specified	Private	Yes
Moldova	State	Non-state	Yes	-	(Mostly) private	Limitedly covered by public resources	BBP-specified	Private	Yes
Romania	State	Non-state	Yes	(Mostly) private	(Mostly) private	Positive list, partially covered	BBP-specified	Private	Yes
Russia	Non-State	Non-state	Yes	Mixed	Mixed	Mostly private	(Mostly) private	Private	No
Slovakia	Non-state	Non-state	Yes	(Mostly) private	(Mostly) private	Covered if prescribed	BBP-specified	Mixed	No
Slovenia	State	Non-state	Yes	(Mostly) private	(Mostly) private	Positive list, partially covered	BBP-specified	Mixed	Yes
Tajikistan	State	State	**No**	(Mostly) public	(Mostly) private	Mostly private	(Mostly) private	-	Yes
Macedonia	Non-state	Non-state	Yes	-	Mixed	Positive list, partially covered	(Mostly) private	Mixed	Yes
Turkmenistan	State	State	**No**	(Mostly) public	Mixed	Mostly private	(Mostly) private	Public	Yes
Ukraine	State	State	**No**	(Mostly) private	(Mostly) private	Mostly private	Emergency	Mixed	Yes
Uzbekistan	State	State	**No**	Mixed	(Mostly) private	Mostly private	Emergency	Mixed	Yes

Table 4.Main financial data on health care in CEE and CIS (2004)[206]

Country	Total health expenditure (THE) as % of GDP, WHO estimates	THE S PPP per capita, WHO estimates	Public sector exp as % of GDP	Public sector HE as % or THE, WHO est	Private sector expenditures as % of THE	OOP as % of THE	OOP as % of private expenditure	Inpatient expenditure as % of THE	Pharmaceutical expenditure as % of THE	Public pharmaceutical expenditure as % of pharm expenditure	Salaries as % of THE
Albania	6.8	340	2.7	40.6	59.4	57.2	96.2	–	–	–	50(2006)
Armenia	5.7	242	1.7	30	70	68.7	98.2	–	–	–	–
Azerbaijan	4	152	0.9	22	78	63.1	80.8	72.1 (2005)	9.1	–	47.4
Belarus	6.2	428	4.6	73.4	26.6	18.2	68.3	55	17.8	20.8	36.7
Bulgaria	7.5	655	4.6	60.5	39.5	38	96.2	–	–	–	–
Croatia	7.7	974	6.2	80.7	19.3	18.1	94	–	–	–	–
Czech Rep	7.2	1388	6.4	89.2	10.8	10.4	95.4	27.6	24.8	76.3	18.2
Estonia	5.2	740	3.9	76	24	21.3	88.8	32.9	27.8	45.4	35.6
Georgia	8.5	276	1.3	15.4	84.6	77.6	91.7	–	–	–	–
Hungary	8.1	1315	5.7	70.5	29.5	24	81.3	28.9	28.3	64	18.9(2001)
Kazakhstan	3.8	263	2.3	60.4	39.6	39.6	100	53.6 (2000)	–	–	–
Kyrgyzstan	5.7	106	2.3	39.7	60.3	57.1	94.6	65 (2002)	–	–	38.6(2002)
Latvia	6.8	796	4	58.6	41.4	40.6	98.1	60.1	–	–	42.7
Lithuania	5.7	756	3.9	67.6	32.4	31.9	98.4	–	–	–	–
Poland	6.2	808	4.3	68.6	31.4	28.1	89.5	28.1	29.6	36.5	–
Moldova	7.4	149	4.2	56.8	43.2	41.4	96	41.2	23.2	36.7	44.4
Romania	4.9	427	3.5	71.5	28.5	25.4	89.3	53 (2001)	–	–	–
Russia	5.2	505	3.1	59.6	40.4	33.2	82.2	–	–	–	–
Slovakia	7.2	1058	5.3	73.8	26.2	19.2	73.1	24.3	31.4	76.1	–
Slovenia	8.5	1863	6.3	73.5	26.5	11.6	43.9	47.3 (2001)	–	–	44.3(2001)
Tajikistan	4.4	54	0.9	21.4	78.6	76.4	97.2	–	–	–	25.8(2003)
Macedonia	8	544	5.7	70.8	29.2	29.2	100	37.5	14.9	–	50.38
Turkmenistan	4.5	230	3	66.6	33.4	33.4	100	–	–	–	–
Ukraine	6.5	427	3.7	56.8	43.2	39.1	90.5	64.1	12.5	33.7	59.9
Uzbekistan	4.9	156	2.3	46.1	53.9	52.4	97.1	45.7 (2001)	–	–	42.4(2001)

[206] All data are presented for the year 2004 if otherwise not stated in prentices. If the data were not available for the year 2004, other nearest available data were used – for reference only. Source: HfA database, WHO. January 2009.

Table 5. Organisational characteristics of the health care systems of CEE and CIS countries (2004-2005)

Country	Type of inpatient organisation	Inpatient physicians emplyed	Type of outpatient organisation	Outpatient physicians employment	Choice of provider	GP-gatekeeper	Decentralisation
Albania	Public	Publicly	Mostly public	Publicly	Free	On paper	Largely centralised
Armenia	Public	Publicly	Mixed	Publicly	Free	On paper	Very decentralised
Azerbaijan	Public	Publicly	Mostly public	Publicly	Free	No	Largely centralised
Belarus	Public	Publicly	Mostly public	Publicly	Partly limited	No	Largely centralised
Bulgaria	(Quasi-)public	Publicly	Mixed	Privately or self-employed	Free	Yes	Very decentralised
Croatia	(Quasi-)public	Publicly	Mixed	Mix	No	Yes	Largely centralised
Czech Rep	Mixed	Publicly	Mixed	Privately or self-employed	Free	No	Very decentralised
Estonia	Mixed	Publicly or self-employed	Mixed	Mix	Free	Yes	Largely decentralised
Georgia	(Quasi-)public	Publicly or self-employed	Mixed	Mix	-	No	Largely decentralised
Hungary	(Quasi-)public	Publicly	Mixed	Mix	Free	On paper	Largely decentralised
Kazakhstan	Mixed	Publicly	Mostly public	-	Free	-	Largely decentralised
Kyrgyzstan	Public	Publicly	Mostly public	Publicly	Free	On paper	Largely decentralised
Latvia	(Quasi-)public	Publicly	Mixed	Privately or self-employed	Free	On paper	Largely decentralised
Lithuania	Public	Publicly	Mostly public	-	Free	On paper	Largely decentralised
Poland	(Quasi-)public	Publicly	Mixed	Publicly	-	On paper	Largely decentralised
Moldova	Public	Publicly	Mostly public	-	Partly limited	On paper	Largely decentralised
Romania	Public	Publicly	Mixed	Privately or self-employed	Free	Yes/On paper?	Largely decentralised
Russia	Public	Publicly	Mostly public	Publicly		On paper	Very decentralised
Slovakia	Mixed	Publicly	Mixed	Mix	Free	On paper	Very decentralised
Slovenia	Public	Publicly	Mixed	Mix	Free	Yes/On paper?	Largely centralised
Tajikistan	Public	Publicly	Mostly public	Publicly	Free	No	Largely centralised
Macedonia	Public	Publicly	Mixed	Publicly	Partly limited	Yes/On paper?	Largely decentralised
Turkmenistan	Public	Publicly	Mostly public	Publicly	Partly limited	On paper	Largely centralised
Ukraine	Public	Publicly	Mostly public	Publicly	Free	No	Very decentralised
Uzbekistan	Mixed	Publicly	Mixed	Publicly	Free	No	Largely centralised

Table 6. Main organisational statistics of the health care systems of CEE and CIS countries (2004)[207]

Country	Hospitals per 100,000	Hospital beds per 100000	Physicians per 100,000	Inpatient admissions per 100	Average length of stay	Nurses per 100,000	Dentists per 100,000	Acute care hospital beds per 100,000	Oupatient contacts per person per year	Priv hospital beds as % of all beds	GP per 100,000	Primary care health units per 100,000
Albania	1.6	300.74	118.28	8.71	6.4	356.09	43.51	271.48	1.9	0	50.84	80.49
Armenia	4.36	443.65	327.19	7.31	10.27	406.13	27.38	388.11	2.08	0	55.66	31.02
Azerbaijan	8.81	823.96	361.78	5.36	16.4	719.27	27.94	755.04	4.8	0.21	17.42	43.59
Belarus	7.17	1071.31	460.9	28.52	11.8	1174.2	45.36	891	13.1	0	32.16	68.32
Bulgaria	3.93	613.13	352.43	19.55	8.2	382.58	83.42	755.35	5.4	1.72	68.9	19.14
Croatia	1.76	552.98	249.88	16.36	10.68	513.56	71.92	363.31	7.59	0.41	68	75.62
Czech Rep	3.56	847.44	347.57	22.15	11	853.17	67.04	620.26	15.2	19.93	71.88	234.65
Estonia	3.78	581.79	320.91	19.18	7.98	643	85.08	426.15	6.8	10.11	65.07	60.03
Georgia	6.29	407.32	489.44	5.48	8.7	396.52	30.68	366.48	2	–	24.25	20.95
Hungary	1.77	782.75	333.69	25.26	8.22	840	50.95	550.64	12.56	2.73	65.53	4.6
Kazakhstan	6.94	776.91	364.74	18.21	12.9	633.1	36.11	617.97	6.7	6.6	14.7	54.83
Kyrgyzstan	2.92	528.51	261.96	12.74	12.5	624.78	21.51	410.08	4	0.92	47.21	15.79
Latvia	5.15	773.56	311.22	21.11	10.59	529.57	60.1	538	5	4.98	53.23	101.09
Lithuania	5.27	843.29	389.95	23.8	10.2	745.72	66.13	554.61	6.6	0.3	82.96	27.04
Poland	2.21	534.82	224.26	17.55	6.9	464.9	26.4	465.77	6	3.75	–	–
Moldova	3.27	641.33	308.44	16.33	10	703.95	39.93	520.76	5.5	0.5	57.66	17.68
Romania	1.92	655.32	198.22	24.45	8.1	400.64	23.13	443.2	5.8	0.38	68.73	51.17
Russia	6.26	987.92	422.09	22.11	14.2	798.74	31.9	821.75	9	–	22.06	11.41
Slovakia	2.67	700.84	313.25	18.6	9.1	663.83	45.33	612.46	13	5.09	43.05	191.78
Slovenia	1.45	479.92	231.2	17.27	7.5	744.26	59.74	385.03	6.98	0.87	46.37	3.2
Tajikistan	6.69	604.38	193.54	9.9	13	428.29	14.72	541.94	4.4	0.22	19.76	49.28
Macedonia	2.66	477.78	221.18	9.88	11.3	357.93	55.86	332.22	4.4	1.03	107.24	84.33
Turkmenistan	2.49	489.62	262.26	14.68	9.9	467.77	15.5	383.89	7.6	0.12	63.6	36.14
Ukraine	5.64	872.85	301.27	21.07	13.9	777.47	40.76	710.81	10.5	–	30.16	14.09
Uzbekistan	3.82	526.04	274.35	14.85	10.6	994.08	20.31	454	8.6	2.2	14.51	25.94

[207] Source: HfA database, WHO. January 2009.

Table 7. Payments and incentives structure in the health care systems of CEE and CIS countries (2004-2005)[208]

Country	Payments to doctors in primary care	Payments to outpatient specialists	Payments to inpatient doctors	Payments to hospitals	Allocation of resources	Bonuses for quality to doctors	Bonuses for quality to hospitals
Albania	Mix	Salary	Salary	Line-based budgets	Prospective	No	No
Armenia	Salary	Fee for service	Salary	Per case/DRG	Retrospective	No	No
Azerbaijan	Salary	Salary	Salary	Line-based budgets	Retrospective	No	No
Belarus	Salary	Salary	Salary	Line-based budgets	Prospective	No	No
Bulgaria	Capitation	Fee for service	Salary	Per case/DRG	Prospective	No	Yes
Croatia	Capitation	Salary	Salary	Per case/DRG	Both	No	No
Czech Rep	Mix	Fee for service	Salary	Global budgets	Retrospective	No	No
Estonia	Mix	Mix	Salary	Per case/DRG and per diem	Prospective	No	No
Georgia	Mix	Mix	Fee for service	Per case/DRG	-	No	No
Hungary	Capitation	Fee for service	Salary	Per case/DRG and per diem	Prospective	Yes	No
Kazakhstan	Salary	Fee for service	Salary	Per case/DRG	-	No	No
Kyrgyzstan	Salary	Salary	Salary	Per case/DRG	Retrospective	No	No
Latvia	Mix	Salary	Salary	Per case/DRG and per diem	Both	Yes	No
Lithuania	Capitation	Salary	Salary	Per case/DRG	Prospective	Yes	No
Poland	Capitation	Salary	Salary	Per case/DRG and per diem	-	No	No
Moldova	Capitation	Mix	Salary	Per case/DRG	Prospective	Yes	Yes
Romania	Mix	Fee for service	Salary	Per case/DRG	Prospective	Yes	No
Russia	Salary	Salary	Salary	Line-based budgets and DRG	Retrospective	No	No
Slovakia	Mix	Fee for service	Salary	Per case/DRG and per diem	Prospective	No	No
Slovenia	Mix	Salary	Salary	Per case/DRG	Prospective	No	No
Tajikistan	Salary	Salary	Salary	Line-based budgets	-	No	No
Macedonia	Mix	Salary	Salary	Per case/DRG	Prospective	No	No
Turkmenistan	Salary	Salary	Salary	Line-based budgets	Prospective	No	No
Ukraine	Salary	Salary	Salary	Line-based budgets	Prospective	No	No
Uzbekistan	Salary	Salary	Salary	Line-based budgets	Prospective	No	No

[208] It is a simplification of the payments mechanisms, which as well changes throughout transition.

Table 8. Other characteristics of the health care systems of CEE and CIS countries (2004-2005)

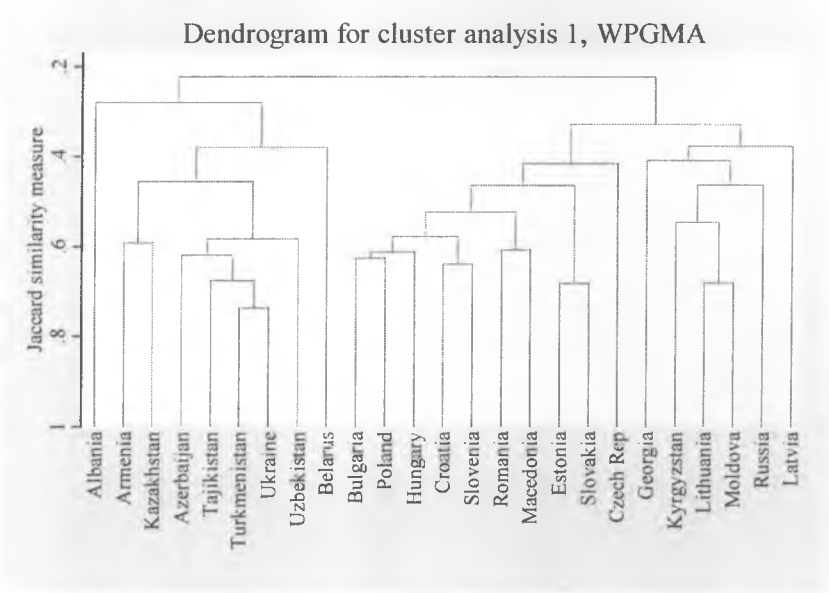
Country	Use of IT	BBP	Professional chambers or associations	Regional variation[209]	Existence of parallel HC systems	SHI existed during Communist times
Albania	Little	Limited	Little role	Minor differences	No	No
Armenia	Little	Limited	Little role	Minor differences	Yes	No
Azerbaijan	-	Limited	Don't exist	Minor differences	Yes	No
Belarus	Some	Comprehensive	Little role	Almost no differences	Yes	No
Bulgaria	Some	Comprehensive	Little role	Almost no differences	Yes	No
Croatia	Some	Comprehensive	Developed	Almost no differences	-	Yes
Czech Rep	-	Comprehensive	Developed	Almost no differences	Yes	No
Estonia	Efficient	Comprehensive	Little role	Almost no differences	No	No
Georgia	Little	Limited	Little role	Minor differences	Yes	No
Hungary	Efficient	Comprehensive	Developed	Almost no differences	Yes	No
Kazakhstan	-	Limited	Little role	Minor differences	Yes	No
Kyrgyzstan	-	Limited	Little role	Minor differences	Yes	No
Latvia	-	Comprehensive	Developed	Almost no differences	Yes	No
Lithuania	-	Comprehensive	Little role	Almost no differences	Yes	No
Poland	-	Comprehensive	Little role	Minor differences	Yes	No
Moldova	-	Comprehensive	Little role	Minor differences	Yes	No
Romania	-	Comprehensive	Developed	Minor differences	Yes	No
Russia	Little	Comprehensive	Little role	Very different	Yes	No
Slovakia	-	Comprehensive	Developed	Almost no differences	Yes	No
Slovenia	-	Comprehensive	Developed	Almost no differences	Yes	Yes
Tajikistan	-	Limited	Little role	Minor differences	Yes	No
Macedonia	Little	Comprehensive	Developed	Minor differences	Yes	Yes
Turkmenistan	Little	Limited	Little role	Minor differences	Yes	No
Ukraine	Little	Limited	Little role	Minor differences	Yes	No
Uzbekistan	Little	Limited	Don't exist	Minor differences	Yes	No

[209] In cluster analysis this variable has been used as binary – whether there are some differences or not (almost not). It is however understood, that this distinction can be very subjective.

APPENDIX IV

CLUSTER ANALYSIS

1. Cluster analysis, using only structural characteristics (WPGMA, Jaccard similarity measure).



Stopping rules

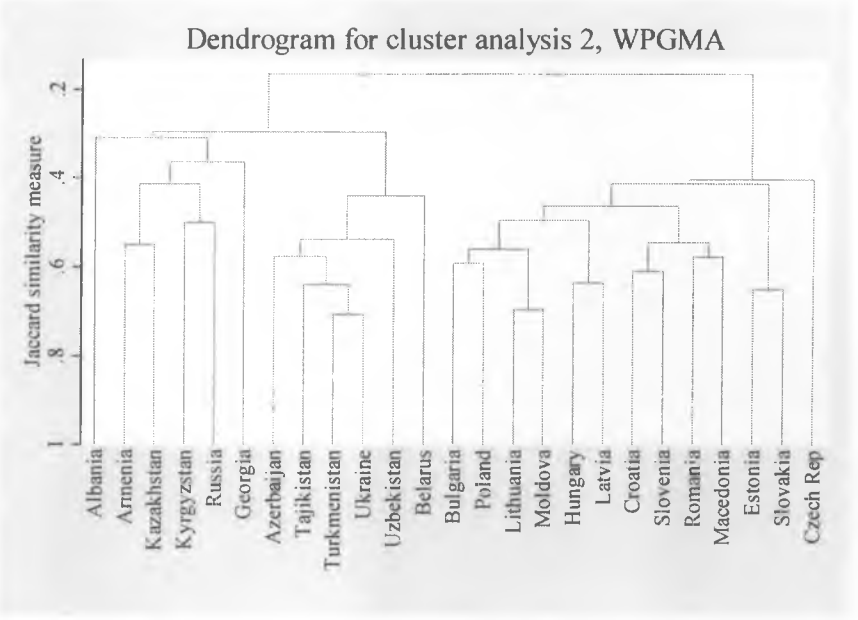
Calinski and Harabasz pseudo-F index

Number of clusters	Calinski/ Harabasz pseudo-F
2	8.32
3	5.03
4	4.74
5	4.02
6	3.45
7	3.22
8	3.09
9	3.03
10	2.99
11	3.11
12	3.28
13	3.25
14	3.26
15	3.16

Duda and Hart Je(2)/Je(1) index

Number of clusters	Duda/Hart Je(2)/Je(1)	Duda/Hart pseudo T-squared
1	0.7344	8.32
2	0.7670	2.13
3	0.8294	2.88
4	0.7546	1.30
5	**0.8100**	**1.41**
6	**0.6771**	**1.43**
7	**0.8412**	**1.51**
8	0.6688	2.48
9	0.5470	1.66
10	0.7865	1.90
11	0.7194	1.95
12	0.3750	1.67
13	0.6781	1.42
14	0.6757	1.44
15	0.0000	.

2. Cluster analysis using only structural characteristics, excluding SHI/NHS divide and co-payments (WPGMA, Jaccard similarity measure).



Stopping rules

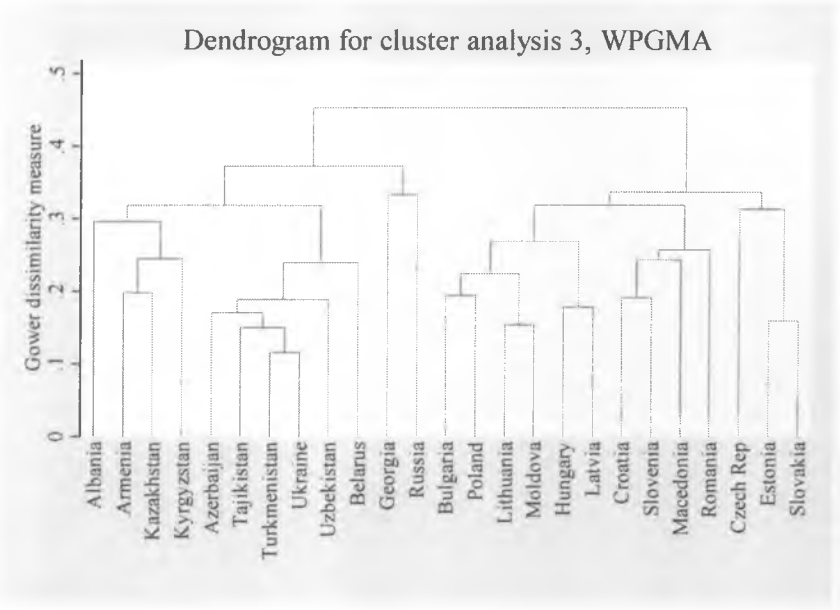
Calinski and Harabasz pseudo-F index

Number of clusters	Calinski/ Harabasz pseudo-F
2	8.24
3	5.58
4	4.26
5	3.62
6	3.29
7	3.27
8	3.13
9	2.84
10	3.10
11	3.18
12	3.09
13	2.94
14	2.95
15	2.84

Duda and Hart Je(2)/Je(1) index

Number of clusters	Duda/Hart Je(2)/Je(1)	Duda/Hart pseudo T-squared
1	0.7364	8.24
2	0.7875	2.70
3	0.7636	1.24
4	0.6875	1.36
5	**0.8872**	**1.40**
6	**0.8371**	**1.95**
7	0.5455	1.67
8	0.7462	1.36
9	0.7695	2.40
10	0.6687	1.98
11	0.0000	.
12	0.6757	1.44
13	0.6061	1.30
14	0.0000	.
15	0.5517	1.63

3. Cluster analysis using structural characteristics, excluding SHI/NHS and co-payments, but adding health expenditure and public health expenditure as a share of GDP (WPGMA method, Gower dissimilarity measure).



Stopping rules

Calinski and Harabasz pseudo-F index

Number of clusters	Calinski/ Harabasz pseudo-F
2	11.46
3	6.91
4	5.23
5	**4.48**
6	**4.14**
7	3.87
8	3.62
9	3.42
10	3.28
11	3.59
12	3.38
13	3.17
14	3.30
15	3.18

Duda and Hart Je(2)/Je(1) index

Number of clusters	Duda/Hart Je(2)/Je(1)	Duda/Hart pseudo T-squared
1	0.6673	11.46
2	0.8369	1.95
3	0.8770	1.54
4	0.0000	.
5	**0.8006**	**1.99**
6	**0.8172**	**1.79**
7	0.3639	1.75
8	0.5566	1.59
9	0.6926	1.78
10	0.3797	3.27
11	0.4871	1.05
12	0.4308	1.32
13	0.6837	1.85
14	0.6060	1.30
15	0.0000	.

Cluster Analysis 1	Cluster Analysis 2	Cluster Analysis 3

country	cluster
Albania	1
Turkmenistan	2
Kazakhstan	2
Armenia	2
Ukraine	2
Tajikistan	2
Uzbekistan	2
Azerbaijan	2
Belarus	2
Macedonia	3
Croatia	3
Slovenia	3
Bulgaria	3
Poland	3
Romania	3
Czech Rep	3
Hungary	3
Estonia	3
Slovakia	3
Moldova	4
Lithuania	4
Kyrgyzstan	4
Russia	4
Georgia	4
Latvia	5

country	cluster
Albania	1
Turkmenistan	2
Kazakhstan	2
Armenia	2
Ukraine	2
Tajikistan	2
Uzbekistan	2
Azerbaijan	2
Belarus	3
Macedonia	4
Croatia	4
Slovenia	4
Bulgaria	4
Poland	4
Romania	4
Czech Rep	4
Hungary	4
Estonia	4
Slovakia	4
Moldova	5
Lithuania	5
Kyrgyzstan	5
Russia	5
Georgia	5
Latvia	6

country	cluster
Albania	1
Russia	2
Armenia	2
Kazakhstan	2
Kyrgyzstan	2
Georgia	3
Azerbaijan	4
Tajikistan	4
Turkmenistan	4
Ukraine	4
Uzbekistan	4
Belarus	4
Slovenia	5
Poland	5
Croatia	5
Estonia	5
Macedonia	5
Hungary	5
Romania	5
Bulgaria	5
Slovakia	5
Lithuania	5
Czech Rep	5
Moldova	5
Latvia	5

country	cluster
Albania	1
Russia	2
Kazakhstan	2
Kyrgyzstan	2
Armenia	2
Georgia	3
Azerbaijan	4
Tajikistan	4
Belarus	4
Ukraine	4
Turkmenistan	4
Uzbekistan	4
Hungary	5
Macedonia	5
Romania	5
Estonia	5
Slovenia	5
Croatia	5
Poland	5
Slovakia	5
Latvia	5
Moldova	5
Bulgaria	5
Lithuania	5
Czech Rep	6

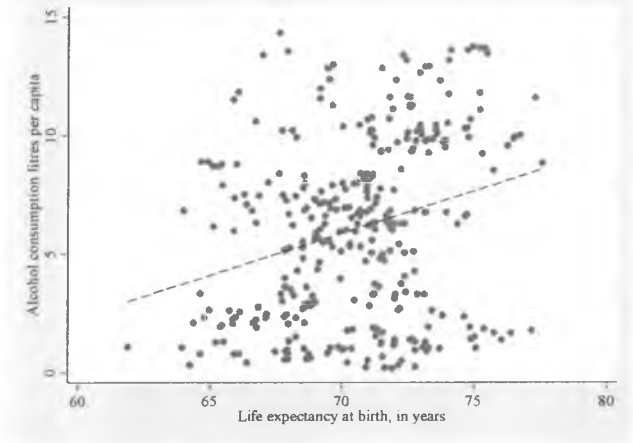
country	cluster
Belarus	1
Tajikistan	1
Ukraine	1
Turkmenistan	1
Albania	1
Azerbaijan	1
Armenia	1
Kazakhstan	1
Uzbekistan	1
Kyrgyzstan	1
Georgia	2
Russia	3
Lithuania	4
Latvia	4
Macedonia	4
Slovenia	4
Romania	4
Croatia	4
Bulgaria	4
Hungary	4
Poland	4
Moldova	4
Estonia	5
Slovakia	5
Czech Rep	5

country	cluster
Tajikistan	1
Ukraine	1
Turkmenistan	1
Albania	1
Belarus	1
Azerbaijan	1
Kazakhstan	1
Uzbekistan	1
Kyrgyzstan	1
Armenia	1
Georgia	2
Russia	3
Hungary	4
Poland	4
Lithuania	4
Moldova	4
Latvia	4
Bulgaria	4
Slovenia	5
Macedonia	5
Romania	5
Croatia	5
Czech Rep	6
Estonia	6
Slovakia	6

APPENDIX V

DESCRIPTIVE STATISTICS

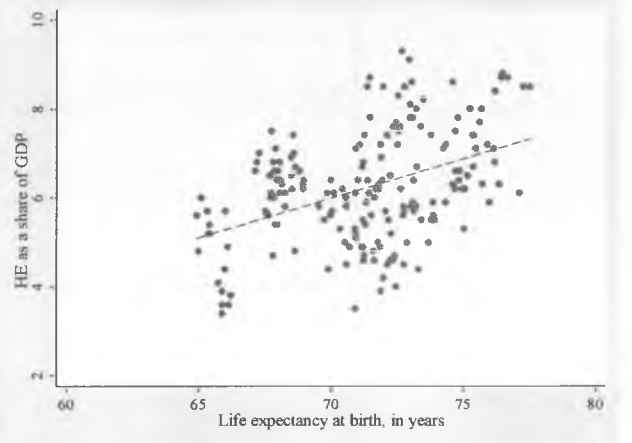
LEB and alcohol consumption in transition countries



LEB and hospital beds in transition countries

LEB and PbHE in transition countries

LEB and HE as a share of GDP in transition countries



LEB and the number of GPs in transition countries

LEB and HE per capita in $ in transition countries

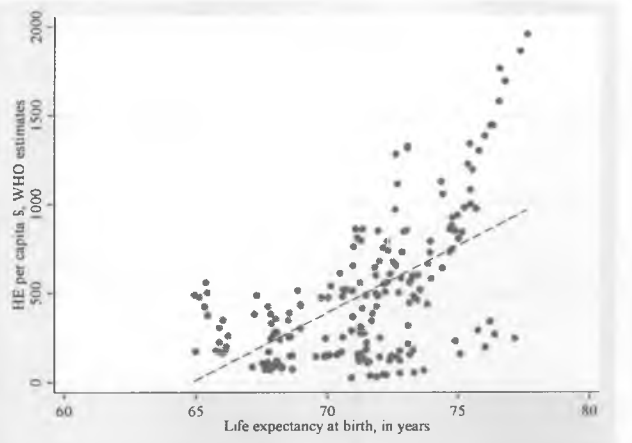


Table 1. Descriptive statistics by groups of classifications. Classification 1.

	Group 1			Group 2			Group 3			Group 4			Group 5		
	Azerbaijan Tajikistan Turkmenistan Uzbekistan Kazakhstan Ukraine Belarus Albania Armenia Kyrgyzstan			Macedonia Slovenia Romania Estonia Croatia Poland Bulgaria Hungary Latvia Lithuania Moldova			Czech Republic Slovakia			Georgia			Russia		
Variable	No. of obs.	Mean	Std. dev.	No. of obs.	Mean	Std. dev.	No. of obs.	Mean	Std. dev.	No. of obs.	Mean	Std. dev.	No. of obs.	Mean	Std. dev.
LEB	164	69.43	2.91	194	71.43	2.47	36	73.65	1.61	16	71.53	0.93	18	66.33	1.67
LEB, male	164	65.45	3.63	194	67.15	2.93	36	69.86	1.89	16	67.72	1.04	18	60.27	1.98
LEB, female	164	73.44	2.53	194	75.73	2.31	36	77.45	1.27	16	75.14	0.85	18	72.76	0.99
MM	178	39.79	22.21	202	20.17	18.58	37	8.39	4.10	19	40.97	19.35	18	42.15	10.50
SDR, infectious	162	27.84	18.43	192	10.77	4.48	36	3.31	0.80	12	12.47	2.45	18	21.10	4.82
TB, incidence	190	61.67	36.55	209	50.09	28.56	38	18.90	7.21	19	85.78	43.30	19	71.22	23.11
SDR, TB	162	14.89	9.06	192	6.76	4.20	33	1.15	0.48	12	7.59	1.27	18	16.13	4.68
Cancer, incidence	168	146.34	100.92	190	328.23	130.20	33	480.50	106.03	19	108.50	22.57	18	296.69	23.25
SDR, cervix cancer	162	5.78	2.65	190	7.84	3.16	36	6.68	0.83	12	6.22	1.60	18	6.84	0.16
Syphilis, incidence	174	38.00	54.73	207	23.69	36.52	37	4.35	2.82	19	21.27	12.56	19	109.99	87.79
Hepatitis B, incidence	163	24.33	30.93	191	13.98	12.33	38	5.89	3.36	19	17.43	13.10	19	24.10	13.05
SDR, ischaemic, 0-64	163	96.27	31.27	192	66.70	27.03	36	59.31	16.98	12	110.99	27.53	18	124.64	20.24
SDR, diabetes	162	15.87	10.95	192	13.81	6.41	36	13.11	3.25	12	13.48	2.37	18	7.71	1.25
GDP (log)	168	7.88	0.64	196	8.92	0.63	34	9.47	0.32	19	7.78	0.42	19	9.04	0.26
Inflation (log)	106	2.81	2.09	179	2.43	1.65	28	1.53	0.97	13	2.27	1.08	15	3.53	1.41
Forex	190	2.47	1.30	209	3.61	1.03	38	3.83	1.03	19	3.03	1.53	19	2.75	0.91
GP	151	33.89	19.45	166	60.77	21.45	36	56.94	14.80	17	29.35	7.80	18	23.54	1.33
Hospital beds	181	839.16	306.02	206	775.20	235.82	38	864.92	104.96	19	640.87	255.00	18	1135.32	108.05
Outpatient contact	181	6.35	3.00	198	6.80	2.16	34	14.33	1.07	19	3.33	2.43	18	9.23	0.25
Alcohol	129	2.44	2.01	156	7.87	2.71	30	11.49	1.72	12	3.45	1.68	15	7.36	1.45
Fruit	123	136.35	44.59	143	171.55	38.72	22	141.11	15.77	12	133.40	13.49	12	120.72	12.52
CO2 emissions	133	4.63	3.59	164	6.10	2.81	32	10.09	2.87	13	1.09	0.62	13	10.56	1.03
Polity	190	-2.07	5.72	209	6.85	4.15	34	8.56	2.80	19	4.42	2.55	19	4.42	2.99
Violent conflict	172	0.40	1.20	191	0.10	0.47	34	0.00	0.00	17	0.59	1.18	17	2.59	1.97
Age dependency	190	0.62	0.13	209	0.48	0.04	38	0.46	0.05	19	0.52	0.02	19	0.46	0.04

APPENDIX VI

HEALTH PRODUCTION FUNCTIONS RESULTS

Table 1. Health production functions models estimation for selected health outcomes for years 1998-2005 – with HE or incorporating groups from Classification 1. Reporting coefficients and standard errors.

	Maternal mortality	Maternal mortality	SDR, infectious	SDR, infectious
GDP (log)	-8.86231**	-5.77404	-5.435127**	-9.683137***
	4.05238	4.444039	2.404568	2.776984
Inflation (log)	-0.59425	-0.92434	0.370002	0.368049
	0.849828	0.863144	0.278325	0.287422
Forex	6.673695**	4.138144	6.411896***	5.511765***
	3.174068	2.96862	1.180087	1.168832
Fruit	-0.1203116***	-0.1184378***	-0.0631603***	-0.0480326***
	0.036527	0.036881	0.014182	0.014453
Polity	-0.3707	-0.27768	-0.12486	-0.11609
	0.427237	0.393555	0.163851	0.160397
Violent conflict	0.762463	1.91308	1.661122***	1.988808***
	1.974477	1.719995	0.613736	0.597733
ALOS	-0.11906	0.107413	0.383788	0.388667
	0.948108	0.946087	0.411696	0.421491
Outpatient contacts	0.278995	-0.12272	0.118566	-0.21789
	0.88254	0.755938	0.407924	0.39592
Group 1	16.67099		16.57664**	
	11.4662		6.59812	
Group 2	10.9895		9.577157*	
	9.629301		5.642439	
Group 4	29.03391*		-2.84493	
	15.03258		9.127376	
Group 5	32.16593**		20.62977**	
	15.38567		8.375852	
THE as % of GDP		0.391441		-0.74651
		1.887659		0.959643
PbHE as % of GDP		-3.43369		1.696405
		2.22316		1.080398
Constant	80.91322*	96.54924**	32.98977	82.68221***
	41.97762	42.45935	23.7645	25.69883
Time effects	Yes	Yes	Yes	Yes
R2	0.6630	0.6265	0.6957	0.4588
Number of observations	125	125	122	122

Group 1	Group 2	Group 3	Group 4	Group 5
Azerbaijan	Macedonia	Czech Republic	Georgia	Russia
Tajikistan	Slovenia	Slovakia		
Turkmenistan	Romania			
Uzbekistan	Estonia			
Kazakhstan	Croatia			
Ukraine	Poland			
Belarus	Bulgaria			
Albania	Hungary			
Armenia	Latvia			
Kyrgyzstan	Lithuania			
	Moldova			

Table 2. Classical health production function models estimation. Dependent variable: Hepatitis B incidence. Reporting coefficients and standard errors.

	Hepatitis B incidence					
	RE	FE	RE	FE	RE	FE
GDP (log)	**-0.52119**	**1.440427**	**0.054223**	**4.17001**	**-1.61892**	**1.839011**
	1.882534	3.124005	2.347421	4.307231	2.885552	4.732875
Inflation (log)	**-0.38898**	**-0.45942**	**-0.63468**	**-0.66033**	**-0.71309**	**-0.7389157***
	0.375717	0.386185	0.426679	0.437066	0.434522	0.443955
Forex	**-1.29944**	**-1.33901**	**-1.982767****	**-1.817014***	**-1.54213**	**-1.15972**
	0.955084	1.011758	1.020479	1.077395	1.073685	1.127827
Fruit	–	–	**0.011332**	**0.020225**	**0.01368**	**0.016675**
			0.021672	0.024192	0.022312	0.02482
Polity	–	–	**0.123282**	**0.132381**	**0.110202**	**0.109464**
			0.16537	0.177499	0.16901	0.179259
Violent conflict	–	–	**0.578424**	**0.59797**	**0.578531**	**0.502233**
			0.544661	0.564263	0.554712	0.576642
ALOS	–	–	–	–	**-0.11481**	**-0.3433**
					0.53932	0.619323
Outpatient contacts	–	–	–	–	**0.729935**	**1.422159****
					0.495236	0.629584
Constant	**22.32064**	**6.887482**	**13.60292**	**-5.20891**	**39.45453**	**8.449945**
	16.73799	26.74433	20.46205	35.93551	26.51668	42.53751
Time effects	Yes	Yes	Yes***	Yes	Yes**	Yes
R2	0.2979	0.2449	0.1287	0.0277	0.3546	0.0023
Number of observations	300	300	215	215	209	209
LM			314.84(p=0)		219.28(p=0)	
Hausman		1.23(p=0)		–		8.53(p=0.9925)

Table 3. Health production function models estimation Classification 2. Reporting coefficients and standard errors.

	LEB	MM	SDR infectious	Hepatitis B incidence	SDR ischaemic heart
GDP (log)	**0.8796375****	**-7.314093*****	**-3.150103*****	**-4.858057*****	**-17.2724**
	0.348044	2.619699	1.153197	1.879057	14.39703
Inflation (log)	**-0.2136758****	**1.107569**	**0.373229**	**0.312593**	**-0.38001**
	0.096972	0.729901	0.322033	0.533584	4.020411
Forex	**0.082755**	**-3.06678**	**1.708057***	**-2.31412**	**-37.32525*****
	0.2733	2.057102	0.907713	1.454746	11.3323
Fruit	**0.0226623*****	**-0.2116245*****	**-0.1156107*****	**-0.0501468****	**-0.4927415*****
	0.003918	0.029492	0.013011	0.021457	0.162432
Polity	**0.053636**	**-0.6393535****	**-0.3685117*****	**0.043571**	**-0.2725**
	0.034324	0.258355	0.113735	0.176324	1.419922
Violent conflict	**0.3033878****	**-3.216726*****	**-0.37582**	**-1.899338*****	**-3.52517**
	0.126032	0.94863	0.41727	0.636077	5.209391
ALOS	**-0.2688961****	**-1.11944**	**0.265578**	**0.085746**	**14.08647*****
	0.108611	0.817501	0.360846	0.582757	4.50496
Outpatient contacts	**-0.2379672*****	**-0.47104**	**-0.29634**	**0.537405**	**9.375955*****
	0.067889	0.510991	0.224807	0.437463	2.806597
Group 1	**-3.955809*****	**9.274414***	**16.41019*****	**4.453794**	**123.7974*****
	0.747812	5.628718	2.475663	4.358633	30.9073
Group 2	**-4.126807*****	**11.96223**	**11.07802*****	**7.490456**	**179.1612*****
	1.013379	7.627618	3.356157	5.652502	41.89979
Group 3	**-4.866104*****	**7.352269**	**9.169522*****	**6.952663***	**218.2214*****
	0.75434	5.677853	2.49868	4.225503	31.19466
Group 4	**-5.243812*****	**7.980069**	**6.89526*****	**13.76632*****	**112.3508*****
	0.700078	5.269426	2.318865	4.385455	28.94977
Group 6	**-7.925637*****	**30.92673*****	**15.09259*****	**27.16271*****	**91.0983*****
	0.822859	6.193589	2.724253	4.556762	34.01081
Group 7	**-4.161832*****	**13.34815****	**9.885863*****	**7.880988***	**48.36818**
	0.830275	6.249407	2.75101	4.575067	34.34487
Group 8	**-2.855142*****	**-15.66025****	**0.848029**	**-4.86779**	**78.79698***
	0.978627	7.366039	3.243578	5.143829	40.49431
Group 9	**-4.082443*****	**21.55913****	**-1.54822**	**2.009475**	**215.1465*****
	1.240561	9.337594	4.252911	6.926811	53.09528
Group 10	**-3.055323****	**9.794652**	**2.738674**	**7.99107**	**36.89042**
	1.361429	10.24736	4.512949	8.309262	56.34172
Group 11	**-4.605554*****	**-0.97564**	**4.340416**	**18.61837*****	**92.34406*****
	0.864554	6.507417	2.883227	4.814803	35.99552
Constant	**70.61984*****	**132.2982*****	**43.65275*****	**59.13622*****	**134.0171**
	4.459343	33.56508	14.79564	20.86954	184.7156
Time effects	Yes	Yes	Yes	Yes	Yes*
R2	0.7706	0.6612	0.8074	0.5669	0.7945
Number of observations	234	234	230	209	230

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11
Azerbaijan Tajikistan Turkmenistan Uzbekistan Kazakhstan Ukraine	Armenia Kyrgyzstan	Lithuania Moldova	Hungary Latvia Bulgaria	Czech Republic Slovakia	Russia	Macedonia Slovenia Romania Croatia	Belarus	Georgia	Albania	Estonia Poland

Table 4. Health production function models estimation Classification 3. Reporting coefficients and standard errors.

	LEB	MM	SDR infectious	Hepatitis B incidence	SDR ischaemic heart
GDP (log)	0.8411158**	-8.281055***	-3.204333***	-3.455109*	-23.72334
	0.3378104	2.550997	1.145434	1.896506	14.87404
Inflation (log)	-0.2249039**	0.909587	0.38964	0.70549	-1.2227
	0.095168	0.718664	0.32347	0.533763	4.200416
Forex	0.083771	-3.28372	1.643092*	-2.02855	-39.42121***
	0.272574	2.058356	0.925175	1.49703	12.01386
Fruit	0.0238951***	-0.2177778***	-0.1263878***	-0.0405873*	-0.6931707***
	0.003778	0.028528	0.012821	0.021548	0.166481
Polity	0.0539542*	-0.5224685**	-0.3285865***	-0.12899	1.064138
	0.033091	0.249886	0.111865	0.175409	1.452623
Violent conflict	0.3127559**	-3.180684***	-0.4265	-1.924293**	-4.05562
	0.125676	0.94905	0.424947	0.65604	5.518147
ALOS	-0.3490923***	-0.61307	1.016036***	-0.67325	28.82059***
	0.082661	0.624217	0.279811	0.502112	3.63349
Outpatient contacts	-0.2671781***	-0.24108	-0.01084	0.149435	15.1432***
	0.062034	0.468456	0.210239	0.429145	2.730061
Group 1	-3.905504***	8.802194	15.90194***	4.523854	113.2383***
	0.745482	5.629552	2.521047	4.48976	32.73706
Group 2	-4.21304***	13.61131*	12.27892***	4.559127	207.5959***
	1.003131	7.575208	3.393579	5.772669	44.06733
Group 3	-5.043075***	4.332747	9.36865***	10.59159**	203.2506***
	0.699706	5.283878	2.369927	4.219475	30.7747
Group 4	-5.528984***	9.659698*	9.497457***	10.78478**	162.5249***
	0.654919	4.945661	2.2165	4.380576	28.78237
Group 6	-7.807317***	30.27063***	14.01173***	27.61181***	70.17343*
	0.816019	6.162221	2.758799	4.673733	35.82439
Group 7	-4.606407***	16.44299***	14.11208***	2.764975	132.1142***
	0.726385	5.48534	2.461225	4.306446	31.96025
Group 8	-2.796215***	-15.27038**	0.610468	-5.97432	77.93133*
	0.976186	7.371734	3.304121	5.294144	42.90568
Group 9	-4.636931***	23.96948***	3.356751	-2.34318	305.5735***
	1.154014	8.714614	4.043469	6.858211	52.50648
Constant	72.32758***	132.994***	31.60653**	57.55207***	-51.5352
	4.252617	32.11391	14.41337	20.92669	187.1649
Time effects	Yes	Yes	Yes**	Yes	Yes***
R2	0.7687	0.6561	0.7973	0.5336	0.7661
Number of observations	234	234	230	209	230

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9
Azerbaijan	Armenia	Lithuania	Hungary	Czech	Russia	Macedonia	Belarus	Georgia
Tajikistan	Kyrgyzstan	Moldova	Latvia	Republic		Slovenia		
Turkmenistan	Albania	Estonia	Bulgaria	Slovakia		Romania		
Uzbekistan		Poland				Croatia		
Kazakhstan								
Ukraine								

Table 5. Health production function models estimation with beta coefficients for Classification 1. Reporting unstandardised and standardised coefficients.

	LEB		Maternal mortality		SDR, infectious		Hepatitis B incidence		SDR, ischaemic heart disease	
	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients
GDP (log)	1.055353***	0.258894	-8.926215***	-0.3536	-2.323332**	-0.1584	-4.907009***	-0.34353	-64.44196***	-0.36352
Inflation (log)	-0.2016263***	-0.12888	1.200855	0.123953	0.497032	0.088704	0.390412	0.070541	-6.167871**	-0.09108
Forex	-0.1812	-0.05485	2.073309	0.101344	3.678234***	0.309679	-1.20971	-0.10483	-27.33231***	-0.1904
Fruit	0.0260431***	0.367871	-0.1671083***	-0.38117	-0.1143572***	-0.45038	-0.0826497***	-0.31122	-0.8801128***	-0.2868
Polity	0.016876	0.030378	-0.4444645*	-0.1292	-0.253479**	-0.1273	0.25719	0.131576	3.217448**	0.133692
Violent conflict	0.2684116**	0.100626	-1.849742*	-0.11198	0.452848	0.047444	-1.608957**	-0.17733	-2.98748	-0.0259
ALOS	-0.3632028***	-0.34873	-0.19347	-0.03	1.609847***	0.428892	-0.32286	-0.08512	21.98231***	0.484571
Outpatient contacts	-0.2573419***	-0.30422	-0.7827736*	-0.14943	-0.33787	-0.11049	-0.32479	-0.10238	13.03135***	0.352615
Group 1	-4.062153***	-0.6376	5.408059	0.137073	11.86525***	0.518792	0.961839	0.041425	115.9375***	0.419431
Group 2	-4.996481***	-0.84249	4.594224	0.125094	9.340201***	0.436698	5.359103	0.253493	133.6642***	0.517083
Group 4	-4.38659***	-0.28474	18.50641**	0.193986	2.784357	0.044768	-8.75952	-0.16845	207.7917***	0.276432
Group 5	-7.895259***	-0.56406	27.74959***	0.32014	10.46841***	0.209092	24.47851***	0.517814	86.16592**	0.142401
Constant	69.59157***		126.1312		14.15133		83.00533***		489.3778***	
Time effects	Yes		Yes		Yes**		Yes		Yes***	
R^2	0.7602		0.5932		0.7296		0.4796		0.7354	
Number of observations	234		234		230		209		230	

Group 1	Group 2	Group 3	Group 4	Group 5
Azerbaijan	Macedonia	Czech Republic	Georgia	Russia
Tajikistan	Slovenia	Slovakia		
Turkmenistan	Romania			
Uzbekistan	Estonia			
Kazakhstan	Croatia			
Ukraine	Poland			
Belarus	Bulgaria			
Albania	Hungary			
Armenia	Latvia			
Kyrgyzstan	Lithuania			
	Moldova			

Table 6. Health production function models estimation with beta coefficients for Classification 2. Reporting unstandardised and standardised coefficients.

	LEB		Maternal mortality		SDR, infectious		Hepatitis B incidence		SDR, ischaemic heart disease	
	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients
GDP (log)	0.8796375**	0.215788	-7.314093***	-0.28974	-3.150103***	-0.21476	-4.858057***	-0.3401	-17.2724	-0.09743
Inflation (log)	-0.2136758**	-0.13658	1.107569	0.114324	0.373229	0.066609	0.312593	0.05648	-0.38001	-0.00561
Forex	0.082755	0.02505	-3.06678	-0.1499	1.708057*	0.143805	-2.31412	-0.20053	-37.32525***	-0.26001
Fruit	0.0226623***	0.320115	-0.2116245***	-0.48271	-0.1156107***	-0.45532	-0.0501468**	-0.18883	-0.4927415***	-0.16057
Polity	0.053636	0.096551	-0.6393535**	-0.18585	-0.3685117***	-0.18507	0.043571	0.022291	-0.2725	-0.01132
Violent conflict	0.3033878**	0.113738	-3.216726***	-0.19473	-0.37582	-0.03937	-1.899338***	-0.20934	-3.52517	-0.03056
ALOS	-0.2688961**	-0.25818	-1.11944	-0.17357	0.265578	0.070755	0.085746	0.022607	14.08647***	0.310517
Outpatient contacts	-0.2379672***	-0.28132	-0.47104	-0.08992	-0.29634	-0.09691	0.537405	0.169394	9.375955***	0.253704
Group 1	-3.955809***	-0.47055	9.274414*	0.178146	16.41019***	0.545154	4.453794	0.149962	123.7974***	0.340281
Group 2	-4.126807***	-0.36156	11.96223	0.169239	11.07802***	0.271278	7.490456	0.188672	179.1612***	0.363008
Group 3	-4.866104***	-0.44863	7.352269	0.109459	9.169522***	0.236267	6.952663*	0.18935	218.2214***	0.465236
Group 4	-5.243812***	-0.63128	7.980069	0.155132	6.89526***	0.231814	13.76632***	0.430417	112.3508***	0.312526
Group 6	-7.925637***	-0.56624	30.92673***	0.356794	15.09259***	0.301453	27.16271***	0.574595	91.0983***	0.150552
Group 7	-4.161832***	-0.55365	13.34815**	0.286743	9.885863***	0.367067	7.880988*	0.299174	48.36818	0.148597
Group 8	-2.855142***	-0.20398	-15.66025**	-0.18067	0.848029	0.016938	-4.86779	-0.10297	78.79698*	0.130223
Group 9	-4.082443***	-0.265	21.55913**	0.225984	-1.54822	-0.02489	2.009475	0.038644	215.1465***	0.286216
Group 10	-3.055323**	-0.22748	9.794652	0.117758	2.738674	0.057003	7.99107	0.090045	36.89042	0.063532
Group 11	-4.605554***	-0.46281	-0.97564	-0.01583	4.340416	0.117018	18.61837***	0.551978	92.34406***	0.205992
Constant	70.61984***		132.2982***		43.65275***		59.13622***		134.0171	
Time effects	Yes		Yes		Yes		Yes		Yes*	
R2	0.7706		0.6612		0.8074		0.5669		0.7945	
Number of observations	234		234		230		209		230	

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11
Azerbaijan Tajikistan Turkmenistan Uzbekistan Kazakhstan Ukraine	Armenia Kyrgyzstan	Lithuania Moldova	Hungary Latvia Bulgaria	Czech Republic Slovakia	Russia	Macedonia Slovenia Romania Croatia	Belarus	Georgia	Albania	Estonia Poland

Table 7. Health production function models estimation with beta coefficients for Classification 3. Reporting unstandardised and standardised coefficients.

	LEB		Maternal mortality		SDR, infectious		Hepatitis B incidence		SDR, ischaemic heart disease	
	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients
GDP (log)	0.8411158**	0.206338	-8.281055***	-0.32804	-3.204333***	-0.21846	-3.455109*	-0.24189	-23.72334	-0.13382
Inflation (log)	-0.2249039**	-0.14376	0.909587	0.093888	0.38964	0.069538	0.70549	0.12747	-1.2227	-0.01806
Forex	0.083771	0.025358	-3.28372	-0.16051	1.643092*	0.138336	-2.02855	-0.17578	-39.42121***	-0.27461
Fruit	0.0238951***	0.33753	-0.2177778***	-0.49675	-0.1263878***	-0.49776	-0.0405873*	-0.15283	-0.6931707***	-0.22588
Polity	0.0539542*	0.097124	-0.5224685**	-0.15187	-0.3285865***	-0.16502	-0.12899	-0.06599	1.064138	0.044217
Violent conflict	0.3127559**	0.11725	-3.180684***	-0.19255	-0.4265	-0.04468	-1.924293**	-0.21209	-4.05562	-0.03516
ALOS	-0.3490923***	-0.33519	-0.61307	-0.09506	1.016036***	0.27069	-0.67325	-0.1775	28.82059***	0.635312
Outpatient contacts	-0.2671781***	-0.31585	-0.24108	-0.04602	-0.01084	-0.00355	0.149435	0.047103	15.1432***	0.40976
Group 1	-3.905504***	-0.46456	8.802194	0.169075	15.90194***	0.52827	4.523854	0.152321	113.2383***	0.311257
Group 2	-4.21304***	-0.46858	13.61131*	0.244462	12.27892***	0.381501	4.559127	0.124164	207.5959***	0.533672
Group 3	-5.043075***	-0.65326	4.332747	0.09063	9.36865***	0.33237	10.59159**	0.402072	203.2506***	0.596619
Group 4	-5.528984***	-0.66561	9.659698*	0.187784	9.497457***	0.319298	10.78478**	0.337197	162.5249***	0.452095
Group 6	-7.807317***	-0.55778	30.27063***	0.349225	14.01173***	0.279865	27.61181***	0.584095	70.17343*	0.115971
Group 7	-4.606407***	-0.61279	16.44299***	0.353226	14.11208***	0.523988	2.764975	0.104963	132.1142***	0.405882
Group 8	-2.796215***	-0.19977	-15.27038**	-0.17617	0.610468	0.012193	-5.97432	-0.12638	77.93133*	0.128792
Group 9	-4.636931***	-0.30099	23.96948***	0.25125	3.356751	0.053971	-2.34318	-0.04506	305.5735***	0.406514
Constant	72.32758***		132.994***		31.60653**		57.55207***		-51.5352	
Time effects	Yes		Yes		Yes**		Yes		Yes***	
R2	0.7687		0.6561		0.7973		0.5336		0.7661	
Number of observations	234		234		230		209		230	

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9
Azerbaijan	Armenia	Lithuania	Hungary	Czech	Russia	Macedonia	Belarus	Georgia
Tajikistan	Kyrgyzstan	Moldova	Latvia	Republic		Slovenia		
Turkmenistan	Albania	Estonia	Bulgaria	Slovakia		Romania		
Uzbekistan		Poland				Croatia		
Kazakhstan								
Ukraine								

Table 8. Health production function models estimation with beta coefficients for Classification 4. Reporting unstandardised and standardised coefficients.

	LEB		Maternal mortality		SDR, infectious		Hepatitis B incidence		SDR, ischaemic heart disease	
	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients	Coefficients	Beta-coefficients
GDP (log)	0.8541764**	0.209542	-7.301564***	-0.28924	-2.845603**	-0.194	-4.862037***	-0.34038	-14.55283	-0.08209
Inflation (log)	-0.2182976**	-0.13954	1.020338	0.10532	0.54312	0.09693	0.326891	0.059063	-0.27053	-0.00399
Forex	0.11238	0.034018	-3.72995*	-0.18232	2.243123**	0.188854	-1.93224	-0.16744	-43.83966***	-0.30539
Fruit	0.0248284***	0.350713	-0.2365226***	-0.53951	-0.1104228***	-0.43488	-0.0396677**	-0.14937	-0.8339718***	-0.27176
Polity	0.047739	0.085936	-0.5140715**	-0.14943	-0.4469498***	-0.22446	-0.01902	-0.00973	0.833147	0.034619
Violent conflict	0.3095181**	0.116036	-3.168513***	-0.19182	-0.4795873	-0.05025	-1.949215***	-0.21483	-4.25534	-0.03689
ALOS	-0.3492007***	-0.33529	-1.04042	-0.16132	1.005108***	0.267779	0.232416	0.061276	24.32207***	0.536148
Outpatient contacts	-0.260907***	-0.30844	-0.6113	-0.11669	0.087664	0.028669	0.7396214*	0.233134	11.88396***	0.321568
Group 1	-3.851473***	-0.45814	7.915219	0.152038	16.95667***	0.563308	5.564287	0.187353	105.8361***	0.290911
Group 2	-4.277512***	-0.53251	13.37924*	0.268959	11.19382***	0.380687	7.669459	0.247482	200.8404***	0.565147
Group 3	-4.939004***	-0.45535	5.953524	0.088635	11.58284***	0.29845	8.415169**	0.22918	222.1846***	0.473686
Group 4	-5.501282***	-0.66227	7.589494	0.147539	9.987035***	0.335758	15.30623***	0.478564	143.1571***	0.39822
Group 6	-7.743831***	-0.55325	29.20528***	0.336934	15.1687***	0.302974	28.24414***	0.597472	63.04403*	0.104189
Group 7	-4.622606***	-0.61495	14.10402**	0.30298	13.77163***	0.511347	9.072379**	0.344401	108.089***	0.332072
Group 8	-2.778459***	-0.1985	-16.35019**	-0.18863	1.062122	0.021214	-4.21428	-0.08915	65.19801	0.107748
Group 9	-5.032381***	-0.5057	-1.46222	-0.02373	9.266018***	0.249812	20.48769***	0.607398	144.2794***	0.321844
Constant	71.86964***		139.2485***		22.50425		52.6302***		3.581556	
Time effects	Yes		Yes		Yes*		Yes		Yes***	
R2	0.7683		0.6531		0.7844		0.5608		0.7644	
Number of observations	234		234		230		209		230	

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9
Azerbaijan	Armenia	Lithuania	Hungary	Czech	Russia	Macedonia	Belarus	Estonia
Tajikistan	Kyrgyzstan	Moldova	Latvia	Republic		Slovenia		Poland
Turkmenistan	Albania		Bulgaria	Slovakia		Romania		
Uzbekistan	Georgia					Croatia		
Kazakhstan								
Ukraine								