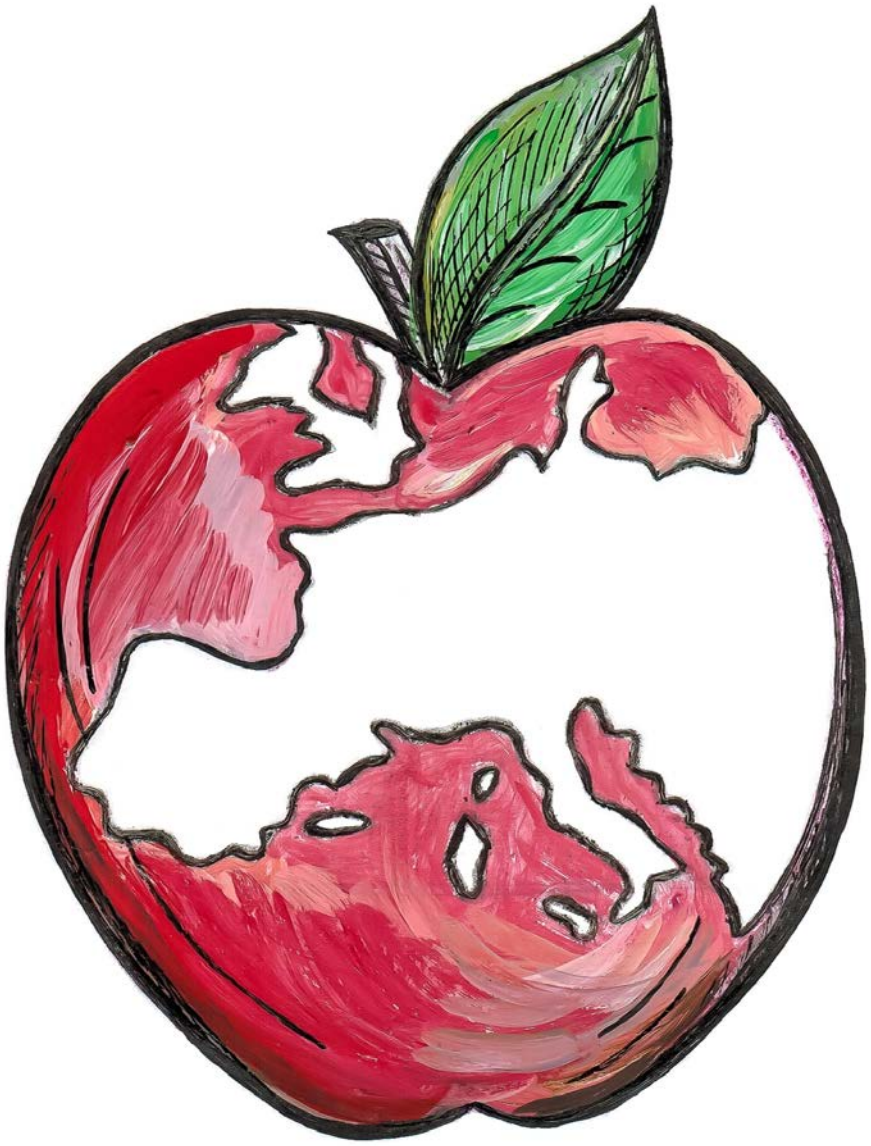
EUROPEAN HEALTH DIVIDE REVISITED

Health in Transition Countries and Beyond



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PhD Thesis

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School of Humanities and Social Sciences (SHSS)

Jacobs University Bremen

2013

Cover illustration by Margarita Vidyakina Lescargot

European Health Divide Revisited: Health in Transition Countries and Beyond

by

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A thesis submitted in partial fulfilment
of the requirements of the degree of

Doctor of Philosophy
in Sociology

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Date of defence: 27 September 2013

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To Mum, Dad, and Grandma Lena

In loving memory of my grandparents, Felix, Valentina, and Nikolay, who did not live to see this work finished, but who supported me and were proud of me for as long as I can remember.

ACKNOWLEDGEMENTS

The years I spent working on my PhD thesis were memorable—a series of challenges, achievements, set-backs, and discoveries. On this journey of three years, ten months, two weeks and one day (or about 1,414 days or 33,936 hours), I have received a lot of help and support, for which I am very thankful.

First and foremost, my special and never-ending gratitude goes to my supervisor, Professor Dr. Jan Delhey. Prof. Delhey guided me, listened to me, and dealt with my lack of organisation. He never failed to give me valuable feedback, which at times meant redoing everything, but in the end made my thesis what it is today. Without his patience, support, and attention, I would not have come this far. Jan, thank you for being there for me!

I would also like to thank my second supervisor and member of the committee, Professor Dr. Christian Welzel. Prof. Welzel was the first to welcome me to PhD student life and has believed in me ever since. Finally, the third member of my committee, Dr. Franziska Deutsch, has been the best field coordinator I could have hoped for. Her support was crucial for my experience and research, and for this I am extremely grateful.

My gratitude also goes to Professor Ilkka H. Mäkinen, who agreed to become the external member of my committee. Prof. Mäkinen gave me the unique opportunity to see Stockholm and Södertörn University, and to join a wonderful research centre on the sociology of health in transition countries for a several months' research stay.

A big thanks is due to the Bremen International Graduate School of Social Science (BIGSSS) and the German Research Foundation (DFG). These institutions have not only given me the opportunity and funding to conduct this research, but also to establish myself as a young scholar.

To Nate Breznau, I am thankful for the to-the-dot corrections of my thesis, for his feedback far beyond mere proofreading, and for being so helpful—not to mention fast—when necessary. Many other people at BIGSSS, Universität Bremen, and Jacobs University Bremen were there for me during those longest days of my life as a PhD student. Dr. Klaus Boehnke, Dr. Werner Dressel, Dr. Mandy Boehnke, Jasmin Schmidt, Judith Lucas, the Jacobs-based BIGSSS IT team, the Jacobs University registrars, the Jacobs Counselling Centre, and finally the BIGSSS fellows and faculty who participated in the Colloquiums and gave me feedback: for everything you all have done to help me, I offer you my thanks.

A big part of my PhD experience turned out to be my 3-year participation in developing and teaching the Academic and Professional Skills (APS) course for BA students at Jacobs University. In this regard, my special thanks go to the wonderful librarians at Jacobs Information Resource Centre, Anja Kakau and Lara Christianson. These two were there to answer any questions and taught me so much about academic skills. They were an amazing team to work with. Finally, a big thanks goes to my other colleagues of APS, Silke Cramer and countless teaching assistants.

PhD life is about much more than research. It is a process of personal growth, friendships, networking, successes, and failures. I am extremely happy that I have been able to meet the wonderful people both within BIGSSS and outside of it. These people have become my good friends; they have advised me in my research; and some of them even had the misfortune to

share an office with me. Tina Müller, Evgenia Bystrov, Michalis Kokkoris, Constantin Jucovschi, Adriana Berrueto, Georgi Dragolov, Svenja Kolkowski – thank you guys!

Marieke van Egmond, thank you so much for all the ice skating fun, the girls' nights, and your level-headed advice and support. Judith Offerhaus, thank you for your support and friendship, for the office companionship, for waking me up in the mornings during the hardest times, for taking me to the dentist, and more importantly, for bringing me home from the dentist! Alexis Rossi, thank you for being the best neighbour and for all the shared wine and olives. A special thank you goes to all of my friends far away. Even though they were at a physical distance, they were still close and encouraged and supported me. Thank you, Rita, Yura, Olya, and Lena.

I am especially thankful to Terje A. Eikemo for believing in me, for showing me that everything is possible, and for helping me to believe in myself. Thank you for introducing me to your beautiful family and making me feel welcome during my stay in Trondheim. I'll never forget this time filled with kids' laughter and Saturday "flat-land" skiing.

During my PhD years I also met my partner, Roberto Bartus, whose support and love have pulled me through the toughest of times. He taught me to relax and find a balance between life and work—something PhD students tend to forget about. He simply showed me the world. I would not have done it without him. Okay, maybe I would have, and I might have even done it faster—but it certainly wouldn't have been as fun.

Finally, my appreciation goes to my family: my grandma, mum, dad, sister, and brother. You never failed to believe in me and you have been proud of me every step of the way. Without you, none of this would have been possible. Thank you.

ABSTRACT

Health is one of the most essential assets of an individual or society, yet throughout time it has developed very differently in various parts of the world. In Europe, the understanding of health has traditionally been regionally divided between the West and East, but is this divide still present? Better understanding health and what determines it in Eastern and Western Europe enables me to revisit the health divide on the continent.

Among the plethora of literature on the determinants of health, one can clearly identify two main approaches. One approach analyses mostly how the objective indicators influence objective health at the country level; another deals with primarily subjective individual-level health and its subjective determinants. Very rarely, however, do the approaches intersect. This thesis incorporates the different approaches to the determinants of health in order to determine whether a) the objective and subjective health indicators are similar or different, and if they could be used interchangeably; b) the objective and subjective determinants influence health differently; c) both the individual and contextual factors affect health; and d) the European health divide has changed over the past two decades of transition.

To do that, the thesis adopts primarily a quantitative approach in the five empirical studies, united under one theoretical umbrella. In the detailed literature review, the main theoretical framework of the augmented health production function is developed and used throughout the thesis. A variety of methods—from cluster and factor analysis to ordinary least squares (OLS), panel, and multilevel regressions—is used in the different chapters of the thesis. The analysis is carried out with the help of six different datasets, providing data at different levels. First, three studies concentrate on the 28 Central and East European (CEE) countries, while the other two focus on the broader European context. In the first four chapters, health is the centre of the story, modelled within the augmented production function. The final study directly assesses the changes in the European health divide at the macro level.

This detailed and extensive analysis provides important answers to the set research questions. First, I find that the objective and subjective health indicators are determined very differently, and therefore, regardless of how similar they may seem, should not be used interchangeably. Second, subjective and objective factors have a different effect on health, and they should both be included when health is analysed. Third, contextual effects on individual health are very weak. This is particularly true for the CEE countries. Finally, over years of transition, the European health divide has changed to a 'West-Central-East' design. Therefore, revisiting our understanding of what "East" and "West" mean in terms of health in Europe is in order.

These findings enhance the literature on the determinants of health by bridging the two diverging approaches and creating a theoretical framework—augmented health production function—for analysing the determinants of health, which can be further tested in other regions of the world. While the divide in Europe—still often referred to as "East-West"—has changed, this divide could adjust our whole understanding of European health patterns.

TABLE OF CONTENTS

ABBREVIATIONS

AIC	Akaike's information criterion
AIDS	Acquired Immunodeficiency Syndrome
BBP	Basic Benefits Package
BIC	Bayesian information criterion
CEE	Central and Eastern Europe
CIS	Commonwealth of Independent States
CPI	Corruption Perception Index
DALE	Disability Adjusted Life Expectancy
DALY	Disability Adjusted Life Years
DEA	Data Envelopment Analysis
DFLE	Disability Free Life Expectancy
DRG	Diagnosis Related Groups
DV	Dependent variable
EBRD	European Bank for Reconstruction and Development
EE	Eastern Europe
ESF	European Science Foundation
ESS	European Social Survey
EU	European Union
FML	Full maximum likelihood
FSU	Former Soviet Union
GDP	Gross domestic product
GLM	Generalized linear models
GP	General Practitioner
HALE	Health Adjusted Life Expectancy
HC	Health care
HE	Health expenditures
HfA DB	Health for All Database
HiT	Health in Transition
HIV	Human Immunodeficiency Virus
ICC	Intraclass correlation
LDC	Less Developed Countries
LE	Life Expectancy
LE65 (m,f)	Life Expectance at the age of 65 (male, female)
LEB (m,f)	Life Expectancy at Birth (male, female)
LiTS	Life in Transition Survey
LS	Lifestyles
MEPV	Major Episodes of Political Violence (dataset)
ML	Maximum likelihood
MLA	Multilevel analysis
MoH	Ministry of Health
MQL	Marginal quasi-likelihood
NBB	New Baltic Barometer
NDB	New Democracies Barometer
NHS	National Health Services/System
NIS	Newly Independent States
NRB	New Russia Barometer
oE	Objective economic determinants
oH	Objective health
OLS	Ordinary Least Squares (regression analysis)
OOP	Out-of-pocket

oP	Objective political determinants
oS	Objective social determinants
OTE	Overall Technical Efficiency
PbHE	Public Health Expenditure
PHI	Private Health Insurance
PQL	Penalised quasi-likelihood
PrHE	Private Health Expenditure
PSAV	Political stability and absence of violence
PYLL	Potential Years of Life Lost
RIGLS	Restrictive iterative generalised least squares
RLMS	Russian Longitudinal Monitoring Survey
RML/REML	Restricted maximum likelihood
SDR	Standardized Death Rate
sE	Subjective economic determinants
sH	Subjective or perceived health
SHI	Social Health Insurance
sP	Subjective political determinants
sS	Subjective social determinants
SWB	Subjective well-being
THE	Total Health Expenditure
TI	Transparency International
TSCS	Time-series cross-sectional (methods, data)
VHI	Voluntary Health Insurance
WB	World Bank
WDI	World Development Indicators
WE	Western Europe
WGI	Worldwide Governance Indicators
WHO	World Health Organisation
OECD	Organisation for Economic Co-operation and Development
USSR	Union of Soviet Socialist Republics
EU-15	15 members of the European Union pre-accession 2004 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom)

GENERAL INTRODUCTION

HEALTH ACROSS BORDERS

Winston Churchill once said "Healthy citizens are the greatest asset any country can have" (Churchill, 1952). But not only is it one of the most important aspects for any country's prosperity, it might as well be the crucial part of any individual's well-being. 'Health' is how we feel, something individuals want, and is a measurement of the capacity to do things from simple daily activities to strenuous physical work or achievements and the capacity to maintain a functional if not favourable mental state. Health is the basis of happiness and life-satisfaction.

Even though there is still no full agreement on what well-being or quality of life exactly are, it is, nevertheless, widely accepted that they are essential for individuals' lives – if not essence of it. Although contested as a term, most definitions accord that ***health*** *must* be an integral part of well-being and quality of life (e.g. Chapter 2 in Rapley, 2003). Whether well-being and quality of life are measured according to the Swedish model of welfare (Erikson and Allardt in Nussbaum and Sen, 1993), the the Living Conditions Index developed in Netherlands (Boelhouwer and Stoop, 1999) or Veenhoven's "four qualities of life" (Veenhoven, 2000), health features in all of them and is important for any society as a whole. Moreover, some argue that at the individual level health is the *single most important factor* in 'experiencing life in full' (e.g. Last, 1998; WHO, 1984), thus it is increasingly important to understand what health is, how society influences it and what generally determines it.

Any new finding, discovery, or answer about how health comes about, can help improve the lives of many people. This thesis sets out to study and analyse health in order to shed some light on narrow, yet important questions, and to clarify some of the existing answers. The focus in this thesis is on empirically testing and merging current methodological and theoretical approaches to studying health, on a sample of the population of Europe, with a particular attention to the area of transition countries after the fall of Communism.

DIFFERENCES IN HEALTH AROUND THE WORLD AND IN EUROPE

Health differs dramatically across the globe with life expectancy at birth (LEB) ranging from 47.8 in Sierra Leone to 82.6 years in Japan in 2011 (WB, 2012b). This makes a difference of around 35 years. The worst health statistics are recorded primarily in Africa, while the highest – in the developed world with Western Europe and Japan leading the list. The North-South divide is definitely strong still, even though over the years health has improved in the poorest population of the World, but it also did in the richest (Table A).

Analysing health is very *region-specific*, as countries in different parts of the world have different regional needs, achievements, institutions, histories and climates. Doubtless, health-related problems, for example, in Africa and rural India are very different from the ones in more developed Western societies. Therefore, the choice of countries under review inevitably affects the interpretation and generalisation of results. However, the choice of the ***broader Europe***, which includes both the world's richest countries of Western Europe and less developed countries of the European East, is a strategic move to try to analyse and compare very *diverse societies*, albeit those that shared many historical and geographic features. Then there was a fracture with the many 'world' wars, the concretizing of nation-states, and the resulting divide between Socialist/Communist countries of the 'East' and the Democracies of the 'West'. After the fall of the USSR and the return of rule to individual Eastern countries, Europe began a re-unification process with the great expansion of economic and eventually social unification that continues today (Dehaene, 2000; Kühnhardt, 2009). The histories of various nations, the rise and fall of Communism and the integration of Europe provides a unique setting to analyse individual country diversities within regional and continental shifts. This on the one hand, provides more answers about

the huge diversity on the European continent; and on the other, allows me to compare countries of different development stages.

Table A. Life expectancy at birth (LEB) for selected countries of the world in 1960 and 2011.

Country Name	LEB, 1960	LEB, 2011	Difference
Japan	67.67	82.59	14.93
Germany	69.62	80.74	11.12
United States	69.77	78.64	8.87
Czech Republic	70.35	77.87	7.52
China	43.46	73.49	30.03
Iran	44.58	73.00	28.42
Indonesia	45.07	69.32	24.25
Mongolia	48.68	68.49	19.81
Yemen, Rep.	37.79	65.45	27.67
Turkmenistan	54.44	65.00	10.55
Rwanda	42.22	55.39	13.17
South Africa	49.04	52.61	3.58
Nigeria	38.50	51.86	13.37
Afghanistan	31.13	48.68	17.55
Sierra Leone	31.46	47.78	16.32
Range (max-min)	39.22	34.81	

NOTE: Countries are sorted according to LEB in 2011. SOURCE: (WB, 2012b).

TRANSITION COUNTRIES AND THE EAST-WEST HEALTH DIVIDE

The term ***transition countries*** derives from the concept of 'transition economy' which refers to a change from planned to market economy (Alam *et al.*, 2008). The term is mostly associated with the Central and East European (CEE) and Central Asian countries, which started their transitions from the planned economies of Communism to the market liberalization in the end 1980's – beginning 1990's. IMF also identifies several Asian transition economies – Cambodia, China, Laos, Vietnam (IMF, 2000). None of the economic progress is possible without a strong institutional support (Alam *et al.*, 2008), therefore in very general terms, 'transition countries' is the term, which ended up to include institutional, political, policy and social change, besides the 'economy in transition'. This term is much more often used for the CEE countries, which have gone through social and political changes with differing degrees of success. World Bank considers that the ten CEE countries, which joined the EU, have finished their transitions (ibid.: 7), while the rest are still 'in transition'. The same World Bank report identifies that all of the CEE countries still have to deal with aftermath and legacy of transition.

The CEE countries represent not just the 'economic and political transition'. The very start of transition also meant the end of the whole epoch of Cold War, Communist 'experiment' and the attempts at building a socialistic society in many nations, which Fukuyama also announced to be "the end of history" (1989; 1992). By that he meant that from those important events of 1989-1991 democracy would become the dominant regime of power in the world. This could be so, but what might have considered 'simple' transition from planned to market economy, resulted in a much more serious cultural change and nations-scale trauma (Sztompka, 2004). Therefore, in the past decades the whole world observed the

'real-life experiment' of transition countries of at first trying to build socialism, then going through revolutions and finally, building democracy. These experiments determined the peculiarities of the region and make transition countries an extremely interesting case to analyse. In this thesis I use the term of 'transition countries' to identify all Central and East European and Central Asian countries, to identify the region, rather than the stage of each country in a transition process that may or may not be complete. For the ease of communication, in this thesis I will use the term of Central and East European (CEE) for the whole region, including Central Asia as well.

As already discussed above, ***transition countries*** unite into a somewhat *unique case* in terms of well-being, but also in terms of health. It has been well documented that the health status in the former Communist societies has been deteriorating or stagnating since the 1970's (e.g. Andreev, McKee, and Shkolnikov, 2003; Bobak and Marmot, 1996; Carlson, 2004; Velkova, Wolleswinkel-van-den-Bosch, and Mackenbach, 1997; Watson, 1995; Wilkinson, 1996), when the world faced new challenges in terms of health: the raising burden of chronic rather than infectious diseases and later – human immunodeficiency virus (HIV). Wilkinson refers to this process as the "epidemiological transition" (Wilkinson, 1996), which besides the change in disease structure, also "marks a fundamental change in the main determinants of health" (Wilkinson, 1994: 65). While the Western countries managed to adjust their socio-economic and health policies to the new challenges, CEE remained narrow-headed and was unable to adapt (e.g. Andreev *et al.*, 2003). By the 1980's a steady *health gap* developed between Western Europe and CEE countries (e.g. Cockerham, 1999). This phenomenon is termed the ***East-West divide***, and can be expressed in many areas of life: economic, political, social, and cultural. In 'happiness studies' the transition region is renown as one of the areas of low satisfaction with life, especially in comparison to other countries with similar levels of socio-economic development, with Russia being the most striking example: it has the lowest satisfaction with life for its economic development (Inglehart *et al.*, 2008; Veenhoven, 2001).

While being a very special case on its own, the CEE region has a ***strong diversity*** of health status, socio-economic and political development, and individual life experiences. Hence, the health gap mentioned above has developed unevenly: while health indicators in most East European countries of the Former Communist camp have stagnated or increased (according to WHO), in the countries of the Commonwealth of Independent States (CIS) [1] they deteriorated. With the start of transition, most countries experienced something of a sudden deterioration in their health outcomes, which was followed by fast improvements in some and very slow changes in others. Thus, the health inequalities *within* the transition region have become greater at the end of the 1980's than before (e.g. Andreev, McKee, and Shkolnikov, 2003). The health care transitions to this day are far from complete with some states introducing efficient reforms, while others continue inconsistent, sometimes counter-productive changes, if introducing health reforms at all. Political and economic development are linked to this health diversity with transition countries varying from still authoritarian to democratic regimes and from planned to market economies.

[1] CIS consists of nine of the former Soviet Union (FSU) republics – Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan and Uzbekistan (CIS Stat, 2013). Turkmenistan and Ukraine never ratified the CIS membership, but both still participate unofficially. Georgia had withdrawn in 2008 due to disputes with Russia (CIS Stat, 2010). Most often the term 'CIS' is used to identify all the former Soviet Union republics except for the Baltic states – despite Georgian withdrawal. The term FSU refers to all countries of the former Soviet Union – hence Estonia, Latvia and Lithuania are part of it.

HEALTH PRODUCTION

As health is a key component of well-being and happiness, it is utilitarian to investigate its production as a public good. It should be sought after by individuals and societies alike and maximized based on the logical conclusion that well-being, life satisfaction, happiness and health are the greatest of all goods requiring maximum efficiency and growth. In short, health (as a part of life satisfaction and well-being) is equivocal with utility as a public resource (Frey and Stutzer, 2002; Stiglitz, Sen, and Fitoussi, 2010).

Theoretical and empirical frameworks are explained in detail in Chapter 1 (p.15), but for the purpose of this introduction the main concepts are summarised. The utilitarian or functionalist approach in epidemiology and health sociology, may be labelled under the umbrella of '***health production function***' (Grossman, 1972a; Grossman, 1972b), where health is a good, and there are certain factors, which 'produce' it.

For many years the World Health Organisation (WHO) and others have pioneered research on health and health inequalities throughout the world trying to analyse the causes and determinants of persisting and widening health gaps (e.g. Gwatkin, 2000; Kim, 2000; Leon and Walt, 2001). A big part of this work and research is directed at the analysis of health care systems and improving their functioning (e.g. Mossialos *et al.*, 2002; Nolte and McKee, 2004b). However, health care system is not the sole determinant of health (e.g. Dahlgren, Harrington, and Ritsatakis, 1995; WHO, 2008), and often determines only a minor part of health variation (Auster, Leveson, and Sarachek, 1969). The WHO research of the Commission on Social Determinants of Health (WHO, 2008) has argued that individual preferences and lifestyles, the social and economic conditions under which people live impact health. Also, social, economic, political, environmental and cultural contexts impact preferences and lifestyles if not health directly along with concomitant individual-level factors of income, education, labour market status and socialization environments (Dahlgren and Whitehead, 1991).

Furthermore, the growing importance of research on subjective well-being of individuals, which argues that the way people *experience* their lives might be as or even *more* important than the actual socio-economic conditions they live in, is more and more widely acknowledged even among policy-makers (e.g. Inglehart *et al.*, 2008; Nettle, 2005; Nussbaum and Sen, 1993; Schimmel, 2009).Furthermore, health research notes that characteristics such as perceived control, satisfaction with life, stress and trust have often figured as main determinants of – usually perceived or self-rated – health (Bobak *et al.*, 2000; Kawachi, Kennedy, and Glass, 1999). Plenty of literature provides evidence for the existence of the link between health and subjective well-being and happiness, and all these factors are theoretically reciprocally related with poor health leading to stress and dissatisfaction and vice-versa (e.g. Friedman, Kern, and Reynolds, 2010; Gerdtham and Johannesson, 1997).

Research on health production has two main approaches. The first involves analyses of *objective measures*, carried out primarily at the *population* or macro-level. These studies tend to analyse the differences in *public health* across countries according to context such as social, political and economic affluence and development (Biggs *et al.*, 2010; Idrovo, Ruiz-Rodriguez, and Manzano-Patino, 2010; Stuckler, King, and McKee, 2009; e.g. Subramanian, Belli, and Kawachi, 2002), as well as the production of health outputs based on the *inputs of health care systems* (e.g. Cremieux, Ouellette, and Pilon, 1999; Elola, Daponte, and Navarro, 1995; Wagstaff and Moreno-Serra, 2007). The second approach to determinants of health is carried out at the *individual level*, and often incorporates *subjective measures* of health and its determinants (e.g. Bobak *et al.*, 1998; Bobak *et al.*, 2000; Carlson, 2005). The contrast of the 'objective' and 'subjective' perspectives in these two approaches leads to a shortcoming

where only subjective indicators are found to influence subjective health, and only objective indicators to influence objective health (Table B). The second shortcoming of this divide is their prevailing separation into individual level versus population level investigations. Some researchers include objective indicators as controls, for instance demographics, but the contextual objective effects of society's economic affluence are rarely analysed within the subjective individual health framework. This is a relatively strong shortcoming, as the 'level' debate is very important for the concept of health itself and for its determinants (Diez-Roux, 2000). Rarely, however, do the differing approaches meet leaving open the potential for both ecological and individualistic fallacies (Coleman, 1986).

Table B. Simplified summary of approaches to the determinants of health

Determinants of health simplified	
Societal characteristics; GDP; health care (mostly) objective determinants	Stress, perceived control over life; subjective well-being (SWB), satisfaction with life (mostly) subjective determinants
↓	↓
Population Objective Health (e.g. infant and total mortality rates, LEB) (e.g. Berger and Messer, 2002; Biggs *et al.*, 2010; Elola, Daponte, and Navarro, 1995; Gerry, Mickiewicz, and Nikoloski, 2010; Hsiao and Heller, 2007; Idrovo, Ruiz-Rodriguez, and Manzano-Patino, 2010; Mackenbach, Bouvier-Colle, and Jougla, 1990; Stuckler, King, and McKee, 2009)	Individual Subjective Health (self-assessed health from surveys) (e.g. Bobak *et al.*, 1998; Bobak *et al.*, 2000; Carlson, 1998; Carlson, 2005; Hyyppäa and Mäki, 2001; Subramanian, Kim, and Kawachi, 2002)

This thesis merges approaches in an extended health production function that I call the '***augmented health production function***'. This new approach analyses both objective and subjective health at individual and population (macro) levels, taking into account the determinants at different levels as well.

WHY HEALTH IN TRANSITION COUNTRIES AND BROADER EUROPE?

According to Bordieu (1984), there is a discrepancy between perceptions and 'reality' and this becomes particularly visible in societies which undergo major and rapid economic, political, institutional or organisational changes. The formulation of attitudes and values cannot keep up with the pace of changes, thus a gap between them inevitably develops (e.g. Abramson and Inglehart, 1995; Bourdieu, 1984). Central and Eastern Europe is an example of the strong instability and rapid social change, mixed with older attitudes and values dating back to Communist institutional socialization (Breznau, 2010), which can be analysed in order to further our understanding of determinants of health and interrelationships between the subjective and the objective and varying contexts. Thus, taking the overall low levels of 'subjective well-being' in the CEE as a starting point allows study of how people and societies experience socio-economic transitions, or lack thereof and ultimately informs determinants of health.

With the start of transition, most of the former Communist-bloc countries sped up towards modernisation 'the Western way' and the European Union became somewhat a role-model for many of the CEE countries. Moreover, while CEE presents a region of constant changes in the past two decades, the Western European states provide a more moderate and stable

background for a comparison. Hence, this research eventually compares the CEE and the West European countries and brings health production to a broader European context.

All in all, this thesis attempts to add to the literature on the determinants of health, synthesises previous approaches and tries to establish, whether the production function of health is defined differently in different regions – for example, East and West Europe and the countries therein.

SUMMARY OF RESEARCH QUESTIONS AND GOALS

Following the background and the brief theoretical discussion, there are two main goals which are at the centre of this thesis. Both of them and the detailed theoretical framework are carefully introduced in Chapter 1. The *first* goal deals with *health as a concept*, its *determinants* and how it is objectively and subjectively understood through measurement and conceptualisations at both individual and population levels. Therefore, specific research questions are as follows:

- Are objective and subjective measures of health similar enough and are determined the same way?
- Are individual- and population-level health concepts the same or different?
- Do the subjective and objective determinants of health influence health outcomes differently?
- Do individual and contextual determinants influence health similarly?

The *second* goal deals with understanding the transition region better by first analysing it in-depth and second by comparing it to the rest of Europe. Hence I aim to implement the detailed empirical framework in both the broader Europe and the Eastern European context in order to try to understand how different have the CEE countries become – and if the divide changed, and how different they still are from the West. The concrete research questions addressed are:

- Is health in transition countries differently determined compared to health in the West?
- Has the European health divide changed: has the border blurred, shifted or multiplied of the divide?

The purpose of this thesis is to reach a better understanding of what health is in empirical research and how the differing approaches can be applied in these specific regions of Europe and Asia.

THESIS STRUCTURE: ANALYSING HEALTH IN FIVE STUDIES

This thesis starts up with the detailed theoretical, conceptual and empirical framework, developed in ***Chapter 1***. The difficult concepts of health, its determinants and health production function are discussed and outlined. The main goal of this chapter is to explain in detail the theoretical groundings for present research, as well as position this thesis within the literature in the field of sociology and in particular, health sociology. The *augmented health production function* is arrived at as the main empirical framework for the analysis in this thesis.

This thesis is then a cumulative work of five empirical studies (Chapters 2-6), carried out under one theoretical umbrella of the augmented health function outlined in Chapter 1 (see Table D). While the thesis presents a monograph, it can also be separated into separate

papers based on each chapter, each covering a side or an angle of the overall research goals. For ease of navigating around the thesis, Table C summarises the overall structure of the current thesis, including a summary of research questions and conclusions, while Table D provides essential details about each study in Chapters 2-6. All chapter-specific research questions, detailed methodology and conclusions are summarised there.

To answer the above stated questions, this thesis utilises a wide variety of data and methods, which are outlined in each chapter separately and summarised in Table D. Due to the nature of the research questions and the quantitative nature of the field of comparative health sociology, the main approaches are quantitative, with one usage of qualitative methods with textual analysis of reports and documents using the WHO "Health in Transition" Reports in order to create a typology of transition health care systems in Chapter 2. The quantitative methods are diverse and include ordinary least squares (OLS); time-series cross-sectional analysis (TSCS); multilevel analysis (MLA)[2], including linear and logit estimations; cross-sectional and longitudinal cluster analysis; and finally, factor analysis.

For all the quantitative analyses secondary data both at the individual and country-level were used. The datasets include at the macro-level: World Health Organisation (WHO) "Health for All" (HfA DB) database (WHO, 2012), World Bank (WB) World Development Indicators (WDI) (WB, 2012b) and Worldwide Governance Indicators (WGI) (WB, 2012c), and Polity IV and Major Episodes of Political Violence (MEPV) from Centre for Systemic Peace (CSP) (Center for Systemic Peace, 2010a; 2010b); and at the micro-level: Life in Transition Survey (LiTS) from the European Bank for Reconstruction and Development (EBRD) (EBRD, 2011a), and European Social Survey (ESS) data (ESS, 2012).

The first empirical study is carried out in ***Chapter 2***, which concentrates on *population health* in transition countries and *macro-level determinants* of it. The centre of attention here is one of the key influences on health – *health care*. Transition countries' health systems are very often united into one block, but the diversity within them is noticeable and increasing. Therefore, the main research goal in this chapter is to investigate, how different the health care systems are between the transition countries and to what degree they influence health at the macro-level in *transition countries*. I find that the economic and political indicators have an effect on health, but also the *health care* systems' functioning play a very *important role*, therefore, should not be ignored.

I continue to analyse health in *transition countries* at the *macro-level* in ***Chapter 3***, where both the *objective* and *subjective* measures of health are included. I find that at the macro-level objective and subjective health measures are different, and the *meaning* of *subjective health* at the *country-level* is questioned. What exactly does subjective health mean when we aggregate the individual evaluations of health? Moreover, I argue that subjective indicators should be included in the analysis of objective health – even at the macro-level.

After examining both the 'objective' and the 'subjective' at the macro-level, the analysis is brought to the *individual* level in a *multilevel* setting in ***Chapter 4***. This chapter brings the 'level-debate' (Gravelle, 1998; Gravelle, 1999; Jen, Jones, and Johnston, 2009a; Jen, Jones, and Johnston, 2009b; Wilkinson, 1996) in studying health to the centre of attention: do contextual factors influence health once the important individual-level factors are controlled for? This chapter concentrates on *subjective health in transition countries* and models the augmented health production function in a multi-level setting. The main goals of this chapter are therefore to analyse, whether objective and subjective determinants have a

[2] It is also often substituted with the term "hierarchical linear modelling" (HLM), but in this thesis I refer to the analysis as MLA as not only linear models are estimated.

different effect on individual subjective health; and whether contextual factors matter. I find that objective and subjective factors influence subjective health *differently* at the individual level but subjective indicators 'take the lead'. *Contextual factors* were found to have an effect only when the *years* were accounted for. Opposite to Chapter 3 I find that GDP is not a significant determinant for health – at least at individual health.

After analysing the diversity of the transition countries in detail, I then compare them with the West. Traditionally, the East-West divide follows the division during the Cold-War, however, as the diversity in the transition countries increases, it is a reasonable question, whether the divide is changing or still exists as well. ***Chapter 5*** looks at individual survey data of both *individual objective* and *subjective health*. The main goal is to compare the *determinants of health in the traditional East and West Europe* and determine if they are different or similar. I find a clear difference between the East and West, even though only mostly 'successful' CEE countries are included in the analysis. This refers to both individual and contextual level factors. These results again are a clear confirmation of the uniqueness of the transition region, which should be analysed as its own case in future health research due to its own health production functions.

Furthermore this region hosts increasingly diverse individual countries and sub-regions. Over time many of the CEE countries diverged from otherwise similar starting points with the departure of Soviet control and concomitant market liberalization, and now some of them finished their economic transitions, some not. Hence, ***Chapter 6*** rounds up the analysis on the East-West health divide by trying to systematically identify how this divide might have changed since that time period. This chapter returns the analysis to the macro-level and in a simple way tries to systematise diverse population objective negative health measures and group countries in the broader Europe accordingly. Therefore, the main goals of this chapter are to identify whether population health measures reflect an overall concept of health, or rather form a 'health profile' containing various interrelated but divergent factors; and then use this to try to discover what changes, if anything, in the European health divide: has it shifted, became more fuzzy or multiplied? I find that various population health measures reflect the different factors of 'health' and may be used in tandem to form a 'health profile' of each given country. These unique profiles cluster together to reproduce the East-West divide in its classic form in the early 1990's, but then diverge as they are transformed throughout transition and a clear three-group divide is now present nowadays. It is interesting to note that this grouping according to the health profile of countries does not follow the EU – non-EU separation in the CEE, as some of the new EU-members are joined in terms of health by some of the former Soviet Union States.

General conclusion summarises all the findings and puts them in the perspective of the literature in the field of health sociology, as well as compares and systematises the different studies' results.

CONCLUSIONS AND SUMMARY OF FINDINGS

There are several overall very important conclusions, which I come to. *First*, I find that *objective* and *subjective* health measures in Europe, while could overlap, are still very *diverse*, as they have very different determinants structures. *Secondly*, there are significant differences in the way the objective and subjective indicators influence health: while subjective indicators influence both objective and subjective health, the objective determinants tend to have the effect primarily on objective health. *Thirdly*, I find that the contextual factors have almost no effect on individual health, once the individual-level forces are controlled for, hence supporting Jen, Jones and Johnston (2009a; 2009b) findings. At the same time, the determinants structures are very similar at the individual- and

country-levels. *Finally*, analysing transition countries, I found from the very first study that they have a very big diversity within the group. The analysis revealed, that while there are still differences between the traditional East and West, a clear three-group pattern has emerged, where the post-Communist – opposite to the post-Soviet – transition countries are coming closer and closer to the European West, and further away from their former Soviet Union neighbours.

All of these findings place this thesis strongly in the field of literature of health sociology on the determinants of health, both objective and subjective, as well as add to the 'level-debate' in health production. It is important to remember that while similar, subjective and objective health measures are determined differently and might reflect very different concepts, hence should not be used interchangeably. The significance of this work is also in the theoretical and methodological synthesis of different approaches to studying health. This is done through revisiting the European health divide. The findings on the change in divide are significant if not crucial for our thinking on health in Europe: the situation has changed, the divide is different from what it was before the transition started, and this new European order should also be taken into account. Perhaps, a completely new outlook in Europe on what we generally understand as 'East' and 'West'.

Table C. Overall summary of the thesis' structure.

	General Introduction ***Health Across Borders***				
Overall Research Questions	Are objective and subjective, individual and public measures of health the same or different? Do the subjective and objective, individual and contextual determinants of health influence health differently? Is health in transition countries differently determined compared to health in the West? Has the European health divide changed?				
	Chapter 1 *Health and its Determinants: Theoretical and Empirical Framework* (p.15)				
Main concepts	Negative and positive health; objective and subjective health; public/population and private/individual health; determinants of health; socio-economic and political determinants; lifestyles; health care; European East-West health divide; transition countries				
Main theoretical assumptions	1) Concept of health is not clearly defined, hence, leaves freedom for interpretation. 2) Health is influenced by numerous factors, not a sole one. 3) Factors both at the population and individual level have to be considered when analysing health. 4) Both approaches – objective and subjective – are to be addressed when analysing determinants of health.				
Empirical framework	Health production function; ***augmented health production function***				
	Chapter 2	**Chapter 3**	**Chapter 4**	**Chapter 5**	**Chapter 6**
	See details in Table D				
	General Conclusion ***The Changing Health in Europe***				
Main empirical findings	1) Objective and subjective health are differently determined, both at the country- and individual-level. This might imply the difference between the concepts themselves. 2) Subjective and objective determinants influence health differently, particularly in the 'traditionally' East European countries. 3) Contextual factors tend to have only small and mostly insignificant effect on individual health as soon as the individual determinants are taken into account. 4) European health divide has changed from the simple 'East-West' structure to a three-group 'East-Centre-West' divide.				

Table D. Detailed summary of each chapter.

	Chapter 2 (p.47)	Chapter 3 (p.65)
Title	Health Care Systems as Determinants of Health Outcomes in Transition Countries: Developing Classification	Macro-Level Health in Transition: the Role of Subjective Determinants
Research question/s	1) What are the main determinants of health at the macro-level? 2) To what extent can the differing health outcomes in transition countries be attributed to the differences in the emergent health care structures?	1) Do the subjective indicators influence health at the macro-level? 2) Do objective and subjective determinants influence health in a different way?
Level of analysis	Country-level (macro)	Country-level (macro)
Sample	Transition countries	Transition countries
Unit of analysis	Countries	Countries
Type of data	Macro-level qualitative and quantitative data	Macro-level statistics and aggregated survey-statistics
Number of observations	484 total observations: 25 countries over 18-16 years	28 countries, over two time-points: 56 total observations
Time dimension	Yearly observations (panel): 1989-2007	Two time-points (non-repeated observations): 2006, 2010
Data source	WHO HfA DB, WHO "Health in Transition" Reports, WB WDI, Polity IV, MEPV	WHO HfA DB, LiTS from EBRD
Methods	Textual analysis; cluster analysis; TSCS	Ordinary least squares (OLS) regressions
Dependent variable/s	Life expectance at birth (LEB)	LEB and aggregated subjective health
Independent variables	Cluster analysis: health care characteristics. Econometric analysis: Gross Domestic Product (GDP), political regime, military conflict, average length of stay (ALOS), outpatient contacts, health care in transition classification	GDP, political stability and absence of violence (PSAV), membership in associations, satisfaction with income (aggr.), satisfaction with how democracy works (aggr.), interpersonal trust (aggr.), health care expenditures, satisfaction with health care (aggr.)
Findings and conclusions	1) Health care systems are indeed very diverse in the transition region, and fall into several distinct groups. 2) Economic conditions (GDP) and health care tend to have the biggest effect on health at the macro-level. 3) The health differences in transition countries can strongly be explained by the diverse health care paths and trajectories: those more 'successful' in modernising their health care systems, tend to produce better health outcomes. 4) Health care analysis can only benefit from creating classifications of the health systems in transition and the classification is indeed possible.	1) Subjective indicators do have an influence on the aggregated health. 2) Objective and subjective health are determined differently by the same determinants. The determinants also have a different effect on health in the different domains: economic, political and social. 3) Most of the subjective determinants are directly related to the subjective health, whereas both objective and subjective play a role for objective health - either in a simple addition of effects (hence, both aspects are significant to a similar degree) or interaction (for economic determinants.

Chapter 4 (p.83)	Chapter 5 (p.101)	Chapter 6 (p.121)
Determinants of Subjective Health in Transition Countries: a Multi-Level Approach	'Being' or 'Feeling' Healthy: Determinants of Objective and Subjective Health in 'Divided' Europe	The Changing Borders of the European East-West Health Divide: Blurring, Shifting or Multiplying?
1) Which indicators influence health at the individual level? 2) Do objective or subjective determinants tend to influence subjective health more? 3) Do contextual factors influence the individual-level health, and if so, which and how?	1) Do the objective and subjective health indicators reflect different measures of the same or different concepts? 2) Are the determinants of individual health structurally different in the East and West?	1) Do diverse health indicators reflect the overall concept of 'health' or describe different aspects of it? 2) Has the boundary of the European health divide shifted, become more fuzzy or multiplied?
Multi-level (country- and individual-level)	Multi-level (country and individual)	Country-level
Transition countries	All European countries	All European countries
Individuals	Individuals	Countries
Macro-level statistics, aggregated survey-statistics and individual survey data	Macro-level statistics, aggregated survey-statistics and individual survey data	Macro-level statistics
58,357 individuals in 27 countries across two time-points	228,874 individuals in 31 countries, five time-points	1479 total observations: 45 countries over 29 years
Two time-points (non-repeated observations): 2006, 2011	Five time-points (non-repeated): 2002, 2004, 2006, 2008, 2010	Yearly observations (panel): 1989-2010
WHO HfA DB, WB WGI, LiTS	WB WDI and WGI, ESS	WHO HfA DB
Multi-level analysis	Multi-level analysis	Factor analysis; Cluster analysis;
Individual subjective health on a 5-point scale	Individual subjective and objective health – dichotomised.	—
Indiv: Gender, education, age, satisfaction with life, work, political activity, membership in associations, health care services usage, economic satisfaction, preference of democracy, interpersonal trust, informal payments in HC Cntry: GDP, CPI, membership in associations, ALOS, HC classifications, trust in the society	Indiv: Age, Gender, Marital status, Education in years, Income 10-step ladder, Voted in last elections, Social activity, Life satisfaction, Satisfaction with economic situation, Satisfaction with democracy, Interpersonal trust, Satisfaction with HC, Cntry: GDP, PSAV, HE as % of GDP, Trust in the society	Cluster: Life expectancy at birth; Cancer incidence per 100000; SDR, tuberculosis, per 100000; AIDS incidence per 100000, Infant deaths per 1000 live births, Tuberculosis incidence per 100000, Life expectancy at birth, Maternal deaths per 100000 live births, SDR, diseases of circulatory system per 100000, SDR all causes per 100000
1) Individual level determinants and subjective indicators tend to have a stronger effect on individual subjective health. 2) Subjective and objective indicators do influence health at the individual level differently: all individual level economic indicators tend to affect health, while political and social are primarily ruled by the subjective determinants. 3) With the exception of GDP, contextual indicators tend to have an effect on subjective health only when the yearly changes are taken into account. Considering the time-frame in this study (2006 and 2010), this might be the effect of the 2008 crisis.	1) Subjective and objective health indicators do have different determinants' structures. 2) Health does not have a universal set of determinants across Europe: East and West differ. 3) Contextual factors have different effects on subjective and objective health as well as in the East and West. 4) Transition countries, even though only the most developed of them are analysed, are clearly different from the West European states.	1) Health indicators commonly used (LEB, mortality and others) could be used as approximate proxies for overall health. 2) A broader 'health profile' consists of four main dimensions: mortality-based, female and child health, tuberculosis and AIDS indicators. 3) Traditional East-West divide did exist before the start of transition. 4) By the end of the transition three groups can be distinguished according to the health profile on the European continent: "West Europe" (group A), "Post-Communist Central East Europe" (group B) and "Post-Soviet CEE" (group C)

CHAPTER 1

HEALTH AND ITS DETERMINANTS: THEORETICAL, CONCEPTUAL AND EMPIRICAL FRAMEWORK

ABSTRACT

Chapter 1 explores the analytical and theoretical concepts involved in this research, as well as provides a very general background for the topic of 'health in transition countries'. This theoretical exploration is based on the existing empirical literature, through synthesis and analysis of which I arrive at the detailed conceptual and empirical framework for the quantitative analysis. First, the concept of health itself is discussed in detail. Then the literature on the determinants of health is summarised and the health production function is introduced. It is then adjusted using all the available research on the determinants of health and an augmented health production function is developed. The chapter ends with a discussion on the European East-West health divide and health in transition countries of Central and Eastern Europe.

1.1 INTRODUCTION

Chapter 1 starts off the thesis and forms the foundation — both theoretical and empirical. I first discuss the main and crucial concept of health, trying to identify what it is and clearly explain how it is used in this thesis. The next section of this chapter deals with the diverse determinants of health, as is evidenced by theoretical and empirical literature in the field of health sociology and epidemiology. I attempt to structure them systematically, so that a step-by-step empirical framework is introduced, which is used for the next four studies in this thesis. The final section of this chapter addresses the European health divide in some detail — in terms of both health and its determinants.

1.2 WHAT IS HEALTH? — ADDING CONCEPTUAL CLARITY

1.2.1 DEFINING HEALTH

General definition: negative vs. positive health

When one hears the word 'health,' one understands it immediately, and it seems a simple concept. But when one is asked to give a definition of it, it becomes problematic because suddenly it appears to be difficult to give full credit to this concept and its diverse sides. The problem primarily arises from the very vague understanding of what health *is* as opposed to what it is *not*. Most people asked would perhaps speak about the physical state of health, but still, the term raises a lot of questions — both in everyday life and for researchers. How does one evaluate the health of a man with the flu who is otherwise fit, or a physically fit person with a chronic disease like cancer? Even trickier is a person with a handicap who is perfectly happy and 'healthy'. While it is easy to identify antonyms of health, such as sickness, illness, disease, and death, one might ask, what exactly is 'health' in a *positive* sense?

Even the standard dictionary definitions are broad and unspecific. For instance, Merriam-Webster Online Dictionary suggests that health can be defined very generally as "the condition of being sound in body, mind, or spirit", "freedom from physical disease or pain", or a "flourishing condition" ("health" [Def. 1a, 2a] Merriam-Webster Online Dictionary. n.d.). The latter definition is in essence synonymous with the concept of well-being, hence it gets harder and harder to differentiate between the two. Originally, the word 'health' derives from an Old English word *hælth*, which means "wholeness, a being whole, sound or well" (Harper, n.d.). This understanding does add a bit to the 'physical' side to health, but then the mental, psychological, and 'well-being' factors of health can also be 'whole'. It is easy to note that initially the term of 'health' was created as a positive notion (wholeness), without any reference to illness (Keller, 1981: 45).

The definitions commonly used across social science disciplines — sociology, health sociology, and political science — are either considered too narrow or not particularly helpful to researchers, who need to *measure* health with *empirical* research. On the one hand, many researchers choose the simple definition of health as a ***negative*** reference to physical and mental health, i.e. 'absence of disease'. On the other hand, the most commonly used definition introduced by the World Health Organisation (WHO) is not extremely useful. The WHO identifies health as "a state of complete physical, mental and social well-

being and not merely the absence of disease or infirmity" (WHO, 2006: 1)[3]. It is indeed very broad, and is often referred to as 'holistic health' or 'positive health'.

Interestingly, the WHO definition is both praised (e.g. Ware, 1987) and criticised (e.g. Bell, 1983; Garner, 1979; Larson, 1996) for essentially the same property: its over-reaching inclusion of elements far beyond medical conditions. On the one hand, the definition suggests that health cannot be simply defined in the *negative* sense — i.e. as "absence of disease or infirmity", which is particularly relevant when talking about tricky issues of 'health with disability'. The WHO definition also includes the 'mental' factor of the concept, which is particularly significant for psychology and mental illness research. Therefore, there is indeed a major step forward from simply understanding health as physical fitness of the body. Still, there are multiple of weaknesses in this broad definition of health, which are widely discussed.

First, the WHO definition includes the 'social' part of an individual's life along with physical and mental states. In favour of this is the argument of Wilkinson (1996), who assumes that health is primarily psycho-social in nature, therefore, the author particularly draws the attention to the links between the psychological and social states. Nonetheless, including social factors into the overall concept of health leads to happiness, quality of life, social inclusion, and life satisfaction being attributed to be factors in health as well (Saracci, 1997). Then almost any aspect of life of a society or an individual is related to health; every problem, a sickness. The concepts listed above are then one and the same. This, however, is an over-generalisation of health and also a confusion of all the concepts. After all, quality of life and well-being are broad concepts, and they themselves encompass health, hence the terms cannot be equal (Larson, 1996; Rapley, 2003; Ware, 1987). While it is evident that mere "absence of disease" would not guarantee *social* well-being (Callahan, 1973: 80), can one really keep the medical profession — which is arguably most often associated with influencing individuals' health — accountable for social well-being and happiness as well, if indeed these are components of health? If achieving happiness were as easy as treating a cold, there would be no unhappiness and suffering in the world, and research in the area probably would not even develop. To counter WHO's inclusion of the 'social' life into the definition of health, some research provides evidence that the social circumstances are not one of the dimensions of health, but rather the external influences of it (Ware, 1981).

A final dilemma arising from inclusion of the social component in the definition of health is the question of whether the *individual* or *societal* social well-being is meant to be part of health (Patrick and Erickson, 1993). Is it the individual's social potential or rather the social environment of the society one is living in? This blurs the definition even further.

The next criticism of the holistic definition of health relates to what Garner calls the 'utopian' nature of the definition (Garner, 1979), which questions the "completeness" of health. Indeed, what is "*complete* … well-being" or health? If it is hard to define 'health', it is probably even harder to define, what 'complete' exactly means. The border of 'completeness' can be different for different cultures and individuals, depending on people's knowledge and experiences. Moreover, 'complete' assumes a certain form of finiteness, which is difficult to achieve in any field, and, in health, difficult to understand and reflect. Again, even minor deviations from this 'completeness' would then mean bad health, therefore it makes being healthy "humanly impossible" (Larson, 1996: 184). If in terms of health, 'complete' refers to a certain combination of physical, mental, and social states that are equally weighted, then happy people with disabilities would be considered equally unhealthy as unhappy,

[3] 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 and entered into force on 7 April 1948 (WHO, 1976).

physically fit people. But, these three dimensions of health cannot and perhaps should not be equally weighted, if weighted at all.

The dilemma of 'completeness' also makes the question of *time changes* of health relevant (Bell, 1983; Bircher, 2005). While health is definitely a state that that can be altered with time, does 'completeness' also change over time? If not, does this mean that aging is inevitably a process of getting unhealthier? If that is so, we would start 'losing health' from birth, and there would be no healthy 60-year-olds, in this extreme model. Therefore, the dynamic or longitudinal approach to health could be quite important.

There are a couple of suggested definitions of holistic health that attempt to correct some of the shortcomings of the WHO definition. One of the definitions is proposed by O'Donnell (O'Donnell, 2009) and supported by the American Journal of Health Promotion (AJHP, n.d.): "Optimal health is a dynamic balance of physical, emotional, social, spiritual, and intellectual health". The AJHP website (ibid.) provides a graphic with physical dimension situated in the centre, surrounded by the other four 'wedges'. On the one hand, it does not argue for the 'completeness' of health, but rather uses the term "*optimal health*", which can indeed be understood close to Larson's "adequate levels" (Larson, 1996: 184), or health sufficient for performing everyday activities and 'living life to the fullest'. Besides, O'Donnell's definition seeks a *balance* between the different dimensions of health, and moreover, a *dynamic balance*. This view on health improves some of the highly criticised sides of the WHO definition. On the other hand, however, the above definition adds even more complexity to the WHO definition by introducing two more dimensions to health: spiritual and intellectual. This might be a very useful approach for the health promotion domain, as then health can be targeted from so many angles, but overall it still makes it more difficult to distinguish health from other notions, such as well-being, quality of life, and 'good living'.

Still broader understanding of holistic health is suggested by Saylor (2004), who criticises the "dimensionality" of health definitions and introduces "the circle of health", which incorporates "optimal function, well-being and quality of life" (ibid.: 105) at its core with concepts as broad as energy, fitness, happiness, growth, social-role performance, adaptation, social support, and relaxation leading towards and from the core. This indeed unites many more than three or five dimensions. Hence, this definition erases specific boundaries between diverse concepts and perhaps is somewhat misleading for both theoretical and empirical research on health.

It is evident that the final — and perhaps most important for this thesis — criticism of the WHO and in fact of any holistic definition of health is that *measuring* it is extremely difficult, and perhaps even impossible, at least universally across different countries over time. While it is hard enough to unite three dimensions into one measure (Breslow, 1972), it is probably nearly impossible to do so with five complex concepts, not to mention a full variety of them as in Saylor's definition. Hence, while holistic health is indeed a valuable step towards understanding the complex human being, it is not particularly helpful for conducting sociological quantitative research, as this definition cannot be operationalized.

All in all, among the proposed definitions of health, there seem to exist two extremes. Medicine and epidemiology use either the so-called *'negative health',* as it refers to the absence of disease and certain medical conditions (Kindig, 2007), or the '*functional state'* (Patrick, Bush, and Chen, 1973). Mostly, negative health is associated with physical health, with some inclusion of mental illness as well. Yet, there is a completely opposite definition of health proposed by the WHO and other researchers (e.g. O'Donnell, 2009; Saylor, 2004), '*holistic health'*, which tends to encompass a broad range of the concepts of the life of an individual. This makes it rather difficult, if not impossible, to operationalize.

So far, a reasonable middle ground is hard to find. One of the definitions that could pose as middle ground in defining health is the one offered by Starfield, who argues for the inclusion of physical, social, and biological environments and identifies health as the tools acquired to *cope* with them. Furthermore, Starfield argues that health also includes the resources (social and personal) and the capacities of the individual:

> [Health is] the extent to which an individual or group is able, on the one hand, to realise aspirations and satisfy needs and, on the other hand, to cope with the interpersonal, social, biological, and physical environments. Health is therefore a resource for everyday life, not the objective of living; it is a positive concept embracing social and personal resources as well as physical and psychological capacities (Starfield, 2001: 453).

Therefore, this definition, while being close to the notion of holistic health, still provides a less encompassing and more systematic understanding of health, which is not equated to the social sphere, but is the *tool* with which individuals *cope* with the social environment. Coming closest to achieving a sound definition of health, the common limitation still remains: Its operationalization is difficult.

Overall, however, when merging all the existing definitions, the most common inclusions are the two main dimensions or sub-concepts: ***physical*** and ***mental or psychological*** states of an individual (Keller, 1981). These are the dimensions identified and used in the common term '***health status***' (or 'health state'), which Starfield defines as "all aspects of *physical* and *mental* health and their manifestations in daily living, including impairment, disability, and handicap" [emphasis added] (Starfield, 2001: 454). Further, Kindig differentiates between 'health status' and 'health outcome', as the latter is a more 'finite' state and is very often used to avoid dealing with the complexity of the health definition:

> [A] health state or health status of an individual or population refers to health at a point or *narrow period of time*, usually measured as morbidity or some indicator of a health-related quality of life. When a measure of *mortality* or life expectancy is added to the measure, it produces a more expansive concept of ***population health outcome*** [emphasis added] (Kindig, 2007: 147).

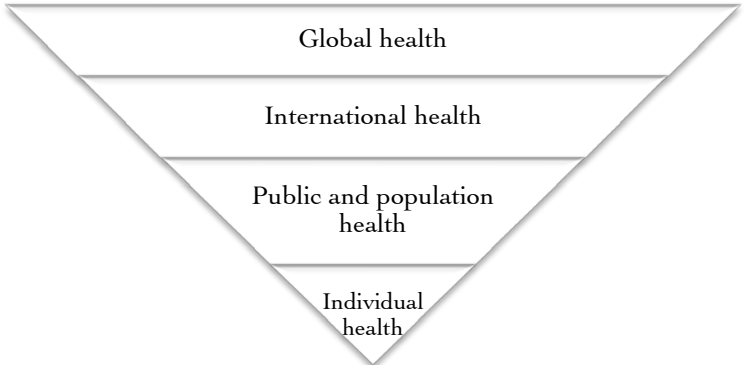
In order to avoid intricacies of *health* concept measurement, '*health* status' is a more common notion used in empirical quantitative research. For instance, Gold and colleagues associate health status with simply *health at some point in time* (Gold, Stevenson, and Fryback, 2002). Therefore, very often researchers analyse as 'health' what, in reality, following Starfield's definition, is 'health status' (e.g. Chopra, 2005; Deaton, 2003; Feinstein, 1993; Idrovo, Ruiz-Rodriguez, and Manzano-Patino, 2010; e.g. Macinko *et al.*, 2003; Sala-i-Martin, 2007; Wagstaff and van Doorslaer, 2000). This is done for ease of operationalization and analysis. This is the approach chosen in this work. To avoid confusion and simplify the already complex framework, from now on *I use the terms 'health' and 'health status' interchangeably,* attaching the meaning of the latter to it. Hence, I concentrate primarily on the 'physical health status', with some links to the 'psychological' health through the 'subjective' health link.

Public, population and individual health

While the very notion of health is complex and broad, concepts like 'population health' or 'public health' add only more confusion, but it is not difficult to systematise them. Very generally speaking, these terms differ primarily, but not solely, in the unit of analysis and the subject to which the term is related. Potentially, they could be assembled into an inverted pyramid, where the bottom is represented by the smallest unit — an individual —

and the top, by health of the global community overall (Figure 1.1). However, in the current thesis I am not interested in the international and global health[4], but concentrate primarily on population, public and individual health.

Figure 1.1. Levels of the concept of health



Individual health is health of a human being, in terms of both physical and mental health. The definitions discussed above, as well as the general term 'health', are most often associated with individual health. When I analyse individual health, I specifically refer to the *physical and mental states of individuals*.

Public and population health are sometimes considered conceptually the same, but they can also be understood in two different ways. On the one hand, both of them reflect health of a group, but on the other hand, they could both represent the diverse approaches to a group's health. Hence, '***population health***' can be understood as "the health outcomes of a group of individuals, including the distribution of such outcomes within the group" (Kindig and Stoddart, 2003: 381). Others have identified population health as an area of analysis or a general approach that includes not only the health outcomes, but what influences them. For instance, Aday (2005), as well as Dunn and Hayes use the Canadian Federal Advisory Committee on Population Health definition of population health:

> Population health refers to the health of a population as measured by *health status indicators* and as influenced by social, economic, and physical environments, personal health practices, individual capacity and coping skills, human biology, early childhood development, and health services [emphasis added] (Dunn and Hayes, 1999: S7)

Therefore, many authors differentiate between population health as a concept, population health perspective, framework, research, and approach (ibid., 1999), as well as population health models (Friedman and Starfield, 2003). While the concept itself tends to go back to the narrower definition by Kindig and Stoddart, taking the population health perspective assumes agreement that health is not isolated, but is rather influenced by societal forces and individual capacities and circumstances (Dunn and Hayes, 1999; Kindig and Stoddart, 2003; Kindig, 2007; Starfield, 2001). This is a very sociological view on health, as health is viewed as a factor that develops in a society overall, rather than a concern isolated strictly to the medical profession.

[4] According to Koplan et al. (2009), global health "[focuses] on issues that directly or indirectly affect health but that can transcend national boundaries" (ibid.: 1994), while international health "[focuses] on health issues of countries other than one's own, especially those of low-income and middle-income" (ibid.). These are relatively broad definitions, but both of them do not deal with comparisons between nations, but with certain summary measures across national borders. Therefore, both are not relevant for the current cross-country research.

Like population health, ***public health*** can also reflect the simple concept of the 'health of the public,' or health of one group. But similarly to population health, it can refer to other, broader meanings. In case of public health it refers to health care services, profession of public health workers, a system and social institution. For instance, Turnock refers to public health as "*certain measures a society undertakes"* to sustain a healthy population, which are very political and government-oriented, and simultaneously grounded in science, prevention and social justice (Turnock, 2004).

In a way, public and population health are similar, but population health as a perspective and approach is somewhat broader, uniting many of the areas of influence on health, whereas public health as an approach is more policy-oriented. In this thesis, population health and public health as concepts will be used interchangeably to simply identify the health of a certain group, whereas the theoretical framework is strongly grounded in the broader 'population health perspective'.

The final discussion, essential for understanding health, is the one about the interrelationship between individual health and population health. Again, there is no uniform agreement across the field, but still the majority agrees that population health is reflected in aggregated and averaged measures of individual health (e.g. Mathers *et al.*, 2003; Murray, Gakidou, and Frenk, 1999; Murray *et al.*, 2003; WHO, 2000; Williams, 2001). Therefore, summary measures of health, such as life expectancy at birth (LEB) and mortality, are used to reflect this relationship.

Arah (2009) proposes a very different take on the individual-population health link and argues that individual and population health are in fact *inseparable* and *interrelated.* Neither is individual health independent from population health, nor is population health possible without the individual. At the same time, the population is not a simple 'summary' of all individuals, but rather an intricate interdependent circle: population health is "the indivisible health experience of a collective of individuals, where this collective is taken to be distinguishable from a mere collection or summation of individuals" (ibid.: 239).

While Arah's identification of the interrelationship between population and individual health is indeed interesting and worthy of analysis, it is difficult to operationalize this intricate relationship between the individual health status and population health. Therefore, keeping in mind Arah's ideas for further multi-level analysis, in this thesis I explore population health as a summary of individual health status indicators.

1.2.2 MEASURING HEALTH

While it is hard to define health, measuring a concept without a universally accepted definition is even harder, particularly when one takes holistic health into account. In this thesis I concentrate on health equated to health status, as this is the traditional solution in health sociology. Health status is often measured in the negative terms: absence (or presence) of some disease and of death, including specific deaths from certain diseases. This way, *morbidity* or *mortality* indicators in the society are used, as well as symptoms, reports, and tests of patients and respondents.

Morbidity refers to "[any] departure, *subjective* or *objective*, from a state of physiological or psychological well-being. In this sense *sickness*, *illness*, and *morbid condition* are similarly defined and [are] synonymous" (Porta, 2008: 158). This is a common definition, also used by Kindig (2007) and Last and Spassoff (2001). Hence, morbidity can be understood as a presence of illness in an individual or a prevalence of certain disease or sickness in a population. Morbidity-based country-level indicators then reflect the *prevalence* of sickness in the population.

Mortality indicators express the finite *'result'* or *'outcome'*. Those include mortality or death rates, crude or specific to a disease or a group by age, gender, and life-expectancy. *Mortality*, or *death rate*, is simply defined as "[an] estimate of the portion of a population that dies during a specified period" (Porta, 2008: 60). *Life expectancy* (LE, or rarely 'expectation of life') is a statistical abstraction calculated from death rates at certain ages, which reflects the number of years an (average) individual of a certain age is to live if death rates remain the same (Last and Spasoff, 2001).

All in all, both of the above types of health indicators refer to purely physical and objective health, primarily measured at the macro or societal level, hence reflecting the *aggregated population health*. While sickness can indeed be measured at the individual level, 'rates' per se involve the existence of a certain group of people for which they are calculated.

Other proxies for health are often measured through the concept of *functional ability*, which can be described as an "ability to perform one's roles and participate in life" (Bowling, 2005: 4). This is one of the individual health proxies. It is sometimes present in the sociological surveys of population, in patients' and doctors' surveys. A different proxy is more commonly used that raises a lot of questions in terms of its measurement, validity and cross-country comparison. This is 'general health, assessed by individuals', often referred to as *self-rated, self-evaluated, self-reported, perceived*, or ***subjective health***[5], as it is assessed directly by respondents or patients. Therefore, the two commonly used terms — 'objective' and 'subjective' health — have appeared and are at the centre of attention in this thesis.

Objective health is very often expressed as so-called 'hard data'. The Dictionary of Epidemiology identifies 'objective' as "free of prejudice, bias, favouritism, special interest" (Porta, 2008: 173), but in reality this can rarely be achieved in pure form. Hence, objective health is simply the one factor not directly evaluated by individuals themselves or reports of specific diseases or functional state by an individual. These are the mortality and morbidity indicators at the macro level, and this is the easiest way to express objective health in sociology. At the individual level objective health involves *knowledgeable* evaluation, by a doctor or medic. This type of statistics is available in epidemiology and medicine, when outcomes of interventions on specific patients are analysed, but is rarely easily accessible in sociology. In the absence of a knowledgeable person, as is the case in most sociological surveys, individuals are asked to report some concrete illness or disability. The common trait of most of these indicators is that they very often express *negative health*, i.e. absence of disease or illness, hence, objective health is very often understood as negative health.

Subjective health is so named as it involves human assessment and evaluation, which explains the usage of 'subjective' in the title. It is, however, very often used interchangeably with objective or physical health in individual-level research, when no other health proxies are present. It is still one of the most disputed health indicators in the discipline of health sociology. *On the one hand*, self-assessments of health can be erroneous; when respondents reply to the questions, they may relate to different experiences and different illnesses in their evaluation. Indeed, a study by Krause and Jay (1994), which assessed in in-depth interviews what people referred to while assessing health through the standard scaled questions of subjective health, revealed that people from different groups had very different points of comparison and referral. Some referred to a specific physical illness, some to general physical functioning, and still others to health behaviours. These differences were found by age, education, and race (ibid.: 936-938). Moreover, respondents could refer and compare their health to a different group, be depressed or stressed, or simply have a bad experience during the interview. There is also some evidence suggesting that subjective measures have somewhat questionable comparability across cultures, genders, and ethnic

[5] All of these terms are used interchangeably throughout the thesis.

groups (Jylha *et al.*, 1998; Mathers, 2003). For instance, Jylha and colleagues (1998) found problems in comparing subjective health between genders as well as some cultural environments. Nevertheless, even Krause and Jay agree that most of respondents still associated subjective health with some *physical health aspect*.

On the other hand, there are strong supporters of subjective health measures (Benyamini and Idler, 1999; Chandola and Jenkinson, 2000; Idler and Kasl, 1995; Lundberg and Manderbacka, 1996), who suggest that the measures are indeed valid for cross-gender, cross-ethnical, and cross-cultural comparisons. Additionally, the measures themselves do predict mortality, physical health, and functional status well (Idler and Kasl, 1995; Idler and Benyamini, 1997; Mossey and Shapiro, 1982; Ratner, Johnson, and Jeffery, 1998; Sherman, Hughes, and Tavakoli, 1995). While uncertainty of the measured concept is one of the criticisms of subjective health, it is also one of the strengths, as self-assessed health may not only predict physical status, but go far beyond that and encompass a positive and more holistic notion of health. Indeed, studies find that subjective health measures are also related to psychosocial distress and mental health (Lundberg and Kristenson, 2008; Trentini *et al.*, 2012), rather than purely to physical health. Therefore, self-assessed health does reflect the physical status, but it also reflects other sides of health, which remain under-researched. While there is no uniform consensus about the validity of subjective health, it is still widely used to reflect general health and, particularly, the 'more positive' notion of health. In this thesis it is used together with objective health measures to investigate the differences between the more objective and more subjective health — at both the individual and macro levels.

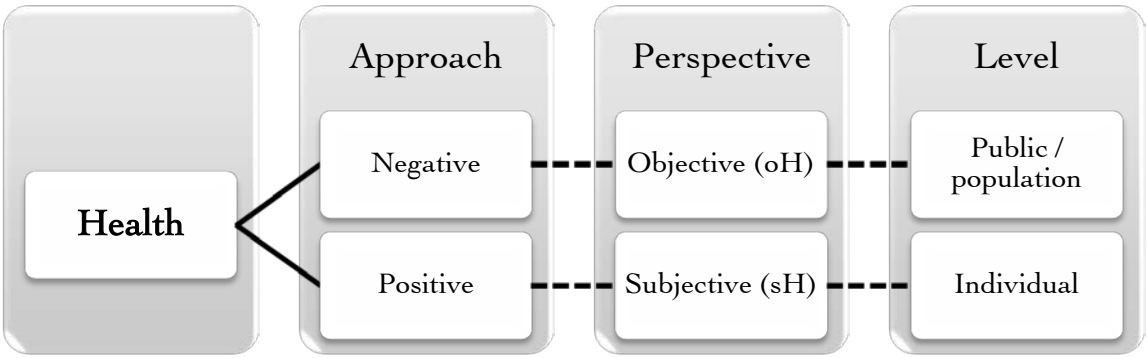
A unique measure/question for subjective health still doesn't exist in survey methodology, but the most common are phrased as "All in all, how would you describe your state of health these days?" (WVS, 2009) or "How would you assess your health?" (EBRD, 2011a) They are measured on a Likert scale of three, five or seven points (EBRD, 2011b; ESS, 2012; WVS, 2009). There is a debate around the usage of the scale in empirical research. On the one hand, there is little or no bias in using the scale as a continuous variable, as long as there are at least five points in the scale and the variable is close to being normally distributed (Dolan, 1994; Olsson, 1979). A three-point scale can indeed be used as a continuous variable, but Dolan and Olsson (ibid.) recommend caution when doing that, as some bias is still possible. On the other hand, the *continuity* of health measured on a Likert scale is often questioned and dichotomisation is suggested (Manderbacka, Lahelma, and Martikainen, 1998; Smith, Shelley, and Dennerstein, 1994). Therefore, for econometric analysis, the scale is sometimes dichotomised to either good and very good health, or bad and very bad (e.g. Carlson, 1998). I follow both of the conflicting suggestions and try to run an analysis on different coding transformations of subjective health. The exact indicator and its transformations used in this thesis are specified in each study separately.

1.2.3 THE CONCEPT OF HEALTH: A SUMMARY

The concept of health is a complex notion. It is ambiguous and overreaching. Through all the definitions discussed above, it is easy to identify several dimensions, according to which the concept of health could be systematised if not identified. These are the general approach (negative or positive/holistic), perspective (objective or subjective), and level of aggregation and analysis (public/population or individual). Interestingly, current research unites the different dimensions and, as I showed above, in theoretical and empirical literature there are two major camps of health. One of them takes on health as a negative notion, which at the same time is inevitably objective and very often public. At the same time, the other camp argues for positive (or holistic) health, which is often analysed in the form of subjective health at the individual level. This distinction is presented in Figure 1.2.

In this thesis, health is addressed in a more negative sense, as holistic health is indeed difficult to operationalize in an empirical study. Studying positive health would require a completely different set of methods, approaches and samples. Nevertheless, I still attempt to compare objective and subjective, public and individual health in order to understand health as a concept and its determinants better. Is objective necessarily public? Are subjective and objective health notions similar or different? Do the individual and public health relate to different notions, and are they determined differently? Therefore, the next section develops a detailed theoretical and empirical framework for analysing the determinants of health.

Figure 1.2. Dimensions of health



1.3 DEVELOPING THEORETICAL AND EMPIRICAL FRAMEWORK

1.3.1 DETERMINANTS OF HEALTH: AN OVERVIEW

Health does not exist on its own and is not independent from other aspects of life. Indeed, there are strong interrelations between health and other factors. For instance, how much people earn very often depends on how healthy they are to complete certain tasks; but at the same time, those with higher incomes tend to lead more healthy lifestyles, have better health knowledge and living conditions, and can afford better health care, hence their health status is better. In this thesis, *health is placed in the centre of the story,* and while I acknowledge that some concepts might be interrelated, these complex links are simplified to uni-directional paths.

When one talks about the factors that influence health, one means the ***determinants of health***[6]. In very general terms, determinants of health are factors that "bring about change in health or cause health outcomes" (Kindig, 2007: 152). In other words, as the Dictionary of Epidemiology states, "[a] determinant makes a difference to a given outcome" (Porta, 2008: 65). A more complex and comprehensive explanation of determinants was provided by Starfield, who states that determinants of health are:

> … the wide variety of ***interacting*** *proximate* and *distal* influences on the health of *individuals* and *populations*, including but not limited to political contexts, policies, distribution of power and wealth, social and physical environments, health systems and services, as well as genetic, biological, and historico-cultural characteristics. The use of the term "determinants" rather than "determinant" is intentional. [As] … there is no single determinant of disease or illness [emphasis added] (Starfield, 2001: 452).

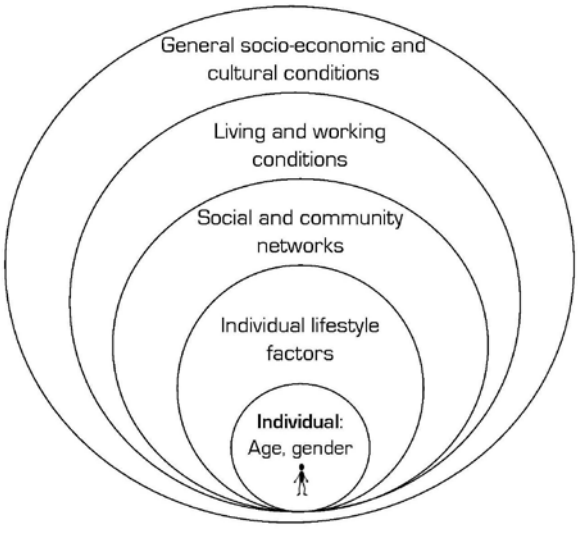
[6] From here on, '*health* determinants' or simply 'determinants' are used interchangeably.

In this definition Starfield provides several important insights into what the determinants are. *First*, they might be *complex* and *interacting* – therefore, the links within a set of determinants structure is never simple and uni-dimensional. *Second*, she also outlines that the influences can be proximate and distal (or distant). This way, for instance, direct effects of living conditions or a spreading disease are more proximate to an individual's health than health policy, but all factors are important and influence health aggregately and complementarily. *Third*, Starfield does mention individual and population health, but does not specifically differentiate between the determinants. Hence, according to Starfield, individual health is influenced by the same or equivalent individual-level factors as population health.

The range of forces affecting health is very wide, and Starfield structures all the determinants in a complex model (Starfield, 2001: 453). These include *political context*; environmental, social, economic, and health *policies*; material and social *resources*; and environmental, cultural, psychosocial, and health system *characteristics*. Starfield also mentions 'equity in health' as one of the important outcomes of health at the population level, however, inequalities in health are outside the reach of this thesis. All in all, while Starfield does provide a model of the determinants of health – both at the individual and societal level, it seems too broad and not systematised enough for cross-country comparisons. Besides, the question inevitably arises whether the determinants of individual and population health are the same or not. Do the two types of health — population and individual — differ only by the level of generalisation? It is evident that Starfield doesn't explicitly differentiate between the two, but this is an important question to investigate.

Dahlgren and Whitehead (1991) present a different scheme of the determinants of health, primarily at the individual level. They envision the main determinants in the form of *concentric circles* (Figure 1.3). An individual and her health are in the very centre of the model, while the determinants are presented as circles around it. Yet again, the causal relationships in this model are *complex* and of strong *endogeneity*: all circles are interconnected and interrelated.

Figure 1.3. Dahlgren-Whitehead model: "Main determinants of health".



SOURCE: Graphic created based on (Dahlgren and Whitehead, 1991)

The circles in the Dahlgren-Whitehead model are not ordered in terms of significance for human health, as all of them are important; but rather according to the 'proximity' to an individual. They range from the most proximal, very often considered to be personal choice lifestyles, to the generic and most distal, socio-economic and cultural environment. All the layers are interdependent and influence human health simultaneously. Thus, as the report

of Dahlgren and Whitehead was policy-oriented, they argued that to improve health outcomes, policies in *all* the layers and areas had to be addressed concurrently.

In this model, the basic human characteristics — age, gender and body constitution — are at the core, as they define the most essential differences between human bodies. In research they are often addressed as ***'demographic characteristics'*** or ***'demographics'.*** The first circle around health contains the ***lifestyles*** of individuals, which are expressed in terms of activity level, quality of nutrition, and choices regarding alcohol, tobacco, and drugs. The next circle encompasses the ***social life factors*** of individuals, their networks and support, which generally fall into the 'social capital' domain (see p.29). After that the working (Bambra *et al.*, 2008; Heikkilä *et al.*, 2013; Joyce *et al.*, 2010)[7] and ***living conditions*** come into play, followed by the very general ***socio-economic, cultural***, and ***ecological environment*** (Last, 1998).

What is evident in the Dahlgren-Whitehead model is the clear reference to 'levels' in determinants of individual health. The authors argue that the determinants influence health from the most individual to the most broad, societal level, and they are all interrelated. This interplay between levels is taken into account while creating the systematic determinants of health framework for this thesis.

1.3.2 EMPIRICAL INTERPRETATION: THE (HEALTH) PRODUCTION FUNCTION

The very concept of the determinants of health assumes that there is a goal of establishing some clear causal relationships between certain socio-economic and political phenomena and health. The most relevant framework for analysing these causal links and determinants of health is the population health paradigm and the ***health production function***. The health production function originates from economics, where a *production function* reflects a technological relationship between the total product and the inputs used to produce it:

> It describes the maximum output obtainable, at the existing state of technological knowledge, from given amounts of factor inputs. Put differently, a production function is simply a set of recipes or techniques for combining inputs to produce output. Only *efficient techniques* qualify for inclusion in the function, however, namely those yielding maximum output from any given combination of inputs. [emphasis added] (Humphrey, 1997: 51)

There are many versions of production functions used by economists today: linear, Cobb-Douglass two-factor, constant elasticity of substitution, and others. They are used by researchers for both *micro-level analysis* of firms' performance, which is intended to be used in maximising profits, and *macro-level analysis* of economic growth (Humphrey, 1997: 51).

The health production function can also be defined as "the relationship between the quantity of inputs used to make a good (health) and the quantity of outputs of that good" (Kindig, 2007: 158). To sum up all literature and systematisation of health determinants into an empirical framework, the health production function equation, in a very general form, can be expressed in the following way:

$$\mathbf{H = } f \mathbf{(determinants),} \qquad \mathbf{(1.1)}$$

[7] Working conditions are excluded from the analysis in this thesis, as this is a very specific area of research and adds more complexity to the analysis. It is a separate area of research (Bambra et al., 2008; Heikkilä et al., 2013; Joyce et al., 2010), independent on its own, hence, including it won't do this research justice.

where ***H*** is the overall concept of health, complex and still not precisely defined. Most empirical work in this thesis relies on the concept of health in a negative objective form (***oH***): absence of an illness or morbidity and mortality; and positive subjective form (***sH***): self-assessment of health by individuals. For example, H can be expressed in mortality rates, life expectancies, levels of illnesses, subjective health, etc. It can also be measured at both an individual and an aggregate, societal level. ***Determinants*** are all the factors influencing health. As there are usually several determinants, I assume that a systematised structure can be developed, which would encompass the determinants in a logical way. The possible determinants' structure is presented in the section below.

1.3.3 SYSTEMATISATION OF THE DETERMINANTS OF HEALTH

Determinants' domains

Synthesising Starfield (2001) and Dahlgren-Whitehead (1991) models, I identify the following domains, which have an influence on health: personal characteristics or demographics, lifestyles, health care, and socio-economic and political determinants. The latter include both characteristics of the society and policies, as well as resources and opinions of individuals in the three main spheres of the societal life: economic, political and social. Below I briefly discuss the literature on the determinants of health by each domain.

Demographics

It is quite logical that health is dependent on ***age***, as people usually are born fairly healthy. Through the course of life, they accumulate illnesses and diseases, and the body becomes older, weaker, and perhaps less healthy. Depending on their lifestyles, people have slightly different health statuses in their 70s, but it is generally not comparable to the health status of a 20-year-old.

Education is important for general individual health (Braveman and Barclay, 2009; Eikemo *et al.*, 2008c; Eikemo *et al.*, 2010; Goesling, 2007; Goldman *et al.*, 2011; Grossman, 1972a; Grossman, 1972b; Hill and Needham, 2006; Taubman and Rosen, 1982), as people with more education make better decisions in terms of lifestyles, economic preferences, and environment. Highly educated people tend to lead healthier lives by choosing better produce, exercising, keeping high standards of hygiene, and scheduling preventive check-ups. This is what Deaton and colleagues refer to as 'health-related knowledge' (Deaton, Jack, and Burtless, 2004: 84), which is particularly important and is well-distributed among the more educated. However, this refers particularly to objective health of individuals, whereas if I speak about subjective health, the relationship might be different, if not reversed. More health-educated people — people with better knowledge about the global inequalities, treatments available, and preventive health care — may evaluate their health as worse than those in the dark about the above issues. This would not necessarily mean that the evaluation of health is accurate, as the points of comparison are very different: informed and misinformed. Therefore, while I expect the *positive* correlation between education and objective health, analysis of *subjective health* can reveal a *reversed* relationship.

Still, the link between education and health might be more complex than stated above, specifically because I am not comparing highly uneducated (and illiterate) individuals with the highly educated. The population of Europe, both West and East, on average is fairly literate and educated, with health-related knowledge transmitted in the society and women being educated and rather emancipated. Therefore, the effects of education in the developed world might be smaller, if not absent at all. However, I still model it in this analysis, as it is

an important determinant as argued by many researchers, and its effect should be at least controlled for.

Gender is another determinant among the demographics that tends to be important for health. Gender inequalities in health are more and more often researched, especially in the contexts of development and underdevelopment (Sweetman, 2001), but the gender differences in health are present in the developed societies as well (Ballantyne, 1999; Denton, Prus, and Walters, 2004; e.g. Hunt and Annandale, 2012). Gender differences are present at the macro-level, with standard public health indicators such as life expectancy at birth (LEB) and mortality being a clear illustration (WHO, 2012). Females tend to be reported as having higher LE, lower mortality, and fewer incidences of disease (with the exception of female-only illnesses, like breast cancer) at the public level in cross-country research. However, the question remains whether the same holds at the *individual* level in both *objective* and *subjective health*. It is very likely, that while the country-level statistics report indicators favouring females, at the individual level the situation could be reversed, especially if one considers subjective health. I can expect big differences between objective and subjective health, as generally men tend to have higher self-assessments, therefore, they might report health being better as well.

Last, but not least, I consider marital status as one of the determinants of health. According to numerous studies, married people tend to be healthier (e.g. Lillard and Panis, 1996; Mauno, Kinnunen, and Rantanen, 2011; Schoenborn, 2004; Taubman and Rosen, 1982; Verbrugge, 1979). However, it is important to examine whether it is the healthy who tend to be in a marriage (i.e. "selection" of healthier people for marriage), or whether marriage indeed influences people's health. While disentangling this particular complex relationship, Wood, Avellar, and Goesling (2007) find that there are no studies that point to a direct link between marital status and longevity or morbidity, but the link exists *through* income, lifestyles, access to health care, and mental health. Therefore, the only more or less direct effect of marriage on health is through psychological health. Generally, marriage provides certain economic benefits, along with a social net of support and psychological feeling of fulfilment. There indeed can be a discussion that being married doesn't necessarily mean that a person is happy with the relationship, however, due to practical reasons I cannot account for the quality of marriage. I assume that only the minority of respondents in the studies below would be in an unhappy (and psychologically discouraging) marriage, or else they would be divorced.

Lifestyles and health behaviours

According to Dahlgren and colleagues, after age, gender, and hereditary factors (or genetic make-up), 'individual lifestyle factors' take the stage (Dahlgren, Harrington, and Ritsatakis, 1995). Thus, the lifestyles individuals lead influence their health directly. Of crucial importance here are such health behaviours as consuming alcohol (Leon *et al.*, 2007; Pridemore, 2002; Zaridze *et al.*, 2009) and tobacco (David *et al.*, 2010; Pampel and Denney, 2011), diet (Cockerham, 2000; Kelleher *et al.*, 2003), workouts and physical activity, sleep (Hale *et al.*, 2013), etc. It is generally accepted that those who lead healthier lifestyles, tend to be healthier and enjoy longer lives in full health.

Nevertheless, the determinants of health very often do not depend purely on the personal choice of an individual (Cockerham, 1997), which is also illustrated in the Dahlgren-Whitehead model by the links between different circles. William Cockerham refers to the sociological thinking on lifestyles of Max Weber, who suggests that two components of lifestyles are important: life choices and life chances (Cockerham, 1997). Thus a person can have a *choice* only within the *conditions* in which he or she lives, or within the *chances* he or

she has. Socio-economic and political environment and health-care services become significant, as they influence human health directly and indirectly.

Socio-economic and political determinants

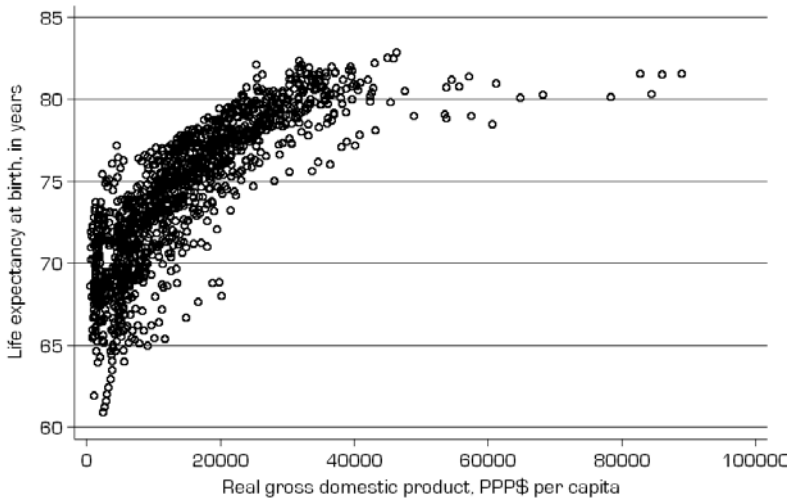
The literature on socio-economic and political determinants of health manifests a great abundance of studies. The socio-economic determinants of health have been studied for decades and commonly unite a broad range of factors, which include all the 'circles' of the Dahlgren-Whitehead model, besides lifestyles. Similarly, the recent WHO Report upholds that health depends on *all the circumstances* in which people grow, live and develop (WHO, 2008). It is however important to discern different socio-economic and political determinants and clarify the concept. Here I will try to summarise the whole variety of literature in a short, systematic way to outline the main determinants of health, which were found significant for determining objective or subjective health.

There is a wide range of indicators within the ***economic sphere*** that influence health, both at the individual- and national-level. It is indeed not surprising, as it is widely accepted that extreme poverty, for instance, does have a negative effect on health (Gupta and Kumar, 2007; Gwatkin, 2000; Holtgrave and Crosby, 2003; Leon and Walt, 2001; Sala-i-Martin, 2007) due to poor living conditions with limited access to health care or good produce. The research on the income-health relationship is extensive and often inconclusive. On the one hand, the link between *income* and *health* is established by many studies (Carlson, 2005; Deaton, 2006; Pritchett and Summers, 1996; Subramanian, Belli, and Kawachi, 2002) and at different levels (Carlson, 2005; Deaton, 2006; Subramanian, Belli, and Kawachi, 2002). On the other hand, there is growing evidence and analysis correcting this statement. *First*, the relationship between income and health exists, but it is not linear (Deaton, 2006), and wealthier doesn't necessarily mean healthier (Biggs *et al.*, 2010). Indeed, when one considers the relationship between income and health at the macro-level, expressed through, for example, gross domestic product (GDP) and life expectancy at birth (LEB), the relationship is not linear, but rather takes a somewhat logarithmic form (Figure 1.4). It is important to note that Figure 1.4 reflects the GDP-LEB relationship in countries only on the European continent, as this is the region of interest in this thesis, and even here the logarithmic shape holds. Adding other regions of the world would further extend the lower tail of the graph (down to an LEB below 50 and per-capita GDP below $500), but the relationship would remain logarithmic. The logarithmic relationship is commonly interpreted to indicate that income influences health to a certain level in development, whereas cost of returns diminishes with higher income (Deaton, Jack, and Burtless, 2004), therefore, wealthier doesn't necessarily mean directly healthier (Biggs *et al.*, 2010). Health depends on additional factors such as level of development and other societal characteristics.

Second, it is sometimes argued that it is really income inequality that influences health, not income itself (Wilkinson, 1996; Wilkinson, 1999). Income inequality doesn't seem to influence health directly, like poverty and low income do, but indirectly through other links. As argued by Macinko and colleagues (2003), there are several pathways from income inequality to health: psychosocial, material, and health-care related. This way, income inequality influences subjective evaluation of social status and position. Besides, societies with higher income inequality tend to have more poor people, which boils the argument back down to income. Finally, income inequality also increases inequalities in health-care access. These are, however, hypothetical links, which are not supported by all researchers and studies. For instance, Lynch and colleagues (Lynch *et al.*, 2004), Wagstaff and van Doorslaer (Wagstaff and van Doorslaer, 2000) conduct critical reviews of literature and come up with the conclusion that findings about the income inequality relationship with

health are inconclusive. Overall, there are many authors who engage in the inequalities debate[8]. But firstly, it is impossible to hypothesise any concrete effect; secondly, this analysis is on its own complex and self-sufficient; and thirdly, health inequalities may not have a direct effect on health, but rather the effect could be wired through income or psychosocial factors. Therefore, the current thesis will not concentrate on income inequalities.

Figure 1.4. Scatter plot of LEB and GDP in Europe, 1972-2010.



NOTE: The sample of the countries includes only the countries in Europe over time (1972-2010).
SOURCE: (WHO, 2012)

Besides income and income inequalities, other economic determinants are important for health, such as job security, employment or unemployment (Bambra and Eikemo, 2009; Lantz and Pritchard, 2010; Laszlo *et al.*, 2010), overall living conditions, quality of food and water (Boelhouwer and Stoop, 1999; Macinko *et al.*, 2003), individual financial position (Carlson, 2004), and relative inequality (Carlson, 2005). Carlson (2004) controls for economic hardship of households, but he takes a relatively subjective measure to reflect it (income satisfaction). At the same time, in his other study he finds that relative inequality — a subjective determinant — is also important (2005). But both objective and subjective indicators can have their own independent influence on health; objective, through economic and living conditions, and subjective, through *psycho-social nature of health* (Wilkinson, 1996). This latter link is important and is very often ignored in health research. Hence, there is a bit of confusion in the usage of the diverse indicators, and a clarification through comparative analysis is important.

As one may notice, some of the indicators discussed can be measured only at the individual level, some only at the macro level, and some at both. Following Starfield's determinants framework (2001), as well as the earlier discussion on the different levels of conceptualising and measuring health, the determinants at different levels have to be taken into account while analysing health. Therefore, it is crucial to consider different economic variables, both objective and subjective, at individual and country levels.

Political determinants are deemed to influence health *indirectly* through several pathways at the individual- and country-levels: institutions, policy, knowledge and social

[8] See (Böckerman *et al.*, 2009; Chopra, 2005; Deaton, 2003; Eikemo *et al.*, 2008d; Feinstein, 1993; Gwatkin, 2000; Idrovo, Ruiz-Rodriguez, and Manzano-Patino, 2010; Keane and Prasad, 2002; Kim, 2000; Kondo, 2012; Leon and Walt, 2001; Marchand, Wikler, and Landesman, 1998; Nolte and McKee, 2004a; Starfield and Birn, 2007)

capital. Institutions and policy have a direct effect on how health care and social support are set up and function (Svallfors, 2007). Depending on the general governmental ideology, the health care system is organized in a certain way, and coverage and fees depend on the type of policy the government is carrying out. Therefore, political determinants may not influence health directly, but through health care, social security, and welfare support (Eikemo *et al.*, 2008a; Eikemo *et al.*, 2008b; Navarro and Shi, 2001; Starfield and Birn, 2007), health promotion (O'Donnell, 2009), and educational policies (Deaton, Jack, and Burtless, 2004). In terms of welfare regimes, Eikemo and colleagues (Eikemo *et al.*, 2008a; Eikemo *et al.*, 2008b) argue that Scandinavian and Anglo-Saxon regimes tend to produce better health outcomes — even at an individual level — whereas Southern and East European nations produce worse. Therefore, welfare and policy at the country level could matter for both public and individual health (Kawachi, Kennedy, and Glass, 1999), as it is individuals who get the support and care from institutions when they are sick. Deaton argues that the political conditions in a society — peace, freedom and human rights — improve health through globalisation and spread of knowledge (Deaton, Jack, and Burtless, 2004).

A big debate exists on the relationship between political ideology, particularly democracy, and health (Besley and Kudamatsu, 2006; Franco, Alvarez-Dardet, and Ruiz, 2004; Kelleher, 2002; Kondrichin and Lester, 1998; Kondrichin and Lester, 1999; Lake and Baum, 2001; Navarro *et al.*, 2003; Page, Morrell, and Taylor, 2002; Ruger, 2005; Smith and Dorling, 1996). There is still no agreement on the causal links between the two, whether there are policy and institutional differences (Ruger, 2005), already discussed above, or simply a general level of economic and political development (Besley and Kudamatsu, 2006; Franco, Alvarez-Dardet, and Ruiz, 2004). It is nevertheless acknowledged by most scholars that democracy produces better health results (see studies above), and while the links between democratisation and health are unclear, I will focus primarily on the institutions, policies, and people's satisfaction with them, as they are also the mediators for the effects of democracy on health.

Besides policy and institutions, there is also research available on the effects of political participation on health, through social capital (Blakely, Kennedy, and Kawachi, 2001; Kawachi and Kennedy, 1997; Kawachi, 1999; Szreter and Woolcock, 2004; Veenstra, 2000; Veenstra and Lomas, 1999). Social capital is discussed in more detail below. It is important to note that political participation creates networks, and through networks and social support provides a 'safety net' for health. Another link, as argued by Wilkinson (1996) is psychosocial: belonging to a group improves psychological health.

While it is not possible to measure the effects of differences in regime at the individual level, people's political actions, political participation, and satisfaction with institutions do connect to how they perceive and experience the regime and institutions. At the country level, the political regime and institutions are handy proxies for political development and policy.

Social determinants are some of the most recent additions to the literature of health determinants, and the most common understanding of the 'social' determinants is in the usage of the term 'social capital' (Putnam, 1995a; Putnam, 1995b; Welshman, 2006). The literature on the effects of social capital on health is already quite extensive, and it keeps accumulating at high speed[9]. One of the reasons for this is a very broad notion of what is

[9] See (Berntsson, Kohler, and Vuille, 2006; Bolin *et al.*, 2003; Braveman and Tarimo, 2002; Carlson and Chamberlain, 2003; Carpiano, 2006; Chavez, Kemp, and Harris, 2004; Coburn, 2000; De Silva *et al.*, 2007; Dolan, 2007; Fujiwara and Kawachi, 2008; Goldman *et al.*, 2011; Habibov and Afandi, 2011; Helliwell and Putnam, 2004; Holtgrave and Crosby, 2003; Hyyppäa and Mäki, 2001; Kawachi, Subramanian, and Kim, 2008; Kennelly, O'Shea, and Garvey, 2003; Kroll and Lampert, 2007;

defined as social capital and the usage of it in health sociology (Szreter and Woolcock, 2004). In order to better understand this discussion, it is first important to outline the social capital concept. The founding father of what later became social capital could be considered Bourdieu (Bourdieu, 1984; 1986), but the modern term was created by Coleman (1988) and popularised by Putnam (Putnam, 1995a; 1995b). There is a whole range of approaches to social capital — from the narrowest in economic sense (Glaeser, Laibson, and Sacerdote, 2002), when it is considered just individual capital and resources, to the broadest definitions of Fukuyama (1995), who identifies social capital of the whole society. Putnam adds the political 'civicness' to the concept of social capital and defines it as "features of social organization, such as *networks*, *norms*, and *trust*, that facilitate coordination and cooperation for mutual benefit" [emphasis added] (1993: 35). These are often the components of social capital, which are expressed through participatory and associational behaviour and are reasonably capable of operationalization in empirical research. These are the concepts I undertake to explore in this thesis as well, networks and trust in particular[10].

There is still no agreement as to how aspects of social capital influence health. Carlson finds a strong link between social capital and health, but as soon as individual income is taken into account, the effect of social capital aspects is reduced (Carlson, 2004). Others find that the link between health and social capital is still not firm, and evidence that it exists is lacking (Adams and White, 2003). Pearce and Smith argue that the term 'social capital' simply became fashionable, and as it is vague and contradictory, focusing on it in policy is a strong drawback. They argue that it can create tensions and inequalities between different communities in their social capital (2003). At the same time, there are strong supporters of including social capital in research, as it adds the social net and cohesion in the society, which have positive effects on health (Kawachi, Kennedy, and Glass, 1999; Kawachi, 1999; Kim and Kawachi, 2006; Kim, Subramanian, and Kawachi, 2006; Subramanian, Kim, and Kawachi, 2002). Social capital in itself might not have a direct effect on health, but it is most often assumed to affect health through psychological factors and health-related behaviours (Lindstrom, 2008). All in all, while there is no agreement, it is clear that the social sphere is important — both at the macro level, and the micro level — and should be included, as the determinants would not be complete without it.

In this thesis, I examine the two dimensions of social capital, expressed on the one hand through the social activity and participation of individuals, their connectedness and networking, also measured as the societal-level characteristic, and on the other hand through a general trust in people and belief in the fairness of people (Allum, Read, and Sturgis, 2011: 42).

Importance of health care

The final determinant under review is health care (HC) and health policy, which is the cornerstone for many studies (e.g. Elola, Daponte, and Navarro, 1995; Hitiris and Posnett, 1992; Nolte and McKee, 2004b). Auster, Leveson, and Sarachek estimate the elasticity of mortality change in relation to health services consumption change, and find that health services consumption contributes to only a 10% change in mortality rates, while more than 50% is attributed to environmental, societal, and personal factors (1969). Thus, the latter are important — if not the most important — determinants of health. Nevertheless, while the overall concept of *being 'healthy'* is influenced by lifestyle and societal factors, *'bringing*

Macinko and Starfield, 2001; Mansyur *et al.*, 2008; Mellor and Milyo, 2005; Pearce and Smith, 2003; Phongsavan *et al.*, 2006; Rose, 2000; Shortt, 2004; Stephens, 2008; van Hooijdonk *et al.*, 2008; Veenstra, 2000; Welshman, 2006; Westin and Westerling, 2007; Wilkinson, 1999; Ziersch *et al.*, 2005; Ziersch *et al.*, 2009)

[10] Norms are very broad notions and are difficult to capture well, therefore, they have to be excluded.

health back' is the major responsibility of the health-care services. Moreover, there are certain diseases for which deaths are completely or partially amenable to health care and prevention, such as tuberculosis, hepatitis, diabetes, cardiovascular and heart diseases, asthma, etc. (Mackenbach, Bouvier-Colle, and Jougla, 1990; Nolte and McKee, 2004b; Velkova, Wolleswinkel-van-den-Bosch, and Mackenbach, 1997). This is where health care services play a crucial role (Nolte and McKee, 2004b). Thus, it is increasingly important to analyse the influence of health-care systems on health.

Health care can be measured in the form of institutions and overall system functioning, health care expenditures, and resources in each separate society (Berger and Messer, 2002; Elola, Daponte, and Navarro, 1995; Hitiris and Posnett, 1992; Hsiao and Heller, 2007). However, the usage of health care can also be measured at the individual level. It is important to account for both of the measures of health care. Both of the approaches seem similar in their assumption of an 'input'-'output' logic, and both incorporate the features of one another (Nixon and Ulmann, 2006, p.8), but the public vs. private (macro- vs. micro-level and often objective vs. subjective) understanding of the commodity of health makes a distinction between the two. However, it is important to take into consideration *both* of the approaches in setting up the framework of research.

In this thesis, health care is addressed both at the macro- and micro- levels. Chapter 1 also develops a unique way to measure overall health care functioning over time through the means of classification.

Perspectives and levels of health determinants

Like in economics, and based on the diverse theoretical approaches (see above, p.27), two empirical approaches to analysing health production exist today. One of them is based on the definition of health as a *personal* commodity and relies on *micro-level, individual* data. This approach takes the researcher back to the work of the 'founding father' of the health production function, Michael Grossman (Grossman, 1972a), who believed that every individual inherits a certain level of health which deteriorates over time but that can be improved through investment — thus, the demand function for the commodity of 'good health' of an *individual* is constructed (Grossman, 1972b: 223-4). Grossman argued that age, income, and education are important determinants of health status, demand for health, and medical services (Grossman, 1972b: 247). This stream of health production research formulated a very specific empirical approach in the existing literature. Often longitudinal panel surveys are used, and the self-perception of health and socio-economic conditions is analysed.

What is particularly important for current research is the perspective that is *most* commonly observed within this stance of research, in particular the *subjective perspective*. Most often, self-rated health is taken as a health indicator in this type of health production expressed as a function of other primarily *subjective indicators*, such as perceived control over life (Bobak *et al.*, 1998; Bobak *et al.*, 2000), social capital and trust (Hyyppäa and Mäki, 2001; Kawachi, Kennedy, and Glass, 1999), emotional, spiritual, and social status (Ratner, Johnson, and Jeffery, 1998; Zullig, Ward, and Horn, 2006), and social psychological factors (Cott, Gignac, and Badley, 1999). In the majority of these studies, the objective indicators, such as age, gender, income, and education, are frequently used purely for controls. Therefore, the first approach to health production primarily focuses on *individual subjective* interpretation of health and determinants.

The second approach views health as a *public* commodity at the macro level, and it becomes an *aggregate* output of, for example, the health-care system or certain societal-level contexts and is influenced by other *macro-level inputs*. This approach mainly uses macro-level data,

is often based on cross-country comparisons and is, for instance, frequently used for analysis of health care cost-containment in many developed countries (Nixon and Ulmann, 2006: 8). Along this line, 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 regard to their effect on aggregate health outcomes. The literature in this spirit is abundant (e.g. Berger and Messer, 2002; Elola, Daponte, and Navarro, 1995; Hitiris and Posnett, 1992; Joumard *et al.*, 2008; Nixon and Ulmann, 2006; Puig-Junoy, 1998; Starfield, Shi, and Macinko, 2003 and other; Wagstaff and Moreno-Serra, 2007). Most of these studies use one or another kind of health care expenditures or a combination of them (total, public, private, inpatient, outpatient, etc.) along with variables of resources available within the system (number of hospital staff, hospital beds), and other system characteristics (insurance coverage, length of stay in the hospital, etc.) as main health-care inputs into health outcomes. At the same time, they control for socio-economic conditions (e.g. GDP per capita, literacy rates, air pollution, etc.).

All in all, the two main approaches to health don't only differentiate between subjective and objective perspectives, but also individual and country levels, respectively. This creates two different approaches to understanding and studying health, which are rarely united or merged. But this could be essential for understanding health better.

For example, in general sociology there is a strong belief that the purely 'objective' approach does not explain all the varieties of people's interactions, decisions, and tastes, as individuals construct their own opinions about the reality that surrounds them (Berger and Luckmann, 1966). Research of Berger and Luckmann (1966) was concerned with reality being subjectively constructed by individuals and their interactions, thus any objective reality only exists where subjective judgement is present. Similar issues were analysed by Norbert Elias as early as 1939, in his "The Civilizing Process", where he argued that there is a strong interrelationship between the 'sociogenesis' — the development and 'creation' of society and 'psychogenesis' — psychological, and self-developments (Elias, 1978). He considered the study of sociogenesis could *not* be *separated* from the study of psychogenesis. This could be extremely important when we talk about health, particularly subjective health, as the objective ('real') and subjective ('constructed') determinants of health might go hand in hand. Therefore, the analysis in this thesis unites both of the approaches in one theoretical framework, so that the set goals of this thesis can be achieved.

Empirical framework: augmented health production function

If all of the above is true, the health production function can only benefit from taking into consideration the relationship between 'objective' and 'subjective', and, moreover, might be seriously undermined by not including the 'subjective' in research. As discussed above, the two major streams of research on the health-production function have concentrated on *either* subjective health and socio-economic conditions, *or* objective health and its determinants. However, including both of the sides of life — objective and subjective — can create a more comprehensive understanding of the determinants of health. Moreover, analysing and understanding the possible *relationship* between the 'objective' and 'subjective' within health-related research can shine more light onto the determinants of health. Thus, accepting the earlier findings of determinants of health as crucial, the current research complements the existing literature by uniting the approaches: subjective and objective, individual and public.

The ***augmented health production function*** underpinning these approaches is developed, hence I can modify equation (1.1) the following way:

$$\mathbf{H = } f \mathbf{ (dem, LS, oE, sE, oP, sP, oS, sS, oHC, sHC),} \qquad \mathbf{(1.2)}$$

where ***dem*** stands for the 'demographics', which include personal characteristics of individual, such as gender, age, and marital status (p.27). ***LS*** stands for lifestyle factors and health behaviours which people choose in everyday life (p.28). ***E, P,*** and ***S*** stand for the economic, political, and social determinants, which form the overall environment within which individuals live (p.29). ***oE*** and ***sE*** stand for objective and subjective economic determinants; ***oP*** and ***sP*** for objective and subjective political determinants; ***oS*** and ***sS*** for social. ***HC*** stands for health care, expressed either in health expenditures or system resources, as well as health-care usage (p.32), while ***oHC*** and ***sHC*** stand for objective health care (inputs, financing, usage) and subjective health care (patient and population evaluation and assessment), respectively.

The augmented health production function allows me to synthesise the available research and to deal with two main dimensions: objective (o) and subjective (s); six main domains: demographics (dem), lifestyles (LS), economic (E), political (P) and social (S) determinants, and health care (HC). The relationships within this setting are complex and are further complicated by both the unknown relationship between the 'subjective' and 'objective' and endogeneity inherent in the production function. Even though the exact links and relationships between the different determinants are unknown, the use of the augmented production function potentially adds more insights into the determinants of health and explains them better.

The augmented health production function also allows for clear level-distinction, as it can be applied in different settings: in macro-, micro-, or multi-level research. Therefore, the augmented health production function in a multi-level setting can be expressed as follows:

$$\mathbf{H_{ij} = } f \mathbf{ (dem_j, dem_{ij}, LS_{ij}, oE_j, oE_{ij}, sE_j, sE_{ij}, oP_j, oP_{ij}, sP_j, sP_{ij}, oS_j, oS_{ij}, sS_j, sS_{ij}, oHC_j, oHC_{ij}, sHC_j, sHC_{ij}),} \qquad \mathbf{(1.3)}$$

where ***i*** identifies the individual (micro- or first) level and ***j*** – population (macro- or second) level.

Levels are of particular importance for health analysis. *First*, the analysis is very often carried out separately at different levels, but arguably the interplay between different levels is essential in health analysis (Diez-Roux, 2000). For instance, one of the strongest level-related discussions currently exists around Wilkinson's (1996; 1997) statement that general *society's* inequality influences health and health disparities. Gravelle (1998; 1999) counters Wilkinson's hypothesis by arguing that the ecological effect is simply a statistical artefact. Jen, Jones, and Johnston (2009a; 2009b)[11] bring this discussion further by analysing the particular links between inequality and health in a *multi-level setting* and in the end mostly favour Gravelle's finding. The question still remains, whether this finding would be different if both objective and subjective determinants are considered.

Second, some researchers (e.g. Kindig, 2007; Starfield, 2001) do not distinguish strongly between the determinants at the individual and country levels, arguing they only differ by level or aggregation. But Wilkinson, in opposition, argues that there should be a clear distinction between determinants of health on the individual and societal levels (Wilkinson, 1996), as different factors can influence health at different levels. Many societal determinants can become constant for a certain society and 'unnoticeable' at the individual level. For example, income differences between developed countries cannot explain much

[11] These studies use subjective health as a proxy for health, hence is in line with this analysis.

variance in health between them, but income differences at the individual level within the countries might have a greater impact on individual health. Thus, the distinction between *individual status and resources* and *general societal context* is crucial.

Therefore, the distinction between *individual* level resources and *societal* level context should be made. Moreover, while the different levels may interact between each other, they have to be considered within the same model.

All in all, the augmented health production function is the core framework for analysis throughout the thesis, with the exception of Chapter 6. In each study I try to look either at one level — macro or micro — or one angle of the analysis, for instance, analysing only objective or subjective health. But overall, the logic of the augmented health production function remains the core for all empirical analysis.

1.3.4 SUMMARY: THE DETERMINANTS STRUCTURE

To summarise the discussion on the determinants, which can be identified and which I use for the analysis and the selection of indicators in each study, I introduce three dimensions: ***perspective***, ***level*** and ***domain***. Perspective refers to the 'objective' – 'subjective' perspective of health and its determinants. Levels are limited to the population (macro, societal, or country) and individual (micro) levels. Domains unite the six main areas in which determinants can be found, such as demographics, lifestyles, economic, political, and social determinants and health care. I seek to select the determinants paired from each of the perspectives (objective – subjective), each of the levels (individual and population) and each of the available domains. These three dimensions of determinants explain and outline a detailed determinant structure, which provides possibly the most fully specified model for health analysis as it include proxies for the most important determinants of health within the same model. Essential for the empirical model is the usage of proxies: I accept the diverse indicators to *'represent'* each of the domains, rather than argue for specific effects of the particular indicator on health. This way, the framework is transferable across studies and datasets, and the results can be better compared. At the same time, the specific effects will indeed be discussed, and generalisations will be used with caution.

Table 1.1 (p.37) provides concrete examples of the determinants and their proxies, which can be used in the analysis. For instance, if one takes the economic sphere, it is possible to identify both objective and subjective indicators, as well as micro- and macro-level variables. Thus, an economic objective first-level indicator would be income and living conditions of an individual, while the subjective twin at the individual level is satisfaction with the income and financial situation. At the macro level, a lot of objective indicators are present, such as GDP, inflation, unemployment, etc. The subjective indicators at the macro level do not exist independently, hence they can only be aggregated from the individual level.

1.4 HEALTH IN TRANSITION AND BEYOND: THE BACKGROUND

To understand the importance of the European region, which is the centre of attention in this thesis, it is crucial to have a closer look at the health developments and specific determinants that perhaps lie behind this divide. I first illustrate the changes in health in Eastern Europe, compared to the West. I then discuss some of the determinants that were identified by existing research as important specifically for the post-Communist and post-Soviet countries in the 1990's and 2000's.

1.4.1 HEALTH IN EUROPE: THE DIVIDE AND THE RECENT CHANGES

Historically, health has developed very differently throughout Europe. For example, in the beginning of the 20th century, life expectancy in Russia was 32 years, while in France it was 47; by 1938 it was 43 and 59 respectively, and by 1965 it had almost evened out (64.3 and 67.5, respectively) (Tragakes and Lessof, 2003). Similar advances could be noted in other Soviet Union states and Communist camp countries. However, the situation started to change in the 1970's, when the world faced new challenges in the form of an increase in chronic rather than infectious diseases. This is known as the 'epidemiological transition' (Wilkinson, 1994), and it required profound changes in health care, policy, and overall lifestyles. The Soviet-type, centrally planned Semashko health care system[12], oriented originally towards fighting infection and based on inpatient care, turned out to be very inflexible and inefficient in the new health order. Therefore, while the Western European states managed to adjust to the changes, Central and Eastern Europe remained narrow-minded.

Table 1.1. Conceptual framework for the analysis: dimensions of the health determinants

		Demographic (Dem)	Lifestyles (LS)	Economic (E)	Political (P)	Social (S)	Health care (HC)
Objective (o)	1 level	Gender Age Marital status Education	Eating habits Alcohol and tobacco	Income Work Living conditions	Political activity, preferences Voting	Membership in associations Social activity Networks	HC services usage
	2 level	-	Alcohol consumption Fruit and vegetable consumption	GDP Unemployment Inflation Inequality	Corruption index Governance index Democratic scale	Membership in associations in the society	Health expenditures Average length of stay Outpatient visits
Subjective (s)	1 level	Satisfaction with life	Satisfaction with the life-style	Satisfaction with economic position and situation	Evaluation and satisfaction with political situation	Interpersonal trust Satisfaction with social life	Informal payments into HC HC services evaluation
	2 level	*Can only be aggregated from individual level*					

NOTE: The main dimensions of determinants (perspective, level, domain) and the possible examples of them.

These changes produced increasing inequalities between the European West and Communist countries of Europe, and a steady health gap developed by the end of the 1980's. This phenomenon came to be called the European East-West health divide. With the start of transition, this gap increased — particularly for some countries. In the early 1990's, a sharp increase in mortality and decrease in life expectancy can be noted in many of the former Soviet Union (FSU) countries, such as Moldova, Russia, Belarus, Ukraine, and the three

[12] The Soviet health care system gets its name from the 'People's Commissar' (ministerial-type position) Nikolai Semashko, who developed a fully centralized model of health care system funded by the state budget in 1918 (Marrée and Groenewegen, 1997) when the Union of Soviet Socialist Republics (USSR) was formed after World War I and the Russian Revolution of 1917. At that time 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" (Barr and Field, 1996: 307). Therefore, the main characteristics of the Semashko system can be described as fully state-financed and planned, quantifying resources and staff, universal access, full responsibility for health on the state, infectious diseases, and preventive epidemic control focus (Rowland and Telyukov, 1991).

Baltic states. Due to this development and the countries' geographical position, this region became the infamous 'mortality belt' (Brainerd, 2001: 1008). At the same time, the Central and Eastern European countries to the West of the 'mortality belt' did not experience such a dramatic deterioration in their health profile.

Table 1.2 classifies the countries into those, traditionally considered 'Western' and 'Eastern' Europe. The Eastern European group is formed primarily by all those countries that initially were on the Communist side of the Iron Curtain. The divide doesn't have much to do with the modern geography of countries per se, but with the developmental differences between the pro-Communist and pro-Capitalist camps — and the legacies of both.

Figure 1.5 presents the life expectancy at birth in all the countries of the traditional 'East'. While the graphs are not particularly telling, as there are many countries on them, it is easy to note that even though all the countries form one stream in female and male life expectancies, the range and spread in LEB for males across countries is much higher. Therefore, the female-male differences by country form two somewhat separate groups: countries with the female-male LEB difference of more than 10 years and those with a smaller difference. Arguably, this is a very high gender-correlated health inequality, hence, one of the significant determinants to be accounted for in transition countries.

Table 1.2. Traditional East-West divide

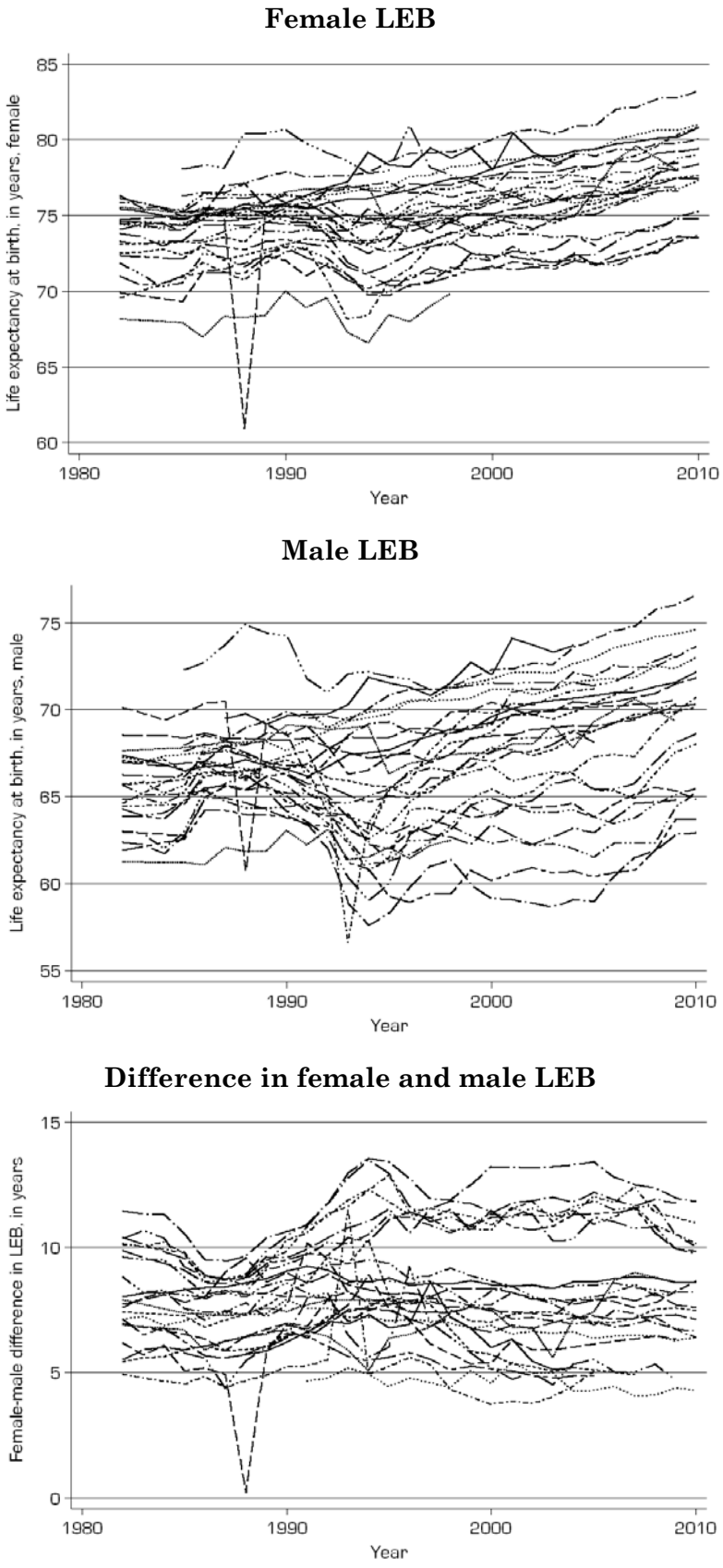
West		East		
Austria	Luxembourg	Albania	Hungary	Russian Federation
Belgium	Malta	Armenia	Kazakhstan	Serbia
Denmark	Netherlands	Azerbaijan	Kosovo	Slovakia
Finland	Norway	Belarus	Kyrgyzstan	Slovenia
France	Portugal	Bosnia and Herzegovina	Latvia	Tajikistan
Germany	Spain	Bulgaria	Lithuania	TFYR Macedonia
Greece	Sweden	Croatia	Montenegro	Turkmenistan
Iceland	Switzerland	Czech Republic	Poland	Ukraine
Ireland	United Kingdom	Estonia	Republic of Moldova	Uzbekistan
Italy		Georgia	Romania	

While it is evident that there is diversity within the region, in order to truly understand the uniqueness, it is necessary to compare the traditional Eastern Europe with those in Western Europe (Figure 1.6). The differences on average are quite striking: nowadays the East-West LEB gap for females reaches almost six years, with around eight years for males. The statistics of the East are averaged across all transition countries; therefore, the trend is rising somewhat thanks to the economic success of some of the former Communist bloc countries.

Pure mortality indicators, such as standardised death rates, follow a similar pattern to LEB: The leading pre-2004 accession 15 members of the European Union (EU-15)[13], which form the majority of 'Western Europe', tend to have constant and stable improvements over the 1990's and 2000's. At the same time, some of the Eastern European countries follow the trajectory of the EU average — such as Slovenia and Poland (Figure 1.7), but the FSU countries did not fare so well.

[13] The 15 member states of the EU prior to the accession of 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

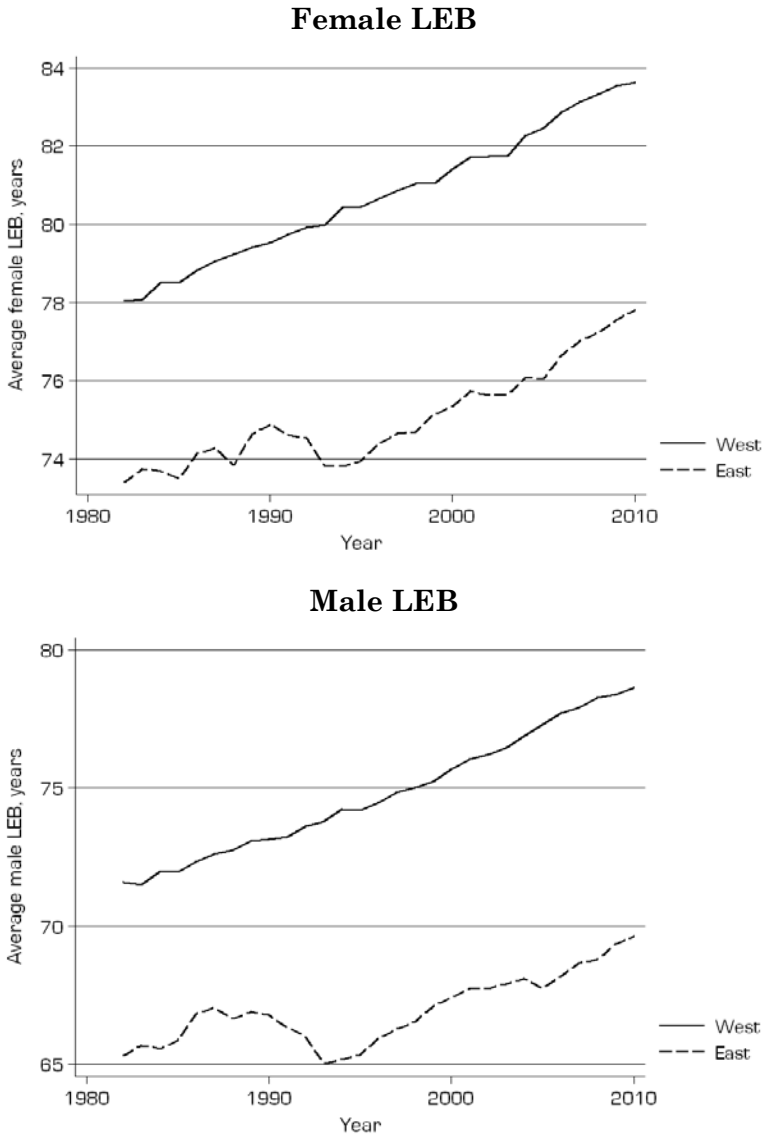
Figure 1.5. Life expectancy at birth (LEB) in the traditional Eastern Europe.



NOTE: All traditionally Eastern European countries. Each line represents a country. SOURCE: (WHO, 2012).

Interestingly enough, as Figure 1.7 illustrates, all selected FSU countries — Russian Federation, Ukraine, Turkmenistan, and Latvia — follow a similar trajectory, with a sudden increase in SDR in the 1990's. After the mid-1990's, Latvia, as an EU accession state, heads towards strong improvements, but to this day it hasn't caught up with the rest of the new EU member states. This could be explained by certain Communist vs. Soviet differences in the pre-transition period (Mihályi, 2004), as well as the differences in approaches and consistency of reforms throughout the 1990's, when the former USSR countries faced more instability than their more Western neighbours.

Figure 1.6. Average life expectancy at birth in the 'traditional' Western and Eastern Europe.

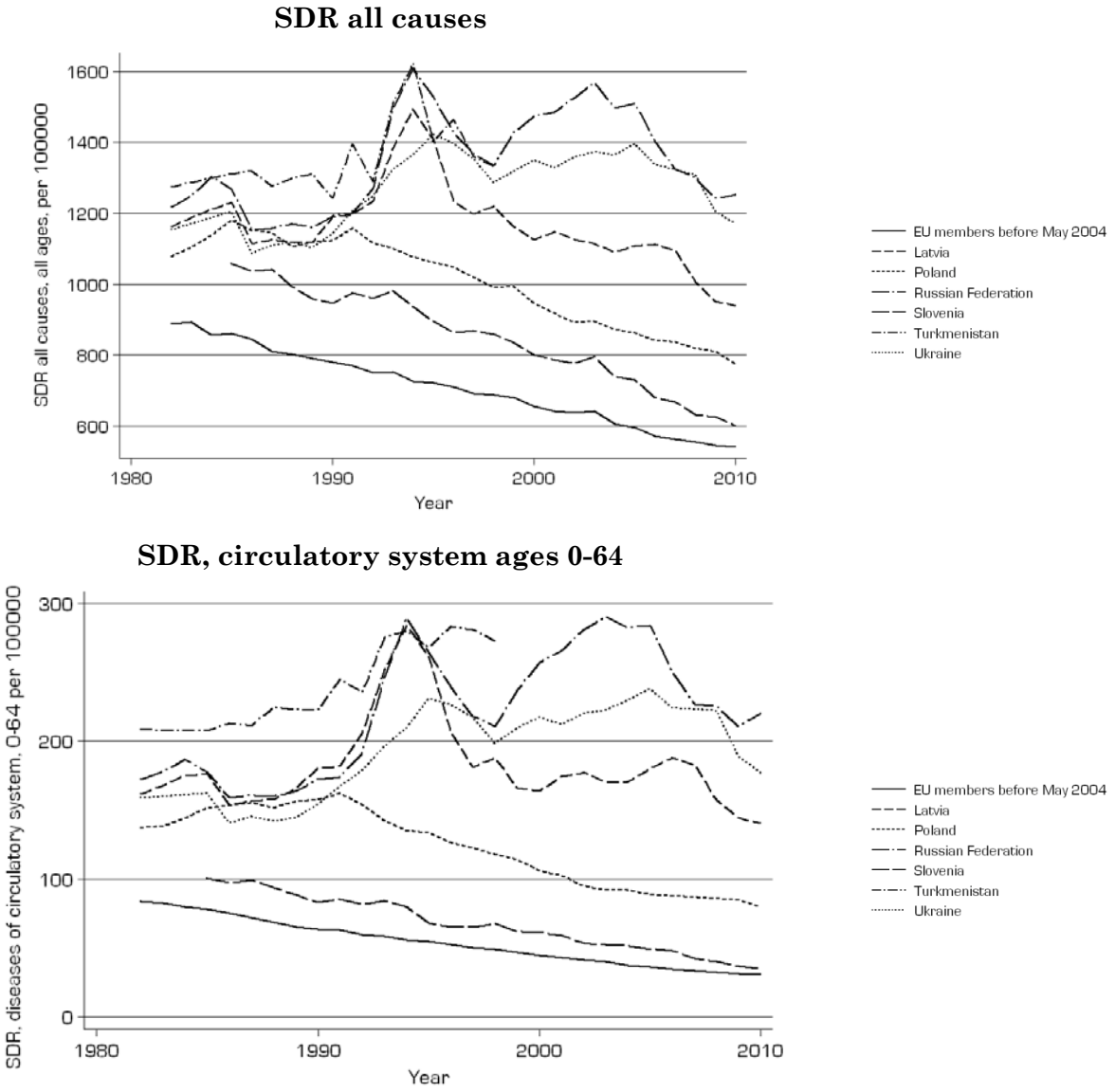


SOURCE: (WHO, 2012)

Morbidity indicators and deaths from diseases mostly follow the same logic: the new EU member states narrow the health gap with the EU, while the FSU countries still struggle to keep up. As a very special case, it is interesting to look at tuberculosis statistics. Generally the Semashko-type health systems were criticised for not being able to deal with the new challenges in health, such as chronic heart and circulation diseases (Wilkinson, 1994). However, it seems that after the start of transition the health care systems in transition countries — particularly the ones in the former Soviet Union — tend to not manage the common infectious diseases very successfully either. For instance, one of these diseases is

tuberculosis, which is commonly acknowledged to fall in the category of "avoidable" mortality (Andreev *et al.*, 2003; Mackenbach, Bouvier-Colle, and Jougla, 1990; Velkova, Wolleswinkel-van-den-Bosch, and Mackenbach, 1997), i.e. deaths that can be avoided preventively or for which the symptoms can be treated in case of infection. As seen in Figure 1.8, both incidences and deaths from tuberculosis escalated in the FSU countries in the 1990's, with some improvements in the 2000's, particularly for Latvia. Nevertheless, the deaths from tuberculosis in the Central and Eastern European (CEE) countries, while not extremely numerous, are still 15 times higher in Russia and Ukraine than in the EU-15.

Figure 1.7. Standardised death rates (SDR) for selected countries of Eastern Europe, compared to the West European average.



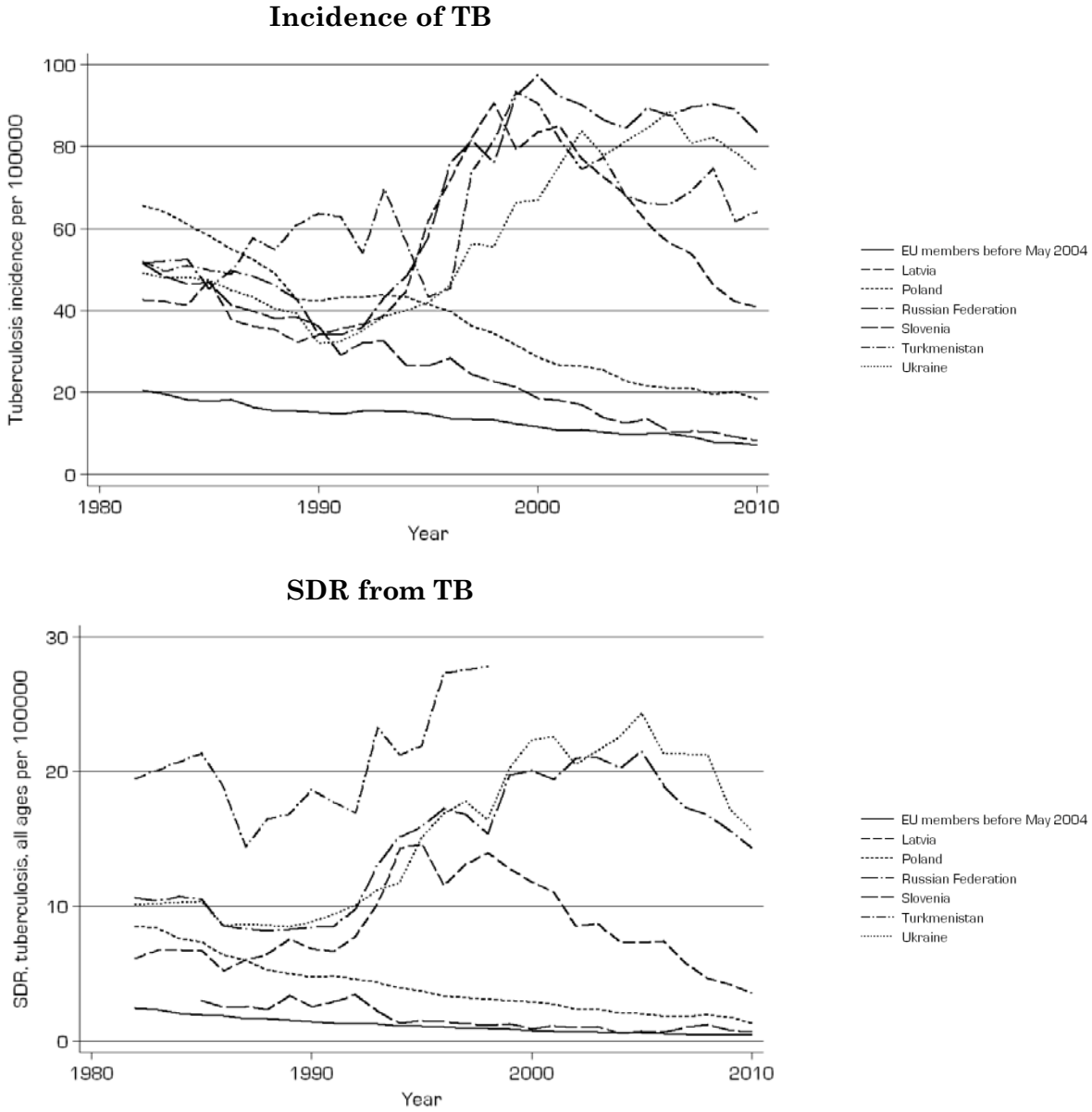
SOURCE: (WHO, 2012)

Another proxy of health discussed and analysed in this thesis — subjective health — also demonstrates strong differences between the countries in Europe. While I can't trace the time-related changes of the 1990's due to data limitations[14], the modern-day differences are

[14] World Values Survey (WVS, 2009) was conducted in the 1990's across the world, therefore it could potentially provide some insight into the time-related changes in subjective health. Unfortunately, WVS is only carried out once every five years, thus it does not offer the continuity necessary for tracing the transition countries' instability in the early 1990's.

still striking. Figure 1.9 clearly illustrates the diversity in subjective health, where yet again the former Soviet states, Ukraine, Russia and Latvia, are the worst performers, while most of the Western Europe nations are leading the 'race'.

Figure 1.8. Tuberculosis (TB) in EU-15, selected countries of the new CEE EU-member states and CIS.

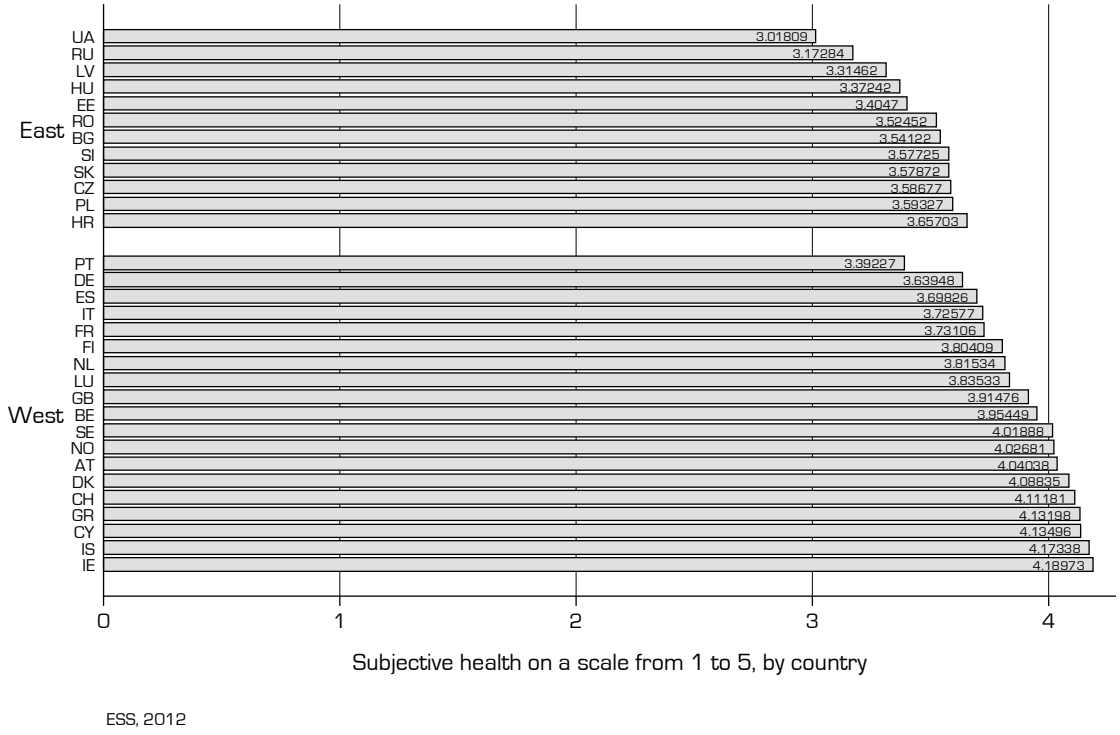


SOURCE: (WHO, 2012)

All in all, it can be seen that there is a strong variance in health on the European continent. What is more, the traditional *European East-West health divide is definitely present* — according to both the objective and subjective health indicators. However, the 'transition region' of Central and Eastern Europe is in *itself* also very *diverse*. It was somewhat different before the start of transition (Tragakes and Lessof, 2003), but as the graphs illustrate, the divergence only increased throughout the transition years of 1990's and 2000's: while some countries sped up towards the developed Western Europe, others remained lagging behind. A clear divide within the broad CEE region has developed: the former Communist countries, which have sprinted economically and politically towards the EU, have also systematically improved health, opposite to the lagging former Soviet

countries. The exact border and the nature of this divide nowadays is still unclear, but it is plainly evident that it has been changing. The border could be *shifting* more East, as Vågerö (2010) suggests; *multiplying*, if the differences with the West are still significant (Marmot *et al.*, 2010); or *blurring*, making the new EU-member states a blurred border between the West and the farther East. This will be paid special attention in Chapter 6.

Figure 1.9. Subjective health in Europe: average by country and 'traditional' East-West divide



SOURCE: (ESS, 2012)

1.4.2 DETERMINANTS OF HEALTH IN EUROPE: TRANSITION AND BEYOND

Most of the Communist camp countries started transition towards market and democracy after the fall of the Berlin Wall in 1989 and dissolution of the Soviet Union in 1991. During that time, some countries experienced huge economic and political shocks, such as Russia and Ukraine; and even violent confrontation and wars, such as former Yugoslavia and Russia. At the same time, after experiencing a somewhat short-lived crisis, other countries rushed forward both economically and politically. Czechoslovakia peacefully separated into the Czech Republic and Slovakia, economic stagnation didn't last long, and soon most of the post-Communist Central Europe moved towards economic development and marketization, and eventually towards European Union. The observed health divide has perhaps developed somewhat evenly with the economic and political transformations. This brings back the argument that health does not develop in a vacuum and is determined by a variety of forces (Kindig, 2007; Starfield, 2001), hence it is extremely important to analyse the determinants of health in transition countries — and beyond.

The determinants of health, which were discussed earlier in this chapter (p. 24), are accumulated from general literature, which usually either analyses the global differences (e.g. Deaton, Jack, and Burtless, 2004; Deaton, 2006; Kim, 2000), or conducts research on the sample of developed countries, e.g. members of the Organisation for Economic Co-operation and Development (OECD) (e.g. Berger and Messer, 2002; OECD, 1987; Puig-

Junoy, 1998; Shaw, Horrace, and Vogel, 2005; Starfield, Shi, and Macinko, 2003; Wendt *et al.*, 2004). However, studies are published that start to apply the acquired knowledge to other regions in the world, as arguably, different factors and forces influence health in different countries, cultures, and climates (Eisler and Hersen, 2000; Jylha *et al.*, 1998; Lynam, 2005). While the *framework* for determinants analysis is a theoretical and empirical *approach*, it can be adjusted and analysis can show *which determinants influence health more in a particular setting*. There is an emerging body of research based on populations in Latin and South America (Biggs *et al.*, 2010), developing and low-income countries overall (Braveman and Tarimo, 2002; Cameron and Williams, 2009; Chopra, 2005; De Silva *et al.*, 2007), India (Ghosh and Husain, 2010), Africa (e.g. Blas, Sommerfeld, and Kurup, 2011; Hill, 1990; Kirigia *et al.*, 2006; Muchukuri and Grenier, 2009; Sama and Nguyen, 2008), and of course, specifically transition countries of Central and Eastern Europe (e.g. Bobak *et al.*, 1997; Brainerd, 1998; Chawla, Betcherman, and Banerji, 2007; Wagstaff and Moreno-Serra, 2009; Watson, 1995).

Indeed, the literature on determinants of health in 'transition' is growing and developing. Over the past decades it became more and more popular to choose as the region of analysis. But besides analysing in detail the area itself, some researchers concentrate on the *differences between the East and West*, i.e. trying to explain such diverse health outcomes in the two regions, which are geographically close but different socio-economically, politically, and in terms of health (Andreev, McKee, and Shkolnikov, 2003; Bobak and Marmot, 1996; Carlson, 1998; Carlson, 2004; Marmot *et al.*, 2010; Sungurova, Johansson, and Sundquist, 2006; Vågerö, 2010). Most of the studies try to find out which of the standard health determinants changed significantly to cause the deterioration in health.

Of the standard determinants discussed above (p. 24), some have been established to play a *more prominent* role in explaining health in CEE. For instance, in the time of instability, it turned out that lifestyles were quite important. For instance, high alcohol consumption and poisoning (Leon *et al.*, 2007; Zaridze *et al.*, 2009), along with tobacco misuse and unhealthy diets (Bobak and Marmot, 1996; Denisova, 2010; Zatonski, McMichael, and Powles, 1998) were found to be of particular significance. There is a debate about the socio-economic transformation that brings about abrupt changes in a society, influencing health in transition. Stuckler, King, and McKee (2009) published a much-disputed paper arguing that mass-privatisation had an effect on how health outcomes developed in the 1990's in the CEE countries. However, Gerry, Mickiewicz, and Nikolski, as well as Earle and Gehlbach argue that the effect is not robust, as soon as the other determinants of health important for transition countries are controlled for and appropriate methods are used (Earle and Gehlbach, 2010; Gerry, Mickiewicz, and Nikoloski, 2010).

Economic and political pre-transition stagnation and changes during the 1990's brought about sudden changes in health as well (Brainerd, 1998; Brainerd, 2001; Walberg *et al.*, 1998). Some researchers explain it not simply through the direct link between the socio-economic and political factors and health, but through stress and lack of perceived control over life caused by the transitional macro-level changes themselves (Bobak *et al.*, 1998; Bobak *et al.*, 2000; Carlson, 1998; Gaumé and Wunsch, 2010). General change in a society — negative or positive in the long run — that brings instability in everyday life can influence the subjective evaluation of reality negatively. Lack of security and control over life can raise negative feelings, stress, and depression. All of those are deemed to have a negative effect on health in Central and Eastern Europe.

Due to economic, political, and policy transformations, transition setting is of particular importance when analysing *health care* reform. Transformation in the early 1990's dictated certain priorities and policies: arguably, health was not the first priority of governments in

the beginning of transition, thus in many countries health care reform was delayed, inconsistent and very much depended on the overall political and economic change. However, health policy decisions have been diverse and are found to have an important effect on health (Moreno-Serra and Wagstaff, 2009; Wagstaff and Moreno-Serra, 2009). Therefore, health care has to take its stage during the analysis of determinants of health in transition.

1.5 CHAPTER SUMMARY

This chapter dealt primarily with outlining the theoretical and developing the empirical frameworks. First, the concept of health was discussed, then the theoretical assumptions were explained, and finally, the empirical framework was arrived at. Health is understood in terms of ***health status***, and both negative objective and positive subjective health are taken into account. The main theoretical approach adopted in this thesis is the '***population health approach***', which stipulates that health is not isolated, but rather influenced by many factors, which surround an individual or a group of people. Therefore, the development of the empirical framework starts with a basic *health production function*, where health is the dependent variable, influenced by the determinants of health. The determinants of health are systematised into a 'determinants set' or 'determinants structure', which is formed by three dimensions: perspective (objective-subjective), level (population-individual), and domain (demographics, lifestyles, economic, political, social determinants and health care). The structure is used for the diverse countries, societies, levels of analysis and time. By integrating the dimensions, one arrives at the '***augmented health production***', which is the main empirical framework for most of the analysis in this thesis. This chapter concludes with a brief background on health and determinants in transition countries and broader Europe.

CHAPTER 2

HEALTH CARE SYSTEMS AS DETERMINANTS OF HEALTH OUTCOMES IN TRANSITION: DEVELOPING CLASSIFICATION

ABSTRACT

In recent research much attention has been paid to the divergent health outcomes that have emerged across the region of Central and Eastern Europe. Though rare the focus of research, one important source of variation in health outcomes can possibly be traced to the evolution of health care systems. In this paper, they and their transformations are relocated at the epicentre of the health story. First the health care systems in transition are classified into a typology through a combination of qualitative assessment of Health in Transition Reports from the World Health Organization (WHO), and cluster analysis based on the literature-driven framework. This resultant classification is then utilised in a panel regression using the fixed effects and panel-corrected standard errors model on the WHO Health for All dataset for 25 transition countries of Central and Eastern Europe and Central Asia across transition years 1989-2007. Through this the research adds an important strand to the health in transition and health care classification literature. Firstly, the study shows that the health care systems of transition countries can be classified into separate groups. Secondly, evidence is presented that the structural differences in health care, reflected in the typology partially explain cross-country health outcomes.

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2.1 INTRODUCTION

The countries of Central and Eastern Europe (CEE) and the Former Soviet Union (FSU) – the so called 'transition' region – experienced a well-documented deterioration in the health profiles of their populations before (and after) the fall of communism (Carlson, 2004; Velkova, Wolleswinkel-van-den-Bosch, and Mackenbach, 1997; Watson, 1995; Wilkinson, 1996) – both in comparison to the West, but also within the region itself. For instance, the current gap in life expectancy at birth (LEB) between certain transition countries exceeds 10 years. The most striking example is a comparison of Slovenia with 78.35 years of overall LEB (74.55 and 82.03 for males and females respectfully) and Russia with 66.67 overall LEB (60.47 and 73.27 for males and females respectfully) in 2006 (WHO, 2012).

The causes of health outcomes are complex and necessarily interrelated with important contributions stemming from genetics, lifestyle patterns and cultures, the environment, socio-economic well-being, social and economic policy, and of course, the health care system (Nolte and McKee, 2004b). For the transition countries there is a rich and growing literature examining different explanations for the patterns in mortality and morbidity, and a cautious consensus has developed which attributes the differing experiences of the region mainly to alcohol and tobacco misuse (Denisova, 2010; Zaridze *et al.*, 2009), deteriorating diet (McKee and Shkolnikov, 2001), stress associated with socio-economic upheaval (Brainerd and Cutler, 2005a; Shapiro, 1995) and socio-economic restructuring itself (Pridemore *et al.*, 2010). The role of the health care system, to the extent it has been considered at all, tends to appear only indirectly. There has been relatively little by way of comparative, systematic attempts to pinpoint the nature of health care system reform or its (changing) role in influencing health outcomes. This paper tries to address this gap by relocating health care systems and their reforms to the very centre of the transition-health story and comparing the health care developments in the region.

I set out to answer two questions: a) how can the diverse health care systems across the transition region be compared and captured empirically? And b) to what extent can the differing health outcomes in transition countries be attributed to the differences in the emergent health care structures? Employing an innovative, mixed methodology I proceed in two steps. In the first step, I undertake a detailed, systematic qualitative assessment of the 25 health care systems under review[15]. Based on the current literature on health care classifications, I formulate a strategy to compare the differing health care developments across transition countries, and then empirically capture them in a manner amenable to the second step cross-country, panel econometric analysis of health outcomes.

The article proceeds as follows. Section 2 reviews the most relevant empirical literature on determinants of health and concludes with an argument for creating a new approach to measuring health care systems. Therefore, section 3 discusses the possibility of measuring health care systems through classifying them, and puts the current research into the context of the health care classification literature. Section 3 then proceeds with the description of the developed and adopted approach to measuring health care systems and their reforms in transition through inductive classification. Section 4 describes the data for classification. The empirical strategies and results of, first, the cluster analysis and, second, the panel econometric analysis are reported in sections 5 and 6 respectively. Section 7 concludes.

[15] Out of all 28 transition countries, Serbia, Kosovo, and Bosnia and Herzegovina were excluded from research on grounds of data unavailability.

2.2 REVIEW OF THE EMPIRICAL LITERATURE

The early empirical literature that examines the fluctuating health outcomes across the transition region is cogently reviewed by Brainerd and Cutler (2005a). They explore four of the most popular explanations for the deterioration in health outcomes in post-socialist societies: individual lifestyle choices as reflected in dietary habits, smoking and drinking; material deprivation; psychosocial stress; and the collapse of the health care system. They conclude that increased alcohol (and surrogate alcohol) use and the stress associated with socio-economic upheaval account for around half of the increase in mortality but that a large residual remains unexplained. Other literature has built on this conclusion in revisiting the role of alcohol (Leon *et al.*, 2007; Treisman, 2010; Zaridze *et al.*, 2009) and diet (Zatonski, McMichael, and Powles, 1998) in particular, while other scholars are stressing the role of economic policy choices (Earle and Gehlbach, 2010; Gerry, Mickiewicz, and Nikoloski, 2010; Stuckler, King, and McKee, 2009) and the labour market (Denisova, 2010) as additional explanations.

Health care is indeed one of the important determinants of health, but finding suitable empirical proxies for health care system inputs, which reflect structural differences between countries and over time accurately, is notoriously tricky. The most common proxies for health care system characteristics are health care expenditures in different forms (Berger and Messer, 2002; e.g. Hitiris and Posnett, 1992); physical resources, typically number of hospitals, hospital beds or physicians (e.g. Cremieux, Ouellette, and Pilon, 1999; Joumard *et al.*, 2008; Self and Grabowski, 2003); dichotomous system indicators capturing whether the funding arrangements are based on social health insurance (SHI) or tax financing (Elola, Daponte, and Navarro, 1995; Wagstaff and Moreno-Serra, 2007).

Research on the influences of health care transformations on health in transition countries is rare. There are, however, two studies of the same authors, which look at the health care transformations in transition countries and their influence on health. Moreno-Serra and Wagstaff (2007) examine the impact of the introduction of SHI in the initially tax-based health care systems (Semashko type) of the post-Communist countries. They find that, though SHI adoption did increase overall government spending on health, it did not have a major impact on the health status of the population. In a later study, Moreno-Serra and Wagstaff (2009) find that the switch from the historical in-line budgeting of hospitals in the post-Communist countries to the new schemes (either patient-based or fee-for-service) increased health spending, but did not necessarily improve health outcomes. Specifically, they find that only a few quite distinct and amenable mortality indicators (such as SDR ischaemic heart disease, SDR cerebrovascular diseases) have been influenced by the introduction of the patient-based reimbursement method.

Apart from the above studies, there is little empirical evidence regarding the relationship between health and health care systems in transition. Moreover, previous research usually takes a rather restrictive view on the health care system, focusing largely on expenditure and resources, the SHI-tax divide and/or payment methods. But as argued by Starfield and colleagues (Starfield, 1992; Starfield and Shi, 2002; Starfield, Shi, and Macinko, 2003), types of the health care financing, expenditures and resources are not sufficient to capture the structural differences between the health care systems. Therefore, they argue for a need of more systematic approach and develop a classification of primary care systems in OECD countries. In transition countries, moreover, all of the standard measures are somewhat obsolete. Health expenditures – regardless of how they are measured – are rather hard to interpret in the climate of inflation, economic and political change, and instability. Health care resources are a very dubious notion, as during the Communist times the distinctive feature of the Semashko system was over-staffing and over-resourcing (Barr and Field,

1996). Hence, many countries (but not all) with the start of transition went on reducing the resources, but at different rates and to different standards; therefore, the common trend of interpreting is hard to establish. Separation between SHI and tax-based systems is rather weak in the transition countries, as many of the countries – up to now – are only quasi-SHI hybrid systems. Furthermore, numerical data might not reflect the fundamental change in the qualitative characteristics and structures of the health care systems during the turbulent transition years. Hence, a completely different approach to health care systems has to be found.

2.3 HEALTH CARE SYSTEMS MEASUREMENT

Most of our knowledge about health care systems in essence stems from classifications (Freeman and Frisina, 2010). Health systems themselves are classifications:

> The health care system is a set of social, economic and political processes concerned with the finance, provision and regulation of health care, that is that set of things we categorize as constitutive of "the health care system" rather than, for example, the transport system or the political system (ibid.: 164).

In turn health care systems can be separated into different types. The essence of creating any classification lies in the Weberian notion of "ideal types" – "analytical constructs" formed by individual phenomena and certain viewpoints and used for a "comparison with and measurement of reality" (Weber, 1949: 97). Any classification can be arrived at more deductively (through theoretical grounding) or more inductively (through analysing specific empirical cases) (Freeman and Frisina, 2010: 165). Welfare and particularly health care research is rich in developing classifications. As early as 1973 Field (1973) arrived at four types of health care systems: pluralistic, insurance, health service and socialised systems. Terris (1978) came up with three types of medical care systems: public assistance, health insurance and national health service. Moran (1999; 2000) tries to systematically analyse the dimensions of service provision, funding and governance, and comes up with four health care types: "entrenched command and control", supply, corporatist and "insecure command and control" states. But probably the most well-known and most often-used classification of health care systems today is the OECD-developed typology of National Health Service (NHS), social health insurance (SHI) and private health insurance systems (PHI) (OECD, 1987; OECD, 1992). All of these types are the examples of the Weberian "ideal types".

Most of the classifications above share similar criteria or dimensions, according to which they were derived: funding/financing, ownership, organisation unit and coverage. There are some other additions to this list, for instance, Tuohy (1999a; 1999b; 2003) analyses social control within the health care systems, which she separates into hierarchy, collegiality and market. To the common dimension of finance, Freeman (2000) adds delivery and regulation, while Rothgang et al. (1999) incorporate service provision and regulation. Wendt, Frisina and Rothgang (2009) go even further and develop a taxonomy of 27 system types on the dimensions of financing, provision and regulation according to the modes of co-ordination (state, society or market).

Most of the above studies still have in common their deductive nature of creating the typologies. Some of the mentioned classifications have already been applied in empirical work, while some have not. In thinking of adopting a framework for classification of the health care systems in transition, three major problems arose. First, most of the above classification frameworks aim at the highest level of abstraction and generalisability, which would land all transition countries into one (or at best two) types. Naturally, this would not serve the purpose of comparisons within the transition region. Second, due to the limited

established theoretical research of the health care in transition, deductive thinking cannot be applied to creating typologies in transition countries. Third, in transition countries transformation and change have to be measured. Even though Wendt et al. (Wendt, Frisina, and Rothgang, 2009) do provide the framework of analysing transformation, which could be present in the forms of "system change", "internal system change" and "internal change of levels" (ibid.: 83), this framework is very hard to utilise in the empirical analysis. The "internal change of levels", which basically entail minor change within the dimensions of classification, would not be reflected empirically at all.

In the absence of the framework, which could be used for the transition countries, a new one has to be developed. To create an encompassing framework for health care classification in transition, I take into consideration the most frequently used dimensions of health care systems: financing, ownership, organisation unit, provision, delivery, regulation and coverage. While the theoretical literature on health care in transition is scarce, the inductive way of creating classification is preferred, which indeed still needs a detailed framework. In order to create the classification, I would then look at the specific empirical phenomena in each country within the outlined dimensions. To arrive at sub-dimensions for the classification, *tailored particularly towards transition*, I consulted the detailed framework of Hsiao and Heller (2007). They provide sub-dimensions for evaluation of health care systems within five major categories, which are similar to the identified dimensions above: *financing* and *payment structure* would fall under the overall umbrella of financing and funding, *organisation* (which unites the ownership and organisation unit, and somewhat the provision of services), *regulation* and *persuasion*.

Financing is one of the most complex, but nevertheless most easily quantifiable aspect, and has been at the forefront of the most significant reforms of health care in transition. This category is divided into sub-components of financing methods (SHI or tax-based, usage of external aid, the development of voluntary (VHI) or private (PHI) health insurance), 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). Of particular salience for the transition countries are the *provider payment schemes*, where informal payments and varieties of corruption as a form of financing health care systems have been particularly widespread (Lewis, 2000). In this institutional context, incentives for medical personnel, for example, take on particular prescience on the supply-side.

Organisational reforms had to be high on the agenda of transition countries, as without structural changes any financing reforms would be ineffective, or less effective than they could have been. Ownership, sectoral structures, competition, coordination and decentralisation are thus essential parts of the organising scheme of each health care system. *Regulation* and *persuasion* capture the effort made by the systems' actors in regulating and managing systems efficiently and in promoting healthy lifestyles. One possible sub-component is the role played by professional organisations rather than centralised ministry officials in licensing.

Due to the peculiarities of the transition countries and their reforms, specific attention has to be paid to primary care. The countries under the Communist Semashko model typically concentrated on curative inpatient care, largely at the expense of primary care. Thus, in the transition context, the special attention of reformers towards *primary care* merits close examination. Therefore, the role of preventive services, the primary care structure and the role of general practitioners (GPs) are distinguished. Besides, under the Semashko model, individual patient or individual practitioner roles were limited, and so the progress made in re-orienting towards the patient is also considered as another important marker of reform.

Hence, I cull two additional dimensions of *primary care* and *patient orientation* from the Starfield and Shi (Starfield, 1992; Starfield, Shi, and Macinko, 2003) framework of primary care analysis.

2.4 DATA USED FOR HEALTH CARE SYSTEMS ANALYSIS

To assess the health care systems according to the framework outlined above I qualitatively examine and carefully scrutinise the available Health in Transition (HiT) Reports of the European Observatory of the World Health Organisation (WHO) (Various Years). Through this I develop a structural health care panel dataset for 25 transition countries. In accord with the selected framework, characteristics such as SHI financing status, the existence of a purchaser-provider split, an indicator of whether funds are collected by the state or not, payment forms to hospitals, and so on were identified and recorded (see Table 2.1).

I classified data according to the following algorithm. First, I adopted 'transition' years in preference to calendar years (this is done throughout the paper), as countries of this region started their transitions at different calendar times. To capture this important temporal distinction I therefore classify 'transition year 1' as 1989 for the countries of CEE and as 1991 for the countries of the FSU and SFR Yugoslavia. I then systematically recorded the binary health care system status in each of the categories on a year-by-year basis based on the available expert reports of the WHO.

By definition, such an approach results in large numbers of missing variables (the WHO does not report for all countries in all years) and in any event institutional change tends to be discrete and steady rather than fluctuating wildly year on year. I therefore classify health care systems across three broad 'transition' periods: 'initial conditions' (T_0: t_0, the year prior to transition year 1); 'early reforms' (T_1: t_1 - t_7); 'further reforms' (T_2: t_8 - t_{15}). In each case, the health care system characteristics at the end, or as close as possible to the end, of the period were recorded.

This qualitative data was supplemented with the collection of a comprehensive panel of WHO data covering health care (including health care expenditures; physical resources such as physicians, hospital beds; vaccination rates; and health care capacity based on admissions and visits) (WHO, 2012). Chapter 2 Appendix presents descriptive statistics for all data for the three time periods.

2.5 HEALTH CARE SYSTEMS' CLASSIFICATION: CLUSTER ANALYSIS AND INTERPRETATION

In order to dictate a three-period classification of the transition countries' health care systems, cluster analysis proves the appropriate methodology for effectively identifying the similarities from numerous characteristics in a complex setting (Statsoft Inc, 2007). Assuming that health care systems can be divided into smaller and broader groupings, I argue that the clusters are inevitably nested and so hierarchical cluster analysis is used. The precise number of clusters depends on the level of (dis)similarity one chooses and the stopping rules. The weighted pair-group average method (WPGMA) is chosen as a linkage rule, as it is more effective than the unweighted equivalent in cases where there are significantly different cluster sizes; WPGMA is also more efficient in identifying outliers. As I have a mixed dataset (with both categorical binary and numerical variables present), the only relevant distance measure was found to be the Gower measure of dissimilarity, while I used the Duda and Hart index as a stopping rule to identify the number of clusters in each time period. All analysis was performed using the software StataSE 10.

Table 2.1. Full list of indicators used for classifications

Criteria	Variable	Sub-variables	Description	Measure
Financing	SHI		SHI existence	1-yes, 0-no
	Earmark		Health taxes/contributions are earmarked	1-yes, 0-no
	Collect		Collecting of funds by state	1-non-state, 0-state
	Pool		Pooling of funds by state	1-non-state, 0-state
	Purchasing		Selective purchasing of services by insurance	1-yes, 0-no
	Risk adj.		Existence of risk adjustment	1-yes, 0-no
	Split		Existence of the purchaser-provider split	1-yes, 0-no
	VHI	Exists	Existence and functioning of VHI/PHI	1-yes, 0-no
		On paper		1-yes, 0-no
		No		1-yes, 0-no
	THE		Total health expenditure as a share of GDP	% of GDP
	PbHE		Public health expenditure as a share of GDP	% of GDP
	GvHE		PbHE as a share of total government expenditures	% of gov exp
	PrHE		Private health expenditure as a share of THE	% of THE
	OOP		Out-of-pocket payments as a share of PrHE	% of PrHE
	SHI of PbHE		SHI as a share of PbHE	% of PbHE
	ExtHE		External financing in the THE	% of THE
	HE pc PPP		Per capita health expenditure	PPP dollars
	PbHE pc PPP		Per capita public health expenditure	PPP dollars
Organisation	Multiple funds	No funds	Existence of multiple insurance funds	1-yes, 0-no
		One fund		1-yes, 0-no
		Multi funds		1-yes, 0-no
	Competition IF		Competition between funds	1-yes, 0-no
	Inpatient organisation		Type of inpatient organisation	1-Public (or Quasi-Public), 0-Mixed
	Outpatient organisation	Public	Type of outpatient organisation	1-yes, 0-no
		Mix		1-yes, 0-no
		Private		1-yes, 0-no
	Provider choice	No choice	Free choice of provider	1-yes, 0-no
		Limited		1-yes, 0-no
		Free		1-yes, 0-no
	Hospitals		Hospitals per 100,000	
	HB		Hospital beds per 100,000	
	Psych HB		Psychiatric hospital beds per 100,000	
	Physicians		Physicians per 100,000	
	Dentist		Dentists per 100,000	
	Nurse		Nurses per 100,000	
	Midwife		Midwives per 100,000	
	Admissions		Inpatient admissions per 100	
	ALOS		Average length of stay	Days
	Outp. contacts		Outpatient contacts per person, per year	
Primary care	GP as gatekeeper	No	GP acts as a gatekeeper to the system	1-yes, 0-no
		On paper		1-yes, 0-no
		Yes		1-yes, 0-no
	Immunisation		Share of infants vaccinated from tuberculosis	%
Payment or Incentive Structure	Primary physicians	Salary	Payment of primary physicians	1-yes, 0-no
		Capitation		1-yes, 0-no
		FFS		1-yes, 0-no
	Outp specialists	Salary	Payment of outpatient specialists	1-yes, 0-no
		FFS		1-yes, 0-no
	Hospitals	Line item	Payment of hospitals – line item budgeting	1-yes, 0-no
		PBP	Patient-based payment	1-yes, 0-no
		FFS	Fee-for-service payment	1-yes, 0-no
	Bonus to doctors		Bonuses to doctors for quality	1-yes, 0-no
	Bonus to hospitals		Bonuses to hospitals for quality	1-yes, 0-no
Patient - orientation	BBP		The scope of the basic benefit package	1-Comprehensive, 0-Limited
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
		Minor		1-yes, 0-no
		Big		1-yes, 0-no

The cluster analysis was performed separately for each time-period (T_0, T_1 and T_2) and in two variations, to check for robustness (See Chapter 2 Appendix for a dendrogram): (1) using the same variables for all time-periods and (2) adding variables as available over

time. For example, the data on health care expenditures are not available for T_0, thus results set (1) does not contain that data for any period, while results set (2) are essentially different for each time-period and use the data as it becomes available. Cluster analysis does not assign weight to any of the variables, thus the inclusion of quantitative variables (measured in varying metric form) can distort the results. To avoid this and to ensure the clusters reflect structural differences, rather than purely physical resources, I assess all groupings qualitatively according to the chosen conceptual framework. The countries, which seem to not belong to one group, are then moved to another. Moreover, while cluster analysis only technically distributes the countries into groups, careful qualitative analysis allows for noting (dis-)similarities and coming up with names for the clusters.

2.5.1 INITIAL CONDITIONS (T_0)

Initially, most countries' health care systems were structurally very similar (and broadly could be put into one type), as until the breakdown of the old regimes they all followed (with some variations) the Communist Semashko model. The systems of this model were strictly planned, owned and budgeted by the state, with focus on infectious disease prevention and inpatient sector, along with tendency of over-staffing and over-bedding, and increasing under-financing (Rowland and Telyukov, 1991; WHO HiT's, Various Years).

Table 2.2. Health care in transition classification: initial conditions (T_0).

Mild Semashko T_0	Soviet Semashko T_0		Quasi-SHI T_0
Bulgaria	Albania	Kazakhstan	Croatia
Czech Republic	Armenia	Kyrgyzstan	Slovenia
Hungary	Azerbaijan	Moldova	
Poland	Belarus	Russia	
Romania	Estonia	Tajikistan	
Slovakia	Georgia	Turkmenistan	
Macedonia	Latvia	Ukraine	
	Lithuania	Uzbekistan	

As the physical resources available in the systems were also used for clustering, several classifications (consistent across result sets) capturing the subtle diversity of initial conditions were possible. The stopping rules suggest either a very broad (2-3 clusters) or a very detailed (7-8 clusters) classifications. However, knowing that structurally the health care systems were very similar, I have reverted to the broader cluster classification. The results (Table 2.2) are intuitively appealing: countries of the CEE formed the first group ("Mild Semashko model"); mostly the Former Soviet Union (FSU) countries formed the second group ("Soviet Semashko model"); and Croatia and Slovenia, with quasi-SHI systems already in place, form a structurally distinct group ("Quasi-SHI system").

2.5.2 EARLY REFORMS (T_1)

The cluster analysis for the early reform period (transition years one to seven) produces five groups (Table 2.3): (a) (early) CEE hybrid systems; (b) (early) ambivalent model; (c) comprehensive tax-based/quasi-Semashko; (d) 'restricted' quasi-Semashko model; (e) 'loosely regulated' system.

One group is made up of the CEE and two Baltic countries. Generally, most CEE countries started reforms rigorously, though often inconsistently, and it is no surprise that they form a distinct sub-group. This group represents the hybrid systems typical for Eastern European countries, where both the features of SHI and tax-based systems are present: SHI contributions are usually collected as (ear-marked) tax.

The FSU countries have been reforming in different ways, thus they are separated into different groups. The second group incorporates the 'ambivalent' system type where reforms

were dual and sometimes only partial. While financing schemes have changed (most of the countries switched to the CEE hybrid type in terms of financing), the re-organisation reforms are still lacking in this period of transition. Reduction of physical resources is also going on at a much smaller scale, comparing to the progressive first group.

Table 2.3. Health care in transition classification: early reforms (T_1).

(Early) CEE hybrid model T_1	(Early) ambivalent model T_1	Comprehensive quasi-Semashko model T_1-T_2	Restricted quasi-Semashko model T_1-T_2	Loosely regulated model T_1-T_2
Czech Rep.	Albania	Belarus	Armenia	Georgia
Croatia	Kazakhstan	Bulgaria	Azerbaijan	
Estonia	Kyrgyzstan	Poland	Tajikistan	
Hungary	Lithuania	Moldova	Turkmenistan	
Latvia	Russia	Romania	Ukraine	
Slovakia	Macedonia		Uzbekistan	
Slovenia				

The second group is qualitatively distinct from the third group of mostly tax-based systems with a comprehensive coverage (e.g. Belarus, Poland and others). This group, even though with some reforms, still operates similar to the pre-transition Semashko model. However, both of these groups are different from the fourth group of 'restricted quasi-Semashko systems', where the pre-transition system saw little structural changes, while at the same time a gradual reduction of available services, access and equity happened.

The final group consists of one country only – Georgia. In Georgia, reforms were technically in place, privatisation was proceeding apace, SHI was introduced in 1995 and the payment structure had been changed, but at the same time, public health expenditures were only 8.7% of all health expenditures with about 89% of total health expenditures being out-of-pocket (OOP) payments and reform monitoring was lax. So, despite apparent reform efforts, the real burden of payment for health services lay with the patients themselves. The reality was an emerging system with limited services and growing inequity, and where reforms, such as there were, were only loosely monitored and implemented.

All in all, the majority of the FSU countries are considered reform laggards in the socio-economic sphere, but they lag behind in terms of health care reforms as well. While the latter governments grappled with political and macroeconomic instability, they typically paid little attention to health care reform and the associated under-financing, corruption, disorganisation and service reduction.

2.5.3 FURTHER REFORMS – (T_2)

In the last time period covered (transition years 8 to 15), I identify five to seven groups and system types (Table 2.4): (a) CEE liberalised systems; (b) (reformed) CEE hybrid systems; (c) (reformed) ambivalent; (d) 'restricted' quasi-Semashko model; (e) 'loosely regulated' model; (f) regionally diverse system; (g) comprehensive tax-based/quasi-Semashko system.

It is easy to note that some groups have remained unchanged compared to the T_1 period, namely, restricted Semashko model, 'loosely regulated' systems and comprehensive tax-based/quasi-Semashko system, even if the composition of groups changed slightly. The only country left among the comprehensive tax-based systems is Belarus in T_2, and it is often considered to still have the original Semashko type model '20 years later'. The rest of the countries within the same group in T_1 have joined other groups.

The group of 'restricted quasi-Semashko model' is portrayed by the same set of countries (with Kazakhstan joining them since it re-introduced tax-based system and further reduced the coverage). To the extent that these countries introduce reforms at all, they still do not

introduce working reforms, often centred on the superficial churning of ministry officials and jobs. The systems are tax-based, the majority of their facilities are publicly owned, and medical personnel are salaried, while the hospitals are paid based on line-items. The systems are strictly hierarchical and centralised, often with an 'executive style of government', as planning comes directly from presidential decree. The real empowerment of regulation remains extremely weak and corrupt throughout this transition period. Even though a lot of these characteristics are similar to those of Belarus, the major difference is that in these countries the systems become more and more restricted and unequal for the population.

Table 2.4. Health care in transition classification: further reforms (T_2).

CEE liberalised T_2	(Reformed) CEE hybrid model T_2	(Reformed) ambivalent model T_2	Restricted quasi-Semashko model T_1-T_2	Loosely regulated model T_1-T_2	Increasingly regionally diverse T_2	Comprehensive quasi-Semashko model T_1-T_2
Czech Rep. Slovakia	Bulgaria Croatia Estonia Hungary Latvia Poland Romania Slovenia	Albania Kyrgyzstan Lithuania Moldova Macedonia	Azerbaijan Kazakhstan Tajikistan Turkmenistan Ukraine Uzbekistan	Armenia Georgia	Russia	Belarus

The so-called 'loosely regulated' model is now represented by Georgia and Armenia, as they share in common a substantial degree of instability and an on-going reduction of coverage and services for their citizens.

It is also possible to note new developments among the countries reforming most quickly, with the Czech Republic and Slovakia progressing most rapidly towards liberalisation while retaining the most comprehensive health care systems. These two now form a separate group of "classical" multiple-fund SHI systems (very similar to the ones in the West), moving furthest away from the original tax-based Semashko model.

Meanwhile, many of the previously comprehensive tax-based countries which preserved universal coverage have changed their reform programmes and, in the case of Poland, Bulgaria and Romania, now join the group of the '(reformed) CEE hybrid systems countries'. These are predominantly hybrid SHI systems, with Latvia and, to a lesser extent, Poland being more tax-based and having only some SHI characteristics (Wagstaff and Moreno-Serra, 2009; Waters *et al.*, 2008). All of them have a clear and well-functioning purchaser-provider split, though the SHI contributions are still collected primarily through (ear-marked) tax. Inpatient facilities are mostly public, while outpatient services are mostly privatised or mixed by now. The payment structures to doctors do vary, while the hospitals in all of them are no longer paid according to line-items. All of these countries provide universal coverage for their population.

Moldova is the remaining country from the 'comprehensive tax-based' system group in the first period, which now moved to the reformed ambivalent model. It implemented some reforms (e.g. introduction of SHI, reform of hospital budget allocation and other), but is not reformed enough to join the CEE countries. Similar to the other countries in this group, it has introduced some further reforms in financing, but not as much in organisation. All of the countries within the ambivalent model are SHI based with very low contribution rates (only 2-4% in comparison to 13-15% in the CEE SHI hybrid group), most facilities are publicly owned, but the range of basic benefit package (BBP) differs somewhat, with Albania and Kyrgyzstan being more restrictive. Even though the combination of countries has stayed nearly the same within this group (with Kazakhstan leaving the group, and

Moldova joining), all of them experienced some further reforms in their policies, comparing to the previous period, thus even though structurally they present similar system, the change towards equality, restructuration and reduction of resources (for example, Moldova and Kyrgyzstan have nearly halved their hospitals and hospital beds in second period) is recorded statistically in assigning them into a different group in T_2 compared to T_1. It is worth noting, that 'ambivalent' does not refer to inconsequent reforms, but rather to the dual qualities of the health care system in terms of the roles of state, insurance funds, providers and patients.

In period T_2 according to cluster analysis in results set (1) Russia is identified as a distinct outlier. Russia, as so often, is a complex case incorporating elements of both the 'old' and the 'new' systems, both tax– and SHI-based. 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 directly from taxes. The methods of payments did change, with about half of contracted hospitals expenditure covered by some form of the diagnosis-related groups (DRG) methods, some through the per diem system, and some through line-item budgets. Yet there is a large regional variation within the country itself, which influences accessibility, equity, coverage and outcome greatly, thus it stands by itself in the 'regionally diverse' group.

2.5.4 CLASSIFICATIONS SUMMARY

To summarise the classifications, it is abundantly clear that some groups stay unchanged throughout the two phases of transition, thus the system types persist. This is true in particular to the "comprehensive quasi-Semashko", "restricted Semashko" and "loosely regulated" groups. Countries within the other groups, such as "CEE hybrid" and "ambivalent", even though stay together through T_1 and T_2, did change at similar time, in similar directions (Figure 2.1, p.58). Thus, certain path-dependency of countries could be noted, coupled with some spatial effects: some countries unite into tight clusters throughout transition.

The purpose of this classification was not to rank or sort the health care systems according to their performance (which indeed would need a different approach), but rather to show that the differences among transition countries have emerged, and could be classified according to certain dimensions into diverse pathways. When it was created, no particular health indicator influenced the selection of criteria and dimensions. On contrary, the classification was intended to be designed independently and objectively, taking only structural health care characteristics into account.

2.6 ECONOMETRIC ANALYSIS

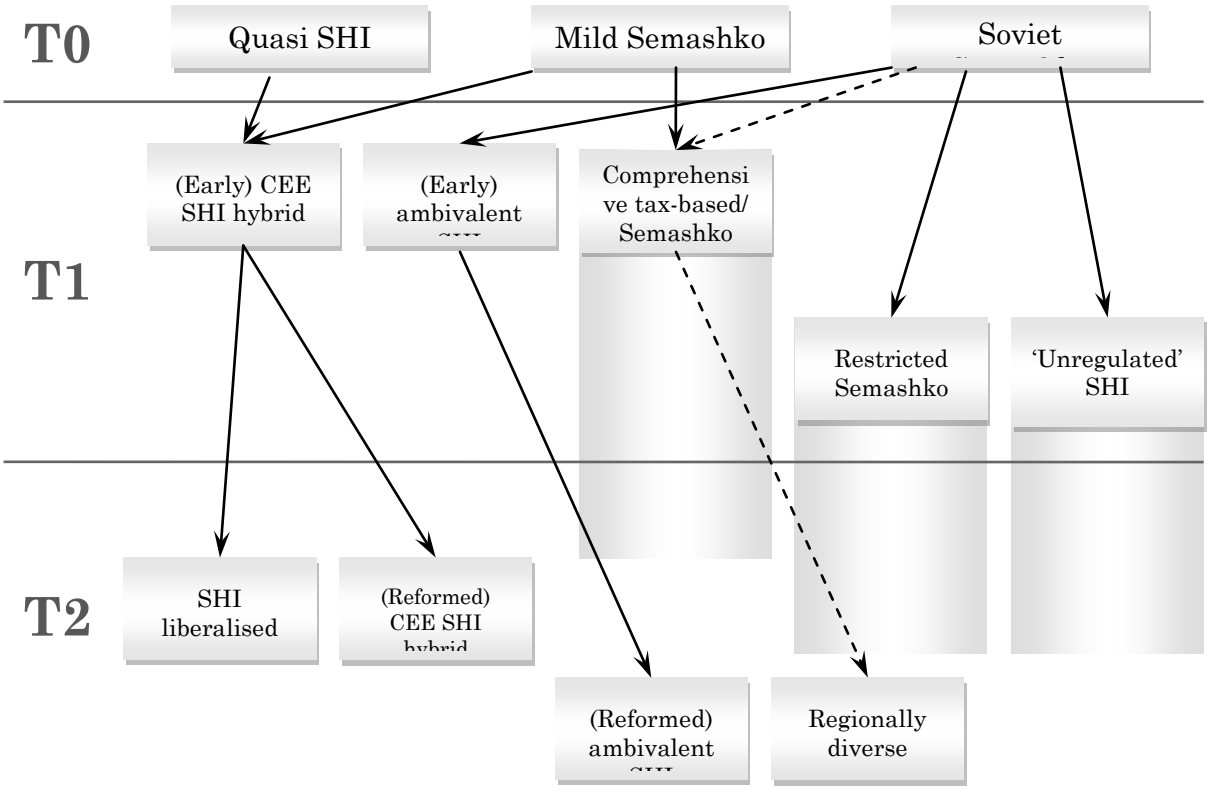
2.6.1 ECONOMETRIC STRATEGY AND DATA USED

The developed proxy indicators of health care system reform can now be incorporated in a series of panel econometric regressions exploring the determinants of health outcomes in the transition period. The main goal is not to analyse the determinants of health as a whole, but rather to test whether the created health care classifications can be used in analysis of public health in general and, as proxies for structural health care differences, can explain some variation in some health outcomes.

For the purpose of this paper, the health production functions only for life expectancy at birth (LEB) are estimated. Indicators of health are numerous, but one of the most universally available and accepted is LEB. Generally, LEB reflects a statistic of mortality at different ages across societies and is not considered to be influenced by health care as much,

as for example, maternal mortality or mortality from infectious diseases. Hence, finding some links between the structural characteristics of health care and LEB would mean that the relationship of the former with mortality, amenable to health care, should be even higher.

Figure 2.1. Summary of health care types in different periods.



NOTE: The solid arrows show the most typical transformation from one type to another, from one time-period to another. The dotted line illustrates less significant/less typical changes. Where the change has not occurred on a wide scale, the types stay the same through periods.

The following health production function is estimated for the panel data analysis:

$$\mathbf{LEB}it = \beta_o + \beta_1\mathbf{HS}it + \beta_2\mathbf{HC}it + \beta_3\mathbf{logGDP}it + \beta_4\mathbf{POL}it + \beta_5\mathbf{WAR}it + \varepsilon i + \varepsilon it,$$

where the subscripts *i* and *t* refer to units (countries) and time (transition years). LEB refers to the total life expectancy at birth measured in years, acquired from the Health for All Database (HfA DB) of the European Observatory, WHO and World Bank World Development Indicators (2012b). HS is a vector of **h**ealth care **s**ystem types culled from the previous section divided into three time periods (included in the analysis as dummy variables), it is at the centre of attention here. The rest of the independent variables in the model are controls for the main determinants of health, which are most often used in the literature. HC is a separate control for some of the **h**ealth **c**are resources usage, among which are the average length of stay in hospitals (ALOS) measured in days, and the number of outpatient contacts per person per year (WHO, 2012). LogGDP is the logarithm of Gross Domestic Product (GDP) per capita in purchasing power parity (PPP) constant 2005 international dollars from the World Bank's World Development Indicators. POL is the Polity IV democratisation index from the Centre for Systemic Peace (CSP), measured on a scale from -10 (least democratic) to 10 (most democratic) (Center for Systemic Peace, 2010b). WAR is a dummy variable for the occurrence of military conflict/political violence inside of each country and/or internationally, culled from the total occurrence of conflict in the Major

Episodes of Political Violence dataset of CSP (2010a). The descriptive statistics for all variables used in the econometric analysis can be found in Chapter 2 Appendix.

According to the literature reviewed earlier, life styles and environment have an influence on health as well (Zaridze *et al.*, 2009; e.g. Zatonski, McMichael, and Powles, 1998). The initial regressions were run with such independent variables as alcohol consumption, fruit and vegetable consumption, CO2 emissions and water pollution. However, none of the above indicators were found significant in any of the models, hence are not included in the final models. Age dependency ratio and EBRD transition indicators have also been considered, however they are very highly significantly correlated (-0.65 and 0.53 respectively) with GDP, hence including them in the model would violate the basic assumptions of regression analysis.

2.6.2 MODELS ESTIMATION

Considering the specificities of transition countries, it is more than possible that the individual country effects are correlated with the other regressors in the models, thus the data was carefully examined, initial regressions and post-estimation tests were carried out. After running the standard fixed (FE) and random (RE) effects models (Wooldridge, 2002; Wooldridge, 2003) with LEB as dependent variable and socio-economic, political and life-styles controls as independent, the Hausman specification test (Greene, 2003: 301-3) was conducted ($Chi^2=17.57$, $p=0.0035$), which rejected the null with 0.01% significance level in favour of FE (consistent model). Thus, the unit heterogeneity is important in this model and FE have to be accounted for.

Even though it can be argued, that most determinants influence health outcomes with some lag, complex dynamic modelling is difficult to perform on data with only 15 time-points and 25 units, hence simple but robust modelling is preferred to dynamic models, which can be inconsistent in the current setting. While FE might not perform most effectively with time-invariant or rarely changing variables, which health classifications are, alternative models were sought besides FE, which can still control for the unit-specific effects. This provides additional source of check for robustness. In the panel setting the OLS standard errors might produce bias, thus I correct the errors using the panel corrected standard errors (PCSE) (Beck and Katz, 1995; 1996; Beck, 2001; 2007). The models include unit dummies to control for fixed effects.

Both the FE and PCSE models are performed in a step-wise manner, as presented in Table 5. For each of the model types (PCSE and FE), four models are presented: one containing solely socio-economic and political controls (models 1 and 5); one – solely dummy variables for health care types (models 2 and 6); and two consisting of both (models 3-4 and 7-8), where models 4 and 8 also include a control for time in a form of dummy variables. Countries' effects are controlled for in all models (via binary controls or fixed effects modelling). Due to data availability only for one year in period T_0, T_0 health care classifications had to be excluded from the models. Nevertheless, this is not a loss as the 'initial condition' or the overall Semashko model becomes the reference group for the rest of the analysis. Even though the slight differences between countries were present before the start of transition, they can still be considered as a one broad group. Moreover, having the initial conditions as a reference group makes it easier to compare the countries' development and transition.

The R-squared are rather high for all models, which indicates that the overall model's fit is satisfactory. Standard Wald tests were conducted to test the significance of health care typology, country and year effects, where appropriate. It was found that all of them were

significant. This indeed is the first indication of the importance of the health care classification for the explanation of the transition health story.

2.6.3 RESULTS

Table 2.5 demonstrates that some of the socio-economic characteristics do indeed influence health significantly. As expected, GDP does influence LEB significantly in all models, the coefficient changes slightly, but stays consistently positive. Interestingly, in both sets of models, GDP influence on LEB becomes the smallest when the time controls are added. In general, adding time controls does add some changes to the models, hence underlining the importance of the dynamic processes in the transition countries. However, it is not recommended to use the time controls for the current dataset, while it overflows the models with variables, and the degrees of freedom are not sufficient to establish any robust links. Moreover, while unable to use more advanced dynamic modelling, simply controlling for time effects would logically entail that the time effects are similar across countries, which is simply a wrong assumption: all countries have developed differently and at a different pace. Hence, the models 3 and 7 are the final ones under scrutiny.

Political indicators (regime and occurrence of violent conflict) have a significant influence on LEB, with the expected signs. Thus, more democratic societies tend to produce better environment for improving health. At the same time, quite obviously, the occurrence of wars increases the mortality and influences health and LEB negatively. The influence of physical resources of the health care systems was slightly unexpected, but well explainable. Average length of stay and outpatient contacts per person have a negative impact on health status – where significant the results are consistent across models. They 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 compared to another system.

Introducing health care types into the equations results in a bigger overall R-squared (which is quite high as it is especially in PCSE models). Introducing the typology into the FE models helps in explaining additional 8-10% of variation in LEB (model 5 and 7). By themselves, types already explain roughly 45% of variation (model 6). Moreover, if one produces the same regression, but also add the health care resources controls, 65% of variation in health is explained. In PCSE much of the variation is explained by the country effects (simply regressing LEB on country dummies gives R^2=0.797), hence the R-squared are higher there. Nevertheless, the overall fit of the models and importance of classification cannot be questioned: it does help to explain more variation in the health outcomes.

Typology as a whole is significant in all models it is introduced (as shown by Wald tests), and some of the types are significant by themselves as well. As expected, once the socio-economic characteristics are controlled for, the most 'successful'[16] types in models 3 and 7 are the liberalised CEE and reformed CEE, which consist primarily of the countries – new EU member-states. The least 'successful' then can be considered quasi-Semashko types and regionally diverse (Russia). The ambivalent and 'loosely regulated' models perform better than the 'restricted Semashko' and 'regionally diverse' types. These results hold ceteris paribus and are expected due to failed health care reforms in many of the countries, especially in Asian FSU countries. Of course, the groupings can still reflect some of the socio-economic turbulence of these societies, which experienced a much worse transition in political and economic sense, comparing to the more advanced CEE. Nevertheless, the example of Russia, which turns out to be the weakest performer (even though this is significant only in model 7) – especially taking into consideration the economic level of

[16] 'Successful' here refers to the best performing health care models, comparing to the Semashko model of the initial period in terms of explaining LEB in production functions.

development and political stability, is striking. It is also showing that the classification does reflect the diversity beyond socio-economic and political characteristics of each society.

2.7 DISCUSSION AND CHAPTER CONCLUSIONS

This paper analysed the health care systems' diversity in transition countries and their possible role in driving health outcomes. The relationship is necessarily complex but also of crucial importance for explaining the diverse health outcomes in the transition area and for understanding pathways of future reforms and, possibly, policy-orientation. The core contributions are twofold. First, based on the structural characteristics of the individual country health care systems, a detailed three-period classification of health care systems in transition is created. Second, these classifications can indeed help in explaining health variation in transition countries.

The first (major) part of the paper arrived at creating the inductive typology of health care systems in transition countries. This approach can indeed be criticised for loose theoretical grounding, inability to generalise the obtained classification to wider populations (i.e. other health care systems outside of the transition region), and "only partial representations of reality" (Freeman and Frisina, 2010: 165). However, neither deductive, nor inductive approaches are in reality exclusive (ibid.), hence even inductive approach is based on a specific framework, which motivates the choices of the empirical indicators used. Moreover, any classification is a simplification of reality, and a certain "trade-off between simplification and accuracy" (ibid.: 166) is always necessary. The debate on the usage of classifications is far from being closed (ibid.: 174), but in the setting of comparing complex systems, which health care systems are, no other method has been so far created for comparative research in welfare regime research, and classifications – both inductive and deductive – are necessary:

> We are left with an understanding of classification as both stable and fragile, authoritative and flawed, inevitable, uncertain, certainly necessary, but difficult. We cannot do without it. (ibid.: 175)

The second part of the paper tried to use the created classifications in the empirical analysis of the determinants of health in order to better understand the structure of determinants of public health in transition and establish, whether structural diversity of health care systems could be responsible for producing the differing health outcomes across the region. The dummies of health care types can somewhat reflect other socio-economic differences between the countries, however, by controlling for socio-economic development it is assumed that the main difference left is that of the health care regimes.

Among the key findings I note two in particular. First, transition countries can indeed be inductively classified according to *structural* characteristics, *and* certain health care transition *paths*. Some countries do follow the same path hand in hand, which suggests the strong spatial ties to be analysed perhaps in future research. Interestingly, the classification in initial condition distinguishes groups of CEE vs. FSU countries, which diverge radically with the start of transition. While CEE rapidly progressed, FSU countries take very different pathways at different speeds, resulting in at least 5-7 types of health care systems in the latest period covered in this study.

Second, using the classification in health production functions I conclude that health outcomes can be partially explained by the structural differences across health care systems. Holding all the other factors unchanged, some groups do tend to perform better than others – even after controlling for country effects and all the socio-economic and

political disparities between countries within the region. Analysing the main features of the 'most successful' groups, it is possible to identify certain characteristics, which deem to have more influence on improving health outcomes (in this paper – life expectancy at birth). The classifications suggest that the key characteristics of the most 'successful' transitions include equity, access, comprehensive basic benefits package and universal coverage of the whole population. Thus, a message for policy-makers could be to strive for the equity of access and a wider range of health care services. Moreover, looking carefully at the results, it seems that the transition countries, which have introduced one or another form of SHI system, still fair better in terms of health outcomes, comparing to the reform lagging Semashko systems.

Practical applications of this research lie first and foremost in the possibility to use the created classifications when analysing health care in transition countries. Even though this study is situated on the empirical end of health care classification research literature, rather than theoretical, it still is able to add to the broader literature. While the typology created is created from the empirical indicators of the countries in question, and can only be applied directly to them, the developed *logic* and *strategy* for inductive classification can be transferred to other cases and regions of the world, which lack deep comparative analysis of health care systems.

Table 2.5. Econometric analysis results. Dependant variable: life expectancy at birth (LEB)

FE and PCSE regressions, dependent variable: LEB

VARIABLES	PCSE (1)	PCSE (2)	PCSE (3)	PCSE (4)	FE (5)	FE (6)	FE (7)	FE (8)
GDP (log)	2.161***		1.967***	0.685***	2.298***		1.972***	0.740***
Polity IV	0.059***		0.029**	0.016	0.04***		0.017	0.007
Military conflict (dummy)	-0.851***		-0.904***	-0.927***	-0.531***		-0.623***	-0.767***
Average length of stay	-0.210***		-0.133***	-0.017	-0.194***		-0.103***	0.035
Outpatient contact	-0.041		-0.101***	-0.098***	-0.103**		-0.131***	-0.119***
(Early) CEE hybrid model T1		2.099**	2.115**	2.592***		0.199	-0.349	1.764**
(Reformed) CEE hybrid model T2		4.722***	3.341***	4.120***		2.912***	0.979***	3.449***
(Early) ambivalent model T1		1.019	0.523	0.943		-0.656**	-0.763**	1.056
(Reformed) ambivalent model T2		2.813***	1.179	1.596*		1.209***	0.044	1.869**
Comprehensive quasi-Semashko model T1-T2		0.607	1.674*	2.249***		-1.309***	-0.722**	1.408*
Restricted quasi-Semashko model T1-T2		0.828	-0.686	-0.168		-0.305	-0.870***	0.959
Loosely regulated model T1-T2		5.569***	3.08***	4.204***		3.344***	0.951**	3.508***
CEE liberalised T2		4.470***	3.611***	3.860***		2.742***	1.296***	3.201***
Increasingly regionally diverse T2		0.738	-0.02	0.268		-1.019*	-1.554***	0.221
Constant	54.20***	66.00***	51.00***	63.93***	53.04***	69.38***	55.19***	64.21***
Observations	404	436	404	404	422	484	422	422
R-squared	0.951	0.929	0.962	0.970	0.579	0.451	0.660	0.734
Number of units	25	25	25	25	25	25	25	25
Unit controls (dummies)	Yes***	Yes***	Yes***	Yes***				
Time controls				Yes***				Yes***
HC classification as a whole (Wald test)		Chi^2=333.75, p<0.000	Chi^2=2348.95, p<0.000	Chi^2=3908.04, p<0.000		F=37.88, p<0.000	F=8.28, p<0.000	F=12.79, p<0.000

NOTE: *** p<0.01, ** p<0.05, * p<0.1; Full models with SE and p-values can be provided on request.
SOURCES: HfA WHO, WB WDI, Polity IV, MEPV, HiT's

CHAPTER 3

MACRO-LEVEL HEALTH IN TRANSITION: THE ROLE OF SUBJECTIVE DETERMINANTS

ABSTRACT

Public health, measured at the macro-level, is analysed worldwide. However, most often only the objective determinants – such as GDP, health care, institutions – are taken into account. Sometimes social capital, well-being and happiness are also analysed at the macro-level, particularly in transition countries. However, rarely is it done in one study simultaneously. Moreover, as in many studies subjective health is often used interchangeably with the objective negative health indicators, the need to unite the different approaches is becoming more urgent. This Chapter will commence the analysis of the 'objective' and 'subjective' – first at the macro level. The goals of this chapter are, therefore, to better understand the differences between the objective and subjective health at the macro-level; to explore whether subjective indicators do explain some variation in health at the country-level; and to try to grasp the links between the objective and subjective determinants themselves. Life in Transition Survey (LiTS) is aggregated to the country-level, and merged with World Health Organization (WHO) and World Bank (WB) data. Sets of OLS regressions are run on life expectancy at birth (LEB) and subjective health within each of the four domains: economic, political, social determinants and health care. I find that first, objective and subjective health do differ at the macro level – at least in the way they are determined. Second, while subjective indicators do influence health – both objective and subjective, but they do it differently. Third, the interrelations between the sets of subjective and objective indicators are dependent on the domain in question. Overall, researchers are encouraged to treat the objective-subjective health indicators with caution, and be aware, that there are different processes underlying them at the macro level.

3.1 INTRODUCTION

The previous chapter analysed the determinants of health at the macro-level from an objective point of view. Even though health care has been at the centre of attention, the evidence suggests that, along with health care, some socioeconomic and political determinants have an impact on health outcomes in CEE and CIS countries throughout the transition period. This corresponds with previous research.

Nevertheless, as it is argued in Chapter 1, the subjective perception of life, economic situation and societal conditions might add its toll and have an influence on health. After all, according to Wilkinson, many modern health problems are psychosocial in nature, or as he puts it, "many of the crucial pathways leading to disease are, as we shall see, psychosocial" (1996: 4, 23). Thus, this chapter turns to analysing primarily the subjective side of the determinants of health. It only covers the peak of the iceberg here by looking at macro-level health and its determinants, starting the debate on the multi-level aspect of the determinants of health. Further chapters will go deeper into transitional societies by analysing individual level health and its determinants.

The chapter starts out with a brief recap of the existing research on subjective determinants of health, which was discussed more in detail in Chapter 1. It is then followed by the goals and limitations of this chapter's analysis. Then the indicators available for current research follows are introduced. They are taken from a combination of originally macro-level data and survey-based data aggregated at the country-level. The described data are then used for the analysis of the determinants of health in the *augmented health production function* framework using both objective and subjective health and factors influencing health at the macro-level.

3.1.1 LITERATURE RECAP

Chapter 1 develops the augmented health production in detail, the essence of which is the inclusion of both the objective and subjective strands of research in analysing health and its determinants. The subjective side is usually analysed at the micro-level, while the objective – primarily at the macro-level. In this chapter the main focus is on mixing these two approaches by focusing on subjective determinants of health at the macro-level.

Although the concepts of objective and subjective health have often been used interchangeably, they are quite different in nature (Burström and Fredlund, 2001; Mossey and Shapiro, 1982; Saevareid *et al.*, 2007), starting from the way they are measured and derived, to how they are understood. However, much attention is paid to the correlations of self-assessed health with the objective negative health measures, like mortality, life expectance and some diseases (Idler and Kasl, 1995; Idler and Benyamini, 1997). The fact that they are correlated does not mean they are one and same, hence if they reflect perhaps different sides of the overall concept of health or are essentially different concepts, it can be expected that they are influenced by different determinants as well.

Yet by distinguishing the two apart, it is evident that there are numerous difficulties in analysing the effect of subjective indicators on objective health. Problems include limitations of data, the nature of subjective indicators, a mismatch between the levels of analyses of the subjective and objective; subjective indicators are often measured at the micro level, while objective ones are measured at the macro level.

Looking at the transition countries, two main psychosocial reasons for widely acknowledged deteriorating health can be noted based on literature: *stress* and *control over life*. In their 1996 paper, Bobak and Marmot hypothesise that "low control over life, and feelings of

disadvantage" (1996: 424) might be some of the reasons for deterioration of health and increase of mortality in the transition region, but the authors don't provide any supporting evidence for this hypothesis. In their 2000 paper, Bobak and colleagues try to empirically establish the links between health and perceived control. They find that inequalities are not significant determinants of health in CEE countries, while education, material deprivation and particularly perceived control are. Moreover, they argue that perceived control *mediates* some effects of the socioeconomic circumstances on health (Bobak *et al.*, 2000: 1347). Hence, even though this is not their main goal, they do find some relationship between the objective and the subjective. It is important to note that Bobak and colleagues use a subjective measure of health, rather than an objective one.

One of the milestones in the 'determinants of health in transition' literature can be rightfully considered the paper by Brainerd and Cutler (2005a; Brainerd and Cutler, 2005b), which addresses the increasing mortality in the Russian Federation and other post-Soviet republics. The authors empirically test whether 'stress of transition', along with other factors, is important for deteriorating health (Brainerd and Cutler, 2005a: 125-28). Brainerd and Cutler make use of the Russian Longitudinal Monitoring Survey (RLMS) and the Central and East European Barometer (CEEB) datasets to test their hypotheses. They study the influence of psychosocial distress on health through analysing the assumed components of stress of transition: "diminished expectations about the future"(Brainerd and Cutler, 2005b: 27), and "the fear of very bad outcomes" (ibid.: 28), measured through the changes in the minimum wages. They conclude that psychosocial factors do indeed have a strong effect on health and mortality:

> "Direct measures of material deprivation such as poverty and having enough food do not predict mortality. Rather, mortality appears to be associated with the prospect of suffering a substantial reduction in income, and, hence, living standards". (Brainerd and Cutler, 2005a)

All in all, there is strong evidence that subjective characteristics do influence health, particularly through psychology. However, most of the studies concentrate on the individual health, as indeed the psychosocial links are found at that level. However, to continue the detailed exploration of health, I first focus on the country-level, where both the objective and subjective health are analysed under the umbrella of the augmented health production function, which takes both the subjective and objective determinants into account.

3.1.2 GOALS OF THIS CHAPTER

Chapter 3 starts to analyse the relationship between, *firstly*, subjective factors and health; and *secondly*, between 'the subjective' and 'the objective' in their influence on health. This Chapter deals exclusively with the macro-level relations and tries to understand whether the country-level is also important while analysing the subjective indicators and can be used for the determinants-of-health-research in a cross-country perspective. This potentially brings current research to questioning the meaning of subjective indicators at the macro-level, considering how often they are used in this way in political science and sociology.

Thus, the goals in this chapter are threefold. First, it is important to try to find out, whether 'the subjective' does influence health at the macro-level at all. Second, the chapter will take into account both the objective and subjective determinants and will try to establish whether they influence health in different ways and are interrelated between each other. Finally, this chapter starts out the methodological quest for establishing the determinants diversity or similarity at different levels – micro and macro.

3.1.3 LIMITATIONS

A limited sample of countries of the CEE and CIS region and a limited time frame, which starts with transition years in the end of 1980's – the beginning of the 1990's and end with the present day, poses some problems due to potentially small sample size. These problems are only increased when one takes *subjective* indicators into account, when the survey data is only available for 12 rounds. As the individual responses from surveys are aggregated by country-years, the amount of available observations is reduced to several dozens for transition countries.

The shrinkage of the dataset was indeed expected, but it was also expected to have an opportunity to unite several different surveys into one dataset according to the same or similar indicators. However, the different datasets, which were explored in detail – the World Values Survey (WVS), the European Values Survey (EVS) and Life in Transition Survey (LiTS) datasets were difficult to combine, as the indicators were phrased differently, had various scales and some items didn't exist across all surveys. Hence, the dataset, which provides the biggest amount of observations for the countries of interest, was selected – LiTS, which has been collected twice: in 2006 and 2010, therefore can provide a sample of only 54 cases.

Data availability restrains the methods' usage and hence, the research questions, which can be posed and answered. The analysis in this Chapter is thus restricted to simple pooled OLS regressions at the country level. Still, the analysis here provides the first insights into the determinants of health and the links between the subjective and the objective; and makes it possible to later compare the results with micro and multi-level approaches to determinants of health.

3.2 METHODS AND DATA

One of the goals of this chapter is to analyse the exact relationships between the subjective and objective indicators. It is possible to identify three types of relations: mediation, addition and interaction. Potentially, there can also be a combination of them. *Addition* is the simplest type of the relation, where the two indicators – the 'subjective' and the 'objective' – influence the dependent variable (health) simultaneously at a similar or various degrees. *Mediation* is a more complex relation between two (or more) factors, where only one has a direct effect on the outcome, through which the other in turn influences the dependent variable. Either 'the subjective' or 'the objective' can be a mediator in a relationship. *Interaction* is yet another complex relationship, where not simply the variables themselves have an effect on the outcome, but also their interrelationship. Interaction can as well be present along with the mediation or addition, but the influence can be diverse. There could be a combination of different relation types present, as well as 'backward' relations. Of course, there might be no strong relations at all, or only one direct influence of *either* the objective *or* subjective determinants.

3.2.1 STRATEGY AND INTERPRETATION

Having only 54 observations within pooled data does not give a chance to utilise any methods which could allow us to trace the complex relationships between the concepts – such as structural equation modelling. The models had to be very simple, comprising of few independent variables only. Therefore, I was limited to analysing very simple ordinary least squares (OLS) regressions in four steps: regressing health first on the objective indicator, then separately on the subjective, after that on both the objective and subjective together; and finally adding an interaction term. The models would take the following form:

(1) $H=\beta_1 O \rightarrow$

(2) $H=\beta_2 S \rightarrow$

(3) $H=\beta_3 O + \beta_4 S \rightarrow$

(4) $H=\beta_6 O + \beta_7 S + \beta_8 OS,$

where H – health, O – the objective determinant, S – the subjective determinant, β_1 - β_8 – coefficients of interest.

After performing the simple regressions (1)–(4) on each pair of the subjective and objective indicators, I analyse the coefficients β_1– β_8, their significance levels and R-squared along all four steps. The basic interpretation could be depicted as follows:

Table 3.1. Interpretation of sets of OLS results.

IF …	AND …	Then …	
(1) $H=\beta_1^{(*)}O$, (2) $H=\beta_2^{(*)}S$	(3) $H=\beta_3 * O + \beta_4 * S$	Addition	$O + S \rightarrow H$
(1) $H=\beta_1 * O$,	(3) $H=\beta_3 O + \beta_4 * S$	Mediation	$O \rightarrow S \rightarrow H$
(2) $H=\beta_2 * S$	(3) $H=\beta_3 * O + \beta_4 S$		$S \rightarrow O \rightarrow H$
(1) $H=\beta_1^{(*)}O$, (2) $H=\beta_2^{(*)}S$	(4) $H=\beta_6 O + \beta_7 S + \beta_8 * OS$	Interaction	$S \times O \rightarrow H$

According to Table 3.1, addition is present, when both O and S are simultaneously significant in (3). Mediation is more complex and requires the condition of both O and S being significant in (1) and (2), and that one of them becomes insignificant in (3). (4) is the regression, which tests for an interaction effect between the two variables.

The pairs of determinants are analysed one by one in pooled OLS regressions. Interactions are calculated using the z-score-transformations of variables. I run the sets of regressions in four steps separately for LEB and sHealth. As it was seen in the previous section, objective and subjective health are correlated, hence I could expect at least some similarities in their determinants.

3.2.2 DATASETS OVERVIEW

Subjective indicators necessary for this analysis are culled from the Life in Transition Survey (LiTS) from years 2006 and 2010 for 27 countries. The European Bank for Reconstruction and Development (EBRD) with collaboration of the World Bank (WB) designed LiTS as a questionnaire of individuals' perceptions. It surveys 58,000 individuals across 29 countries (EBRD, 2007; EBRD, 2011b): 28 Central and Eastern European and Central Asian transition countries (Table 3.2), plus Turkey and Mongolia, which are excluded from the analysis. LiTS covers four main sections of individuals' perceptions of life in transition: material wellbeing, attitudes and satisfaction, "histories" of transition, and individuals' evaluations of crime and corruption (EBRD, 2007: 5). All the analysis in this Chapter is conducted on a pooled dataset.

Subjective indicators, selected from LiTS, are accompanied by the objective data 'twins' from the World Health Organisation (WHO) and World Bank (WB) in five main domains: *health, economic, political* and *social* determinants, and *health care*. Below all the macro-level indicators are summarised by each domain.

Table 3.2. Countries present in the LiTS dataset, 2006.

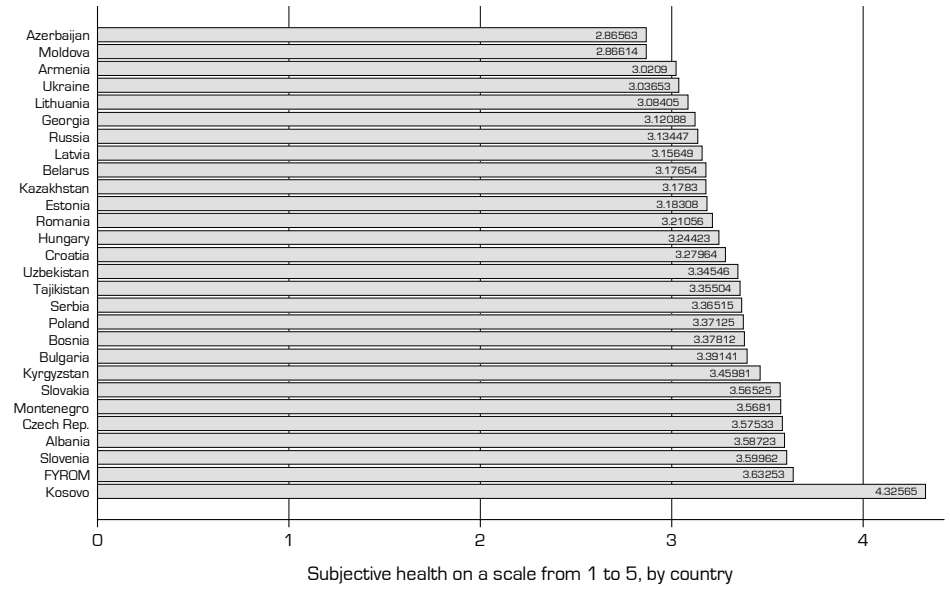
1	Albania	15	Kyrgyzstan
2	Armenia	16	Latvia
3	Azerbaijan	17	Lithuania
4	Belarus	18	Moldova
5	Bosnia	19	Montenegro
6	Bulgaria	20	Poland
7	Croatia	21	Romania
8	Czech Republic	22	Russia
9	Estonia	23	Serbia
10	FYROM	24	Slovakia
11	Georgia	25	Slovenia
12	Hungary	26	Tajikistan
13	Kazakhstan	27	Ukraine
14	Kosovo[17]	28	Uzbekistan

SOURCE: (EBRD, 2011a)

3.2.3 HEALTH

LiTS provides the subjective health measure, which is paired with the objective counterpart from the macro-level. As an objective health proxy, the same indicator as the one used in Chapter 2 is introduced – life expectancy at birth (LEB). Due to the nature of the WVS and LiTS, only subjective measures of health are available in them. However, it is important to analyse the subjective-objective link between the health indicators as well, thus perception of health, along with the objective health indicator, is taken into account. Objective health is measured here with the life expectancy at birth (LEB) indicator in line with the Chapter 2 analysis.

Figure 3.1. Subjective health (five-point scale), by country, LiTS I – II.



SOURCE: (EBRD, 2011a)

[17] Kosovo is only present in the second wave of LiTS in 2010, but due to its recent independent status, macro-level data is not available for it on all indicators, hence it is not used for the analysis in many models.

Subjective health is measured by the question "How would you assess your health?" and is measured on a 5-point scale with 1 – "Very good" and 5 – "Very bad", which was reversed for the ease of understanding. The country-level statistic is presented in Figure 3.1. The lowest scores can often be found in the so called "mortality belt" (Brainerd, 2001): Moldova, Belarus, Ukraine and Russia, but many of the post-Soviet republics join them as well. It can also be seen from the graph. Central European countries, such as Poland, Slovenia and Hungary, evaluate their health as mostly fair, rather than good, while people in most of the Balkan countries seem to be more satisfied with their health.

3.2.4 DETERMINANTS OF HEALTH

To analyse the relationship between the objective and the subjective, *pairs* have to be determined within each of the four domains: *economic*, *political* and *social* determinants, and *health care*. Due to methodological limitations, I do not use any demographic indicators in the analysis below, as the regressions are kept simple with only one pair per model maximum. Table 3.3 summarises the variables in each domain, according to objective and subjective side. Descriptive statistics for all the variables used in the analysis below are available in Table 3.4.

Table 3.3. Pairs of indicators within each domain at the macro-level.

	Economic	Political	Social	HC
Objective	GDP pc PPP (ln)	Political stability and absence of violence (PSAV, WGI WB)	Membership in associations	Health expenditure (HE) as per cent of GDP
Subjective	Satisfaction with income (10-step ladder)	Satisfaction with how democracy works	Interpersonal trust	Satisfaction with HC

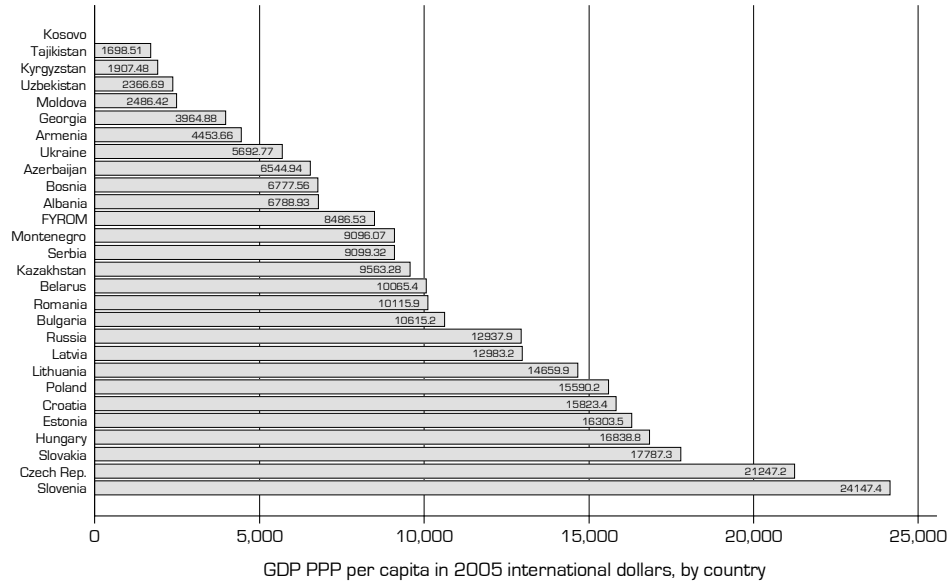
Table 3.4. Descriptive statistics for data used.

Indicator	N	Mean	Std. Dev.	Min	Max
Life expectancy at birth (LEB), WHO	55	72.12	3.35	65.47	78.97
Subjective health, 5point scale	55	3.39	0.31	2.87	4.33
GDP pc PPP, 2005$	54	10266.81	6028.21	1500.28	24819.94
Income ladder – financial satisfaction	55	4.31	0.47	3.16	5.24
Political stability and absence of violence, WGI WB	54	-0.03	0.75	-1.94	1.06
Preference of democracy, share of people	55	0.55	0.10	0.36	0.76
Membership in associations, share of people	55	0.14	0.08	0.02	0.36
Trust, share of people who trust	55	0.33	0.10	0.08	0.56
Health expenditures as per cent of GDP	54	7.05	1.71	4.07	11.94
Satisfaction with health care	55	3.30	0.26	2.73	3.81

The objective economic (*oE*) determinant is represented by *GDP per capita* in purchasing power parity PPP measured in 2005 international dollars (Figure 3.2). Possible equivalent of economic determinant of health within the subjective domain (*sE*) is the *satisfaction with financial situation in a household*. The exact question is phrased as "Please imagine a ten-step ladder where on the bottom, the first step, stand the poorest people and on the highest step, the tenth, stand the richest. On which step of the ten is you household today?"

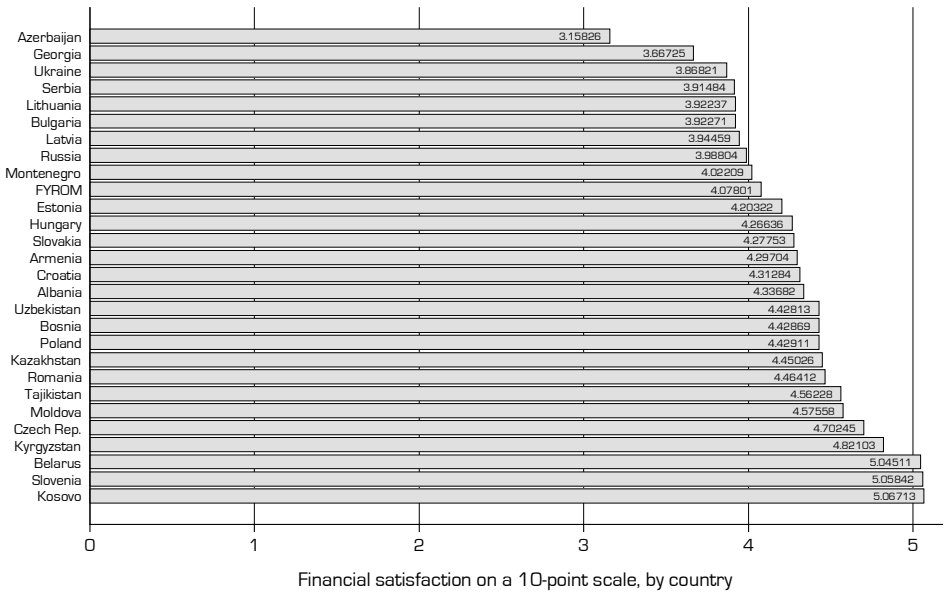
Therefore, this indicator reflects the evaluation of the relative income and economic position of the household, along with satisfaction component.

Figure 3.2. oE: GDP per capita PPP, 2005$ across transition countries.



The differences between countries in satisfaction with financial situation are rather small (Figure 3.3), with many of the post-Soviet countries appearing on the lower-satisfaction end. However, some of the countries report higher satisfaction being less economically developed in the group – like Belarus. Perhaps, this is some evidence of the influence of the political situation and the freedom of speech and expression.

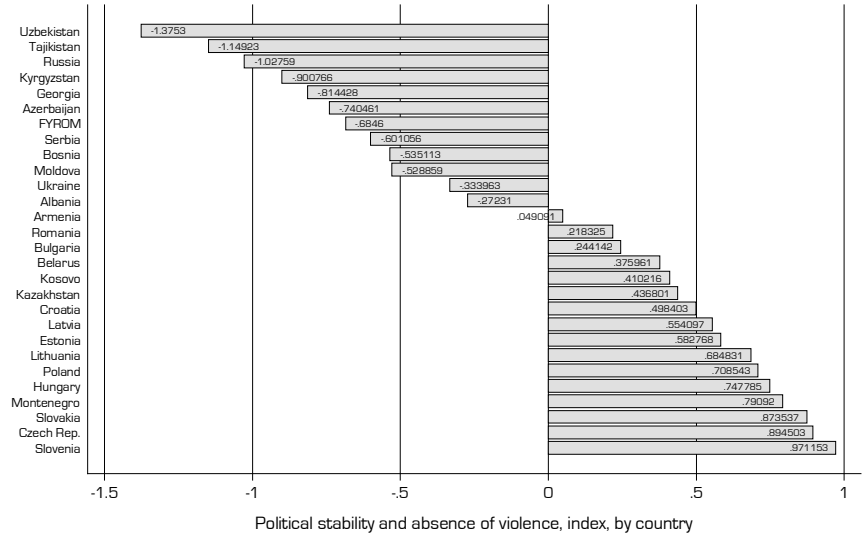
Figure 3.3. sE: Financial satisfaction across transition countries.



Objective political (*oP*) indicator in this chapter is selected among the Worldwide Governance Indicators (WGI) of World Bank – *political stability and absence of violence (PSAV)*. PSAV is an interesting indicator, which doesn't only measure stability per se, but also the risk of violent regime change and demonstrations, hence reflects the regime

legitimacy in each country. WGI's are measured on a scale between -2.5 and 2.5 with higher numbers indicating 'better' performance. In the current dataset the PSAV ranges between -1.4 in Uzbekistan to ~1 in Slovenia, hence the difference is quite significant (Figure 3.4).

Figure 3.4. oP: Political stability and absence of violence (PSAV) across transition countries.



LiTS provides several indicators for subjective political (*sP*) determinants, among which I choose the one most related to regime and political situation: *preference of democracy in each country*. The indicator is reflected through a question: "With which one of the following statements do you agree most?" with possible choices of: 1 – "Democracy is preferable to any other form of political system"; 2 – "Under some circumstances, an authoritarian government may be preferable to a democratic one"; 3 – "For people like me, it does not matter whether a government is democratic or authoritarian". The indicator was dichotomised, where 1 reflects preference of democracy over other political systems. At the macro level this indicator reflects the percentage of people in each society with democracy preferences. The diversity between countries in democracy preference is quite big (Figure 3.5), with 40% range between the lowest (Russia) and highest (Kosovo).

The notions of social capital come into focus, when social indicators are discussed. Social capital could be seen consisting of three main components: networks, trust and norms(Putnam, 1995a; van Deth, 2003). Following the classic work of Putnam, the network component of social capital is often measured through the civic engagement or membership in associations(Putnam, 1995a; Putnam, 1995b), which represent the objective social determinant (*oS*). Another – subjective – side of social capital can be expressed by either trust or norms. Norms in this context are the norms of reciprocity, the measure of which is hard to find, moreover, trust is the most important and significant component of social trust. According to Putnam: "the more we connect with other people, the more we trust them"(Putnam, 1995b: 665). Hence, *trust* is taken as a subjective social (*sS*) indicator.

Both of the social indicators were taken from LiTS and aggregated to the country-year level. Membership in association is extracted from the battery of questions about membership in diverse organisations. It is then dichotomised into 1 – member of any association, 0 – not a member of any. The aggregated indicator reflects the share of people in each country, who are members in any of the associations (civic, voluntary club or organisation). The measure has a degree of subjectivity in it, as any self-reported data, but this is the closest indicator to measuring the component of connectedness of the social capital. The diversity here is quite

striking (Figure 3.6): people participate in clubs or associations very differently across the transition countries. On the lower end of participation is Uzbekistan with only ~4% of respondents reporting participating in any association; on the most active end is Slovenia with ~31%. While the range seems to be high, the overall level of participation is still relatively low, with 14% cross-country average.

Figure 3.5. sP: Preference of democracy across transition countries.

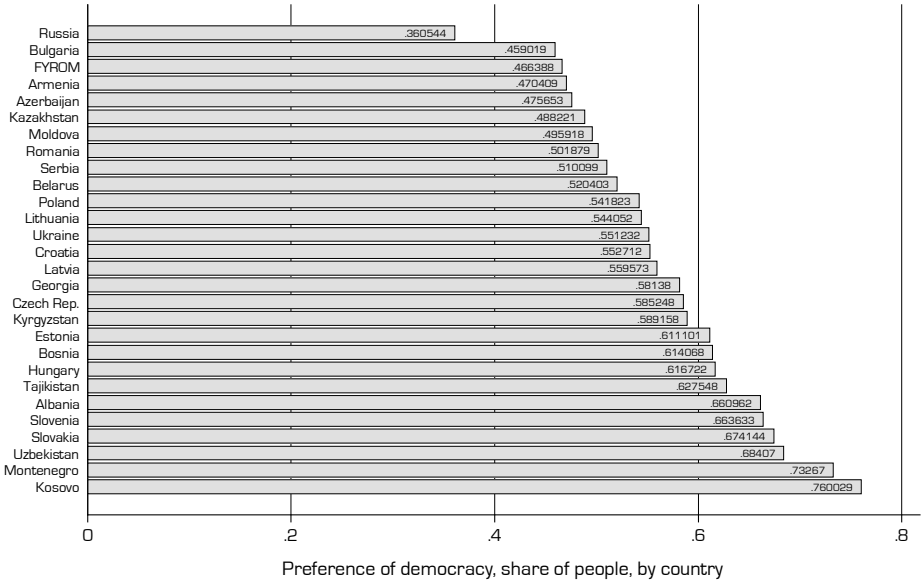
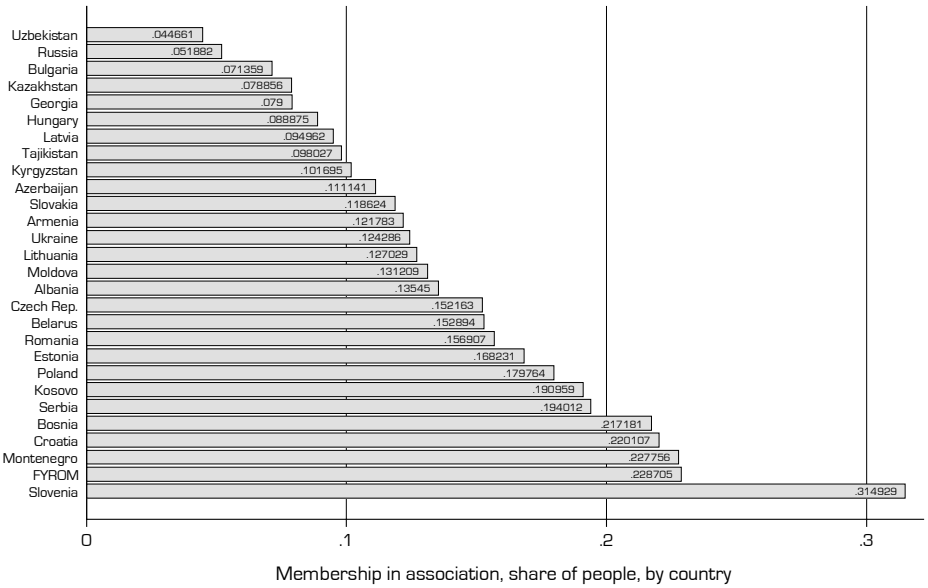


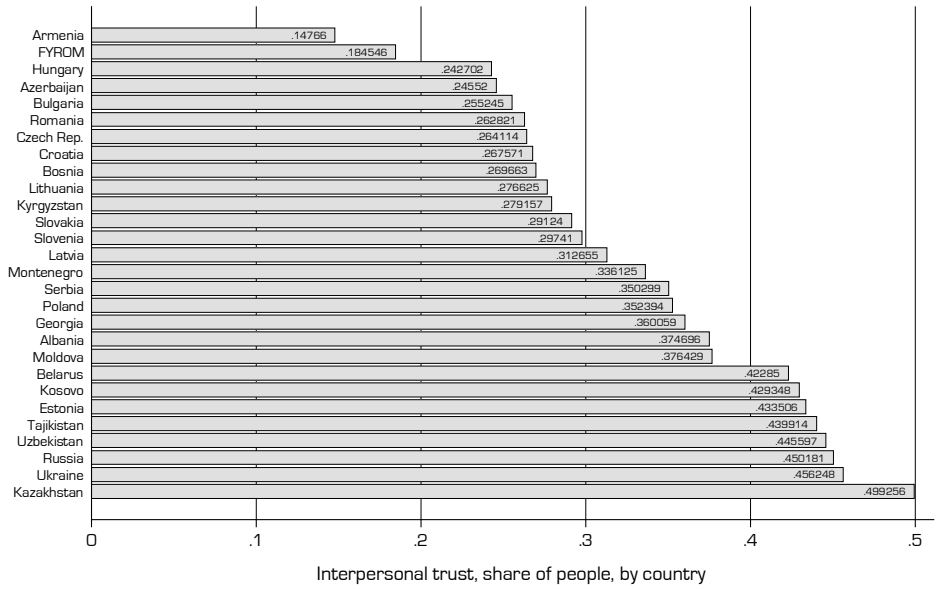
Figure 3.6. oS: Membership in associations across transition countries.



Subjective social determinant is reflected in the indicator of trust (Figure 3.7), which is phrased as "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" and coded from 1 – complete distrust to 5 – complete trust. For use at the macro-level this indicator was dichotomised with 4-5 recoded as 1 – reflecting those respondents who generally trust others. Therefore, the aggregated indicator reflects the share of people, who tend to trust those around them. The country-diversity is quite big here as well: ranging between ~14% and 50% with a mean of 33%. On

average, most countries do not show high levels of trust in people in transition countries, which supports findings from other studies of social trust in modern societies (Delhey and Newton, 2005).

Figure 3.7. sS: Trust across transition countries.



Health care is presented by the *health expenditures as per cent of GDP* as an objective measure (*oHC*), and *satisfaction with health care services* (or people's evaluation of them) – as a subjective (*sHC*). Inadequacy of a single health care measure was discussed in previous Chapter 2, but due to these chapter's limitations, it is the only way to analyse the relations between HC and health outcomes.

Generally, health care has a direct effect on health through prevention and intervention; it is essential for preventing amenable deaths. Subjective health care has a slightly more complex link to health, as it is most probably indirect: the evaluation of health services might influence people's decisions to use them. The exact question posed in LiTS is phrased "How satisfied were you with the quality and the efficiency of the service/interaction?" (in terms of health services received), coded from 1 – very dissatisfied to 5 – very satisfied. Only the people who indeed had some interaction with medical facilities or services within the preceding 12 months were asked this question. The cross-country differences in both oHC and sHC are presented below (Figure 3.8 and Figure 3.9). While there are quite big differences in terms of health expenditures between countries, the cross-country diversity in satisfaction with health services is not so big.

Overall, the levels of satisfaction for most variables are not very high for transition countries; this corresponds with the research on life satisfaction and happiness (Delhey, 2004; Inglehart *et al.*, 2008; Veenhoven, 2001). Even though experiencing certain level of economic, political and social development, the countries of Central and Eastern Europe fall short of being satisfied with it. However, understanding the processes, which go on between development and perception of it, might be a key to understanding these societies and population health there.

Figure 3.8. Objective health care: health expenditures as per cent of GDP.

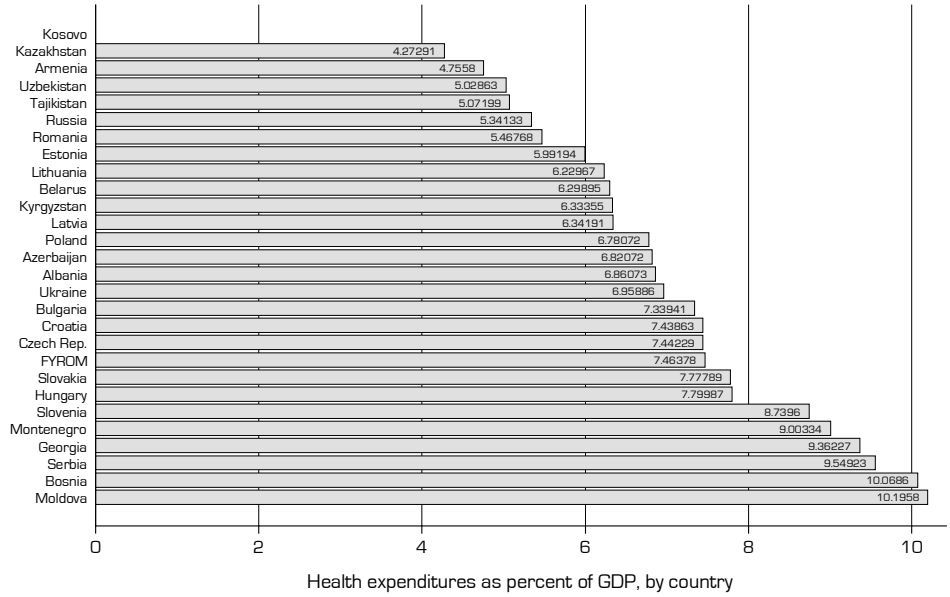
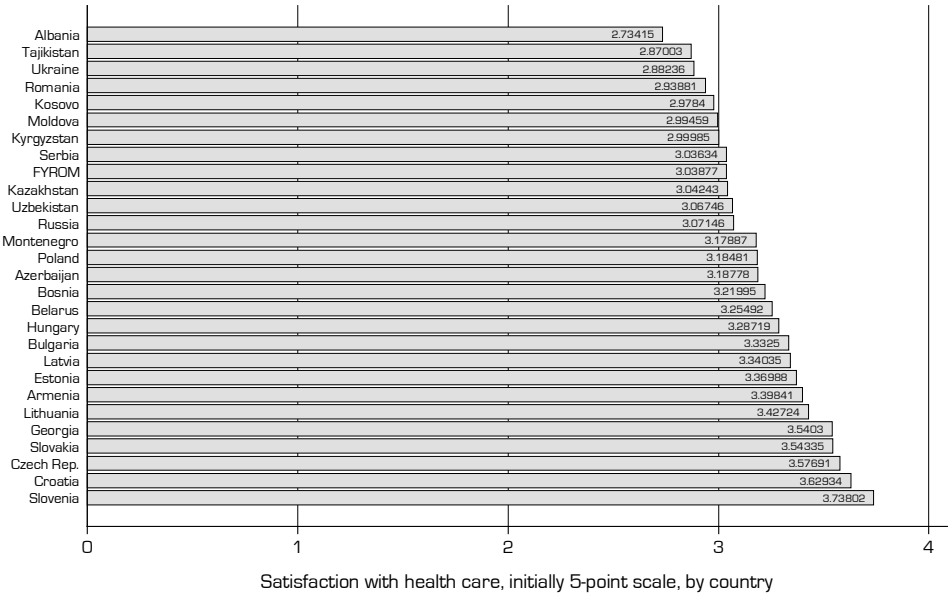


Figure 3.9. Subjective health care: satisfaction with health care services.



3.3 ANALYSIS AND RESULTS

3.3.1 CORRELATIONS

Starting the analysis, one would wonder, whether the relationships between health and its determinants are really less complex, than anticipated, or not present at all. Hence, the simple correlations analysis can already tell a little about the relations between health and some societal characteristics (Table 3.5).

It is important to note that subjective and objective health are very different in their correlations. The variables, which correlate with LEB, don't correlate highly with subjective health. This is one of the evidences of the persisting strong differences between objective

and subjective health. Generally, most of the indicators in the set correlate with LEB, and these correlations are significant. The highest correlations here are between LEB and GDP, PSAV, associational membership. It was expected that objective health would correlate more with the objective indicators, and subjective health – with the subjective. This, however, is not completely true. LEB, for instance, still correlates highly with trust and satisfaction with health care. This latter finding is of particular interest, as it shows, that subjective health care does have some relationship with objective health, and this relation is positive. Interestingly enough, subjective health does correlate primarily with subjective determinants – financial satisfaction and preference of democracy, all the other correlations are small and insignificant.

Table 3.5. Correlations between objective and subjective variables.

	LEB	sHealth	GDP	Inc. sat	PSAV	Pref. dem	MB ass.	Trust	HE GDP
LEB	1								
sHealth	0.33***	1							
GDP	0.62***	0.19	1						
Inc. sat	0.14	0.65***	0.22	1					
PSAV	0.57***	0.15	0.80***	0.28**	1				
Pref. dem	-0.02	0.33**	-0.19	0.27**	-0.01	1			
MB ass.	0.60***	0.41**	0.38***	0.20	0.33**	-0.04	1		
Trust	-0.45***	0.09	-0.15	0.24*	-0.11	0.09	-0.15	1	
HE GDP	0.44***	0.13	0.09	-0.04	0.04	-0.09	0.48***	-0.17	1
HC sat.	0.55***	-0.01	0.61***	0.03	0.54***	-0.04	0.37***	-0.10	0.32**

NOTE: Correlations are performed on merged WHO, WB, and aggregated LiTS data. N=55. * – 10%, ** – 5%, *** – 1%.

The relations within each of the pairs are particularly interesting: none of them are high or significant at the macro-level with the exception of health care, where the correlation is relatively small, but significant. This in itself is an interesting finding, as points towards the relatively weak relations between the subjective and objective at the macro-level – in the same domain. Generally, all subjective indicators have much less correlational links in the table, which is a strange observation, as it assumes certain independence of these indicators – at the macro-level.

All in all, analysing correlations is important, but gives only an overview of where the links could be present or not. Hence, it is necessary to analyse the relations between the objective and the subjective in detail pair by pair.

3.3.2 DETERMINANTS OF HEALTH AT THE MACRO LEVEL

The first group to be analysed is the one most often mentioned as an important determinant of health: ***economic characteristics***, represented by logarithmic GDP and aggregated satisfaction with financial income of household, represented by the 10-step ladder evaluation of household's economic position. Table 3.6 presents the results for LEB and sHealth as dependent variables in four steps, reporting unstandardised (b) and standardised coefficients (ß), standard errors (s.e.), significance levels and some summary statistics: Akaike's information criterion (AIC), Bayesian information criterion (BIC) and R^2.

As can be seen from Table 3.6, models (1)-(3), LEB is influenced by GDP, while subjective health is influenced by only subjective determinant – satisfaction with financial situation. Interaction term also becomes significant in model (4) for LEB, which signifies a slightly more complex relationship between the 'objective' and 'subjective' at the macro level. Therefore, LEB is influenced directly by GDP, as well as GDP interact with the financial

satisfaction in its influence on LEB. Examining standardised coefficients provides a good argument as well: subjective indicator's effect on LEB is meagre, while it is the only indicator of importance for subjective health.

Table 3.6. OLS: economic determinants of objective (LEB) and subjective health

		(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
		LEB				Subjective health			
GDP (ln)	b	**2.86*** **		**2.82*** **	**2.36*** **	0.05		0.03	0.04
	s.e.	0.49		0.49	0.52	0.05		0.04	0.05
	ß	0.63		0.62	0.52	0.12		0.08	0.1
Income satisfaction	b		0.99	0.93	0.93		**0.43*** **	**0.38*** **	**0.38*** **
	s.e.		0.97	0.78	0.75		0.07	0.07	0.07
	ß		0.14	0.13	0.13		0.65	0.63	0.63
Interaction	b				**0.90** **				-0.01
	s.e.				0.41				0.04
	ß				0.25				-0.03
Constant	b	46.4***	67.8***	42.7***	46.8***	2.9***	1.5***	1.4***	1.4***
	s.e.	4.42	4.21	5.37	5.52	0.48	0.3	0.45	0.49
N		54	55	54	54	54	55	54	54
AIC		259.8	290.9	260.4	257.5	19.1	-1.09	-6.43	-4.5
BIC		263.8	294.9	266.3	265.4	23.1	2.92	-0.46	3.45
R-squared		0.4	0.02	0.41	0.46	0.015	0.43	0.41	0.41

NOTE: * p<0.1, ** p<0.05, *** p<0.01.

Overall model fit is also an important factor to look at when comparing models. For LEB, the best fit according to all indicators (AIC, BIC and R^2) is in model (4) – with direct effect of GDP and interaction between the 'objective' and 'subjective', which all together explain 46% of variation of LEB. In models run on subjective health best fit is perhaps in model (2) with only satisfaction with economic situation as independent variable, which on its own explains 43% of subjective health variation. Even though AIC and BIC are smaller for some of the models, the b- and ß-coefficients are extremely small and insignificant, hence, adding them is not essential for those models.

All in all, objective and subjective health are determined differently in the economic domain at the macro level. Subjective health is only determined directly by the subjective economic indicator, while objective health – by a combination of direct objective and indirect interaction effects. All the directions of relations are logical and expected: those countries with higher GDP also report higher LEB levels, and higher income satisfaction is linked to better subjective health.

Next domain to be analysed is the ***political determinants*** of health. Table 3.7 presents the similar results for the OLS run on both LEB and subjective health using the pair of objective-subjective political indicators. Interestingly enough, there are no surprises here: 'objective' influences the 'objective', 'subjective' – the 'subjective'. There are no interactions or mediation effects, the relations are simple and clear: at the macro-level the objective-subjective dimension has a very clear divide – in terms of health and determinants. This is also confirmed by comparing the overall goodness of fit statistics for the models.

The direction of the relations both for LEB and subjective health are positive: the higher levels of political stability and absence of violence are associated with higher LEB, and bigger preference of democracy is related to a more positive health evaluation.

Table 3.7. OLS: political determinants of objective (LEB) and subjective health.

		(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
		LEB				Subjective health			
PSAV	b	**2.55*** **		**2.55*** **	2.59***	0.06		0.06	0.06
	s.e.	0.51		0.51	0.53	0.06		0.05	0.06
	ß	0.57		0.57	0.58	0.15		0.16	0.15
Preference of democracy	b		-0.56	-1.04	-1.44		**0.97****	**0.98****	1.03**
	s.e.		4.4	3.78	4.01		0.38	0.4	0.42
	ß		-0.02	-0.03	-0.04		0.33	0.32	0.34
Interaction	b				-0.13				0.02
	s.e.				0.4				0.04
	ß				-0.04				0.06
Constant	b	72.16***	72.43***	72.73***	72.95***	3.39***	2.86***	2.86***	2.83***
	s.e.	0.38	2.47	2.11	2.23	0.04	0.21	0.22	0.23
N		54	55	54	54	54	55	54	54
AIC		266.2	292	268.1	270	28.5	23.3	24.4	26.2
BIC		270.2	296	274.1	278	32.5	27.3	30.4	34.2
R-squared		0.33	0.00031	0.33	0.33	0.024	0.11	0.13	0.13

NOTE: * p<0.1, ** p<0.05, *** p<0.01.

The analysis of ***social determinants*** provides more diversity of health determinants relations. Both the objective and subjective indicators seem to influence LEB according to a clear "addition" pattern (Table 3.8): both of them are equally significant and have almost equal effect (ß-coefficients). The goodness of fit is also the best for model (3), which is the model testing the addition effect. This is an interesting finding, as provides a clear confirmation of the influence of social capital on health at the macro-level, and moreover – all of the aspects of social capital. This can, however, be only said about objective health, the subjective health is a completely different story. Only the more objective indicator has the effect on health, and the best model fit is in model (1). These results indeed should be treated with a degree of caution, as both the objective and subjective indicators essentially come from the individual-reported data, hence the objective determinant could have a more 'subjective' side to it.

Turning to the coefficients themselves provides quite an interesting dilemma. First, membership in association is positively related to both LEB and subjective health and has quite an impressive coefficient. Taking into account that the independent variable is not in percentages, but scaled between 0 and 1, simple arithmetical calculations are in order. Hence, according to the analysis at the macro level, with just 1% change in membership in association in the population, overall life expectancy in transition countries could potentially increase by around 3 months. At first glance, it doesn't seem like a lot, but then returning to the actual values of membership, which in some countries like Uzbekistan and Russia is only around 4-5%, and in best achievers (excluding Kosovo) – 22%, the difference is dramatic. Hence even bringing the participation level up would increase the net of support for people, and could potentially deal with some mortality issues, boosting LEB at the macro level as well. Coefficients are not so dramatic for subjective health, but are still quite substantial.

Simultaneously, trust provides a surprising finding. The relationship between it and LEB is negative (it is positive for subjective health, but insignificant). It is hard to explain this

finding, and one of the possible explanations could be grounded in the better social and institutional support in the countries higher LEB, hence the effect of trust is channelled through institutional path. However, this is only a hypothesis, and indeed this should be studied more closely in order to understand how trust influences health in other societies and at the individual level.

Table 3.8. OLS: social determinants of objective (LEB) and subjective health

		(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
		LEB				Subjective health			
Membership in ass.	b	**26.08*** **		**23.67*** **	23.92***	**1.66*** **		**1.75*** **	1.75***
	s.e.	4.76		4.35	4.34	0.5		0.5	0.51
	ß	0.6		0.55	0.55	0.41		0.44	0.44
Trust	b		**-15.2*** **	**-12.3*** **	-11.9***		0.28	0.49	0.48
	s.e.		4.17	3.4	3.4		0.43	0.39	0.4
	ß		-0.45	-0.36	-0.35		0.09	0.16	0.15
Interaction	b				0.51				-0.01
	s.e.				0.45				0.05
	ß				0.11				-0.03
Constant	b	68.49***	77.11***	72.88***	72.79***	3.16***	3.30***	2.99***	2.99***
	s.e.	0.76	1.43	1.39	1.39	0.08	0.15	0.16	0.16
N		55	55	55	55	55	55	55	55
AIC		267.4	279.8	**256.9**	257.6	19.2	29.1	19.6	21.5
BIC		271.4	283.8	**263**	265.6	23.2	33.2	25.6	29.6
R-squared		0.36	0.2	**0.49**	0.5	0.17	0.0083	0.2	0.2

NOTE: * p<0.1, ** p<0.05, *** p<0.01.

Health care influences LEB (Table 3.9, p.81) very similarly to the social indicators: there is a very clear addition pattern. Both the objective and subjective health care influence LEB and to a more or less similar degree. The best model fit is in model (3) as well. Both coefficients have the expected signs: both objective and subjective health care influence LEB positively. When it comes to subjective health, the picture is a little different and slightly disappointing: there are no effects observed whatsoever. This could be explained by the distance and irrelevance of health care on subjective health, but one has to keep in mind that these are the effects solely at the macro level, hence do not have much to do with the individual choices and preferences.

3.3.3 SUMMARY

To summarise the numerous analyses, a conceptual figure (Table 3.10) illustrates the discovered links between the objective and subjective determinants for each of the domains, as well as the comparisons between the objective and subjective health.

First of all, objective and subjective health are determined differently by the similar factors. It is not surprising that objective determinants have an effect on objective health, while subjective – on subjective. Hence, when subjective health is used in research at the macro-level, it might be reasonable to pair it with subjective variables as well.

Second, it is also possible to note that the determinants influence health differently in different domains. There are some interesting and complex links between the determinants and life expectancy (interaction and addition), whereas the models for subjective health

remain simple and straightforward. Both objective and subjective determinants play a role for LEB with the exception of political indicators.

Table 3.9. OLS: health care as a determinant of objective (LEB) and subjective health

		(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
		LEB				Subjective health			
Health expenditures	b	**0.86*** **		**0.58** **	0.60**	0.02		0.02	0.02
	s.e.	0.24		0.23	0.23	0.02		0.02	0.02
	ß	0.44		0.3	0.3	0.13		0.12	0.12
HC satisfaction	b		**7.03*** **	**5.78*** **	5.96***		-0.01	0.03	0.03
	s.e.		1.47	1.52	1.51		0.16	0.16	0.16
	ß		0.55	0.45	0.46		-0.01	0.03	0.03
Interaction	b				-0.71				0.01
	s.e.				0.5				0.05
	ß				-0.16				0.02
Constant	b	66.09***	48.91***	48.94***	48.45***	3.22***	3.43***	3.13***	3.13***
	s.e.	1.78	4.88	4.77	4.74	0.16	0.54	0.5	0.51
N		54	55	54	54	54	55	54	54
AIC		275.7	272.4	264.2	264	18.9	29.6	20.9	22.9
BIC		279.7	276.4	270.1	272	22.9	33.6	26.9	30.8
R-squared		0.19	0.3	0.37	0.4	0.018	0.000092	0.019	0.019

NOTE: * p<0.1, ** p<0.05, *** p<0.01.

Table 3.10. Summary of the relations between objective and subjective determinants of health in transition countries at the macro level.

Determinants	Objective health (LEB)	Subjective health
Economic	oE ➔ H oE × sE ➔ H *Direct effect of oE, Interaction*	sE ➔ H *Direct effect of sE*
Political	oP ➔ H *Direct effect of oP*	sP ➔ H *Direct effect of sP*
Social	oS + sS ➔ H *Addition*	oS ➔ H *Direct effect of sS*
Health Care	oHC + sHC ➔ H *Addition*	- *No relation*

3.4 DISCUSSION AND CHAPTER CONCLUSIONS

This chapter concentrated on the macro-level health and its determinants. It was primarily concerned with adding the subjective determinants of health into the equation and analysing the relationships between the different indicators. This was done within four domains separately: economic, political and social determinants, as well as health care.

The findings are manifold. ***First***, subjective indicators indeed have effect on health – both objective and subjective – at the macro-level. ***Second***, it is important to note, that even though the objective and subjective health are correlated, they have a very different determinants structure at the macro-level, and the determinants influence them in different

ways. Some influence only subjective health, some – only objective. Therefore, using the two indicators interchangeably at the macro-level is questionable and should be done with caution. Moreover, I find that objective health is more understandable and explainable at the macro-level, as both objective and subjective determinants influence it. However, subjective health is more prone to have associations with subjective or essentially indicators, aggregated from individual surveys.

Third, relationships between the subjective and objective determinants are present, but are very diverse in various societal spheres, and specific for dimensions of health itself. Therefore, there is no one unique objective – subjective pattern, but rather domain-specific.

Finally, the research of objective and subjective indicators poses a lot of limitations in methodological terms. Theoretically, increasing the set of observations could increase the methodological robustness. This, however, can only be done going beyond the boundaries of the transition region, which will be done in Chapter 5 in a multi-level setting. Furthermore, analysis of the subjective indicators at the macro-level in general poses some questions, such as what does the aggregation of them mean? It was argued in Chapter 1 that the way individuals experience and perceive their lives matters for their health along with the societal and individual conditions people live in. This, however, relates to individuals at the *micro*-level. What happens with those perceptions at the macro-level? When the macro-level is analysed, the aggregated subjective indicators become rather a *characteristic* of a society, or perhaps a *climate* within a society, rather than a proxy for individuals' perceptions. Hence, when making conclusions about the relations between the objective and the subjective at the macro-level, we are probably talking about *characteristics* and *climate* in which these characteristics are developing. Similarly, macro-level health in itself presents the "health environment", gives an estimate of probable health of individuals and provides an overall average. It does not, however, account for the diversity within countries, or account for individual health. While it is interesting to understand the intricacies of macro-level relations, life and health are still experienced by individuals, situated in households, cities and countries, which calls for a multi-level approach, focusing on individual health. This will be done in the next Chapters.

CHAPTER 4

DETERMINANTS OF SUBJECTIVE HEALTH IN TRANSITION COUNTRIES: A MULTI-LEVEL APPROACH

ABSTRACT

Two main analytical approaches characterize existing research on health and its determinants. One is based on the definition of health as a personal commodity and tries to establish the psycho-social subjective influences on health often relying on micro-level data. The other views health as a public commodity tending to analyse objective societal characteristics and health care interventions with a macro-level perspective. Rarely do these approaches meet. To fill this gap, the current study incorporates these different approaches in a multi-level setting in Central and Eastern Europe (CEE). The analysis concentrates on subjective health and objective social, political, and economic determinants at the societal and individual-levels. The dataset used is the Life in Transition Survey (LiTS), conducted by the European Bank for Reconstruction and Development (EBRD) and the World Bank (WB) in 2006 and 2010. These are pooled cross-sectional data on 58,357 individuals in 27 CEE states with a range of demographic measurements in addition to subjective and objective health indicators. They are accompanied by macro-level data provided by the WB and Transparency International. My findings demonstrate that individual-level variables explain subjective health, with subjective indicators influencing health more than objective ones. The contextual factors, however, also have their effects on health, once time is accounted for. In general, the differences between 2006 and 2010 are significant, and point in the direction of a pre- and post-financial crisis 2008 effects. This chapter contributes to collective knowledge on the determinants of health by fusing objective and subjective determinants in a hierarchical setting. The findings of prevalence of subjective indicators and contextual factors depending on the time changes are important, but the question still remains, whether they can be transferred to a different sample of countries as well.

4.1 INTRODUCTION

The previous two chapters concentrated on health in transition countries at the macro-level. The main goal was to analyse health and its peculiar determinants within the CEE region at the country level. Chapter 4 moves further in-depth to multi-level analysis and, specifically, individual health. While the contextual effects are important, it is increasingly useful to understand whether they are interconnected with individual health and its determinants. This Chapter presents the third study, which is carried out on subjective health in transition countries.

4.1.1 THEORETICAL AND EMPIRICAL FRAMEWORK OF THIS CHAPTER

As shown earlier, the analysis of the determinants of health exists in abundance. Two main approaches concentrate on either *objective public health*, which is often measured at the macro-level with contextual determinants accounted for (Berger and Messer, 2002; e.g. Cremieux, Ouellette, and Pilon, 1999); or *subjective individual health*, which primarily relies on subjective measures of health and its determinants (e.g. Bobak *et al.*, 2000; Habibov and Afandi, 2011). Therefore, there are two main aspects to studying and understanding health: the objective-subjective dimension, and the individual-public level dilemma.

For conducting the econometric analysis in each study, Chapter 1 develops a clear and detailed theoretical and empirical framework by introducing the ***augmented health production function***, which unites the two main streams in determinants of health literature: objective and subjective, as well as leaving space for using it in a single- or multi-level setting. Chapters 2 and 3 then concentrate on objective and subjective health exclusively at the macro-level. Chapter 4 addresses individual-level health and analyses its determinants – both objective and subjective - at *two levels*.

One of the biggest 'level-related' discussions exists currently around Wilkinson's (1996; 1997) statement that relative social inequality influences health and health disparities. Gravelle (1998; 1999) counters Wilkinson's hypothesis by arguing that the effect is ecological and simply a statistical artefact, and that individual-level characteristics are the most significant determinants of individual health. Jen, Jones and Johnston (2009a; 2009b)[18] bring this discussion further by analysing the particular links between inequality and health in a multi-level setting finding that when individual factors are controlled for society-characteristics become insignificant, favouring Gravelle's finding. This brings a whole new light to the analysis of health and health determinants. To extend these findings, other indicators besides inequality should be analysed in a multilevel setting with a goal of establishing the relationships between the individual- and macro-level. Moreover, while Jen, Jones and Johnston analyse both individual- and country-level determinants, they primarily use economic indicators. Perhaps if one takes into account a fully specified model of determinants – using subjective and objective, economic, social and political indicators – within a multi-level setting, one would find that some contextual effects do have an association with health.

This is attempted in the current chapter with the usage of the ***augmented health production function***, which expresses health as a function of *demographics* – age, gender, education, marital status; *objective and subjective economic, political and social characteristics* – both at the individual- and country-levels; *health care* – functioning and evaluation; and finally *lifestyles and health behaviours*. Whenever possible, these

[18] These studies use subjective health as a proxy for health, hence is in line with this analysis.

determinants are taken at both of the levels – the micro and macro, as described in the following sections.

4.1.2 GOALS OF THIS STUDY

The main goal of this study is to bridge the different approaches to health production in order to determine what influences health in transition countries. First, I incorporate objective and subjective approaches. I aim to analyse what tends to influence subjective health status. Second, a multi-level approach in this study furthers the debate over contextual effects on individual health, and this positions the current study in the broader range of literature (e.g. Bobak *et al.*, 2000; Elola, Daponte, and Navarro, 1995; Joumard *et al.*, 2008) on the differences in health production at different levels. The question of interest is then: "Do contextual factors influence the individual-level health, and if so, which and how?" To answer this, the current study aims at analysing the most comprehensive range of factors potentially influencing health.

4.1.3 OUTLINE

The chapter proceeds as follows. The first section introduces the main dataset used, explaining the dependent, independent and control variables. Then the methods used for the analysis are outlined. Results follow, which are finally synthesised in the discussion and conclusions.

4.2 DATA

All analysis is carried out on the *Life in Transition Survey (LiTS)* dataset. It is a two-round cross-sectional survey, conducted primarily in the former Communist and Soviet countries, and investigates the socio-political, economic and attitudinal changes throughout the transition years. LiTS I and II were carried out in years 2006 and 2010 respectively by the co-operation of the European Bank of Reconstruction and Development (EBRD) and World Bank (WB). I limit the sample to *28 transition countries*[19]: the countries of Central and Eastern Europe (CEE), South-East Europe and post-Soviet Central Asian states. A total of 58,358 individuals (27,002 in LiTS I, 31,356 in LiTS II) are present in the pooled dataset. The sample was randomly selected by EBRD and is representative in each particular society; data was obtained through face-to-face or telephone interviews. More information on the survey can be found in the Life in Transition reports (2007; 2011).

The individual-level dataset was complimented with several macro-level datasets. First, health care-related variables were merged from the *World Health Organisation Health for All Database (HfAD),* which provides different health-related data since 1960 (in this analysis only the years in question are of interest). Second, the *World Development Indicators (WDI)* of the World Bank (WB), which report economic, developmental and societal data for most countries worldwide are merged into the dataset for the appropriate years. As political data at the macro-level tends to attract a lot of discussion in terms of usability and reliability, I started off comparing different measures, including *World Governance Indicators* (WB, 2012c), *Corruption Perceptions Index* (TI, 2012), *Polity IV Index*

[19] This includes all available post-Communist and post-Soviet countries. Turkmenistan is not present in either LiTS I or LiTS II. Kosovo only appears in LiTS II. Several West-European countries (France, Germany, United Kingdom, Italy, Sweden) are added to the sample in round two. They along with Turkey and Mongolia are, however, not used in the analysis at this stage, as a) I am primarily interested in transition countries in the first part of this analysis; and b) West European states are present only in one round (hence, including them would result in losing the information from LiTS I).

(Center for Systemic Peace, 2010b), and *Major Episodes of Violence* (Center for Systemic Peace, 2010a). *Transparency International Corruption Perception Index (TI CPI)* was chosen as the main proxy for political context in the transition societies, as the Communist legacy of informal practices, lack of transparency, and fight with corruption has often determined the success of political and economic changes in a given society (Ledeneva, 2009; Thompson and Witter, 2000).

All macro-level indicators are added to the LiTS dataset with a *one year lag* (i.e. data from 2005 and 2009 for LiTS I and II respectively). This is done as the macro-level indicators are assumed to require some time to have any effect on people's lives (not to mention perceptions).

4.2.1 DEPENDENT VARIABLE

The main dependent variable in the current analysis is "subjective health" – the only health-assessing variable in LiTS I-II. It is expressed through the simple question of "How would you assess your health?" and is measured on a 5-point scale with 1 – "Very good" and 5 – "Very bad". For ease of interpretation, however, the scale of the variable is reversed into 1 – "Very bad" to 5 – "Very good". There is a wide discussion in regards to how a Likert-scale variable should be treated in analysis so that the estimates and standard errors are not biased (Dolan, 1994; Olsson, 1979). General consensus, however, is that when the variable is measured on at least a 5-point scale and has a fairly symmetric distribution, the bias produced by treating it as continuous is only small. Hence, as subjective health in LiTS is measured on a 5-point scale and its distribution is relatively normal (Figure 4.1), the dependent variable serves as a satisfactory measurement in this study.

The descriptive statistics first give a picture of what subjective health in transition countries is. Interestingly enough, average subjective health in the majority of countries has increased between 2006 and 2010 (Figure 4.2) and the differences are significant for all countries at (ANOVA model: F_{year} (1, 58,187)=520.87, p<0.001; $F_{country}$ (27, 58,187)=185.9, p<0.001; $F_{year*country}$ (26, 58,187)=9.00, p<0.001): either people became more positive about their health or health itself had been improving in the recent years.

One way to try to better understand the patterns of subjective health over time is to reflect on the general positivity of individuals and their happiness and satisfaction, which potentially influence their responses to any evaluative questions (e.g. Heine *et al.*, 1999; Schimmack *et al.*, 2002; Schimmack and Diener, 2003). Therefore, life satisfaction should be included as a possible control for subjective health in the models.

Gender differences in health are very often significant. Figure 4.3 presents gender differences in subjective health by country. Opposite to objective health at the macro-level (e.g. life expectancy at birth (LEB) is higher for females – see Figure 1.5, p.39), male respondents tend to evaluate their health better and this gender difference is significant (ANOVA test: F_{male} (1, 58,146)=535.02, p<0.0001; $F_{country}$ (27, 58,146)=176.67, p<0.0001; $F_{male*country}$ (27, 58,146)=3.09, p<0.001). This could be explained through a more confident evaluative judgement of males, rather than objective health differences per se.

Age is another significant determinant of health. Therefore, I expect that health differs by age and age groups. Figure 4.4 summarises the subjective health by age groups in LiTS I and II, and shows that age group differences are significant across years (ANOVA test: F_{male} (1, 58,129)=598.88, p<0.0001; $F_{age\ group}$ (5, 58,129)=3512.67, p<0.0001; $F_{male*age\ group}$ (5, 58,129)=5.75, p<0.001). There is no surprise that with age health deteriorates and this is reflected in subjective evaluations.

Figure 4.1. Histogram for subjective health, LiTS I and II pooled.

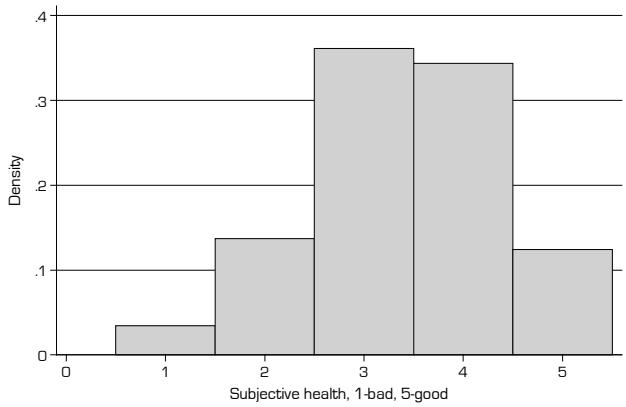
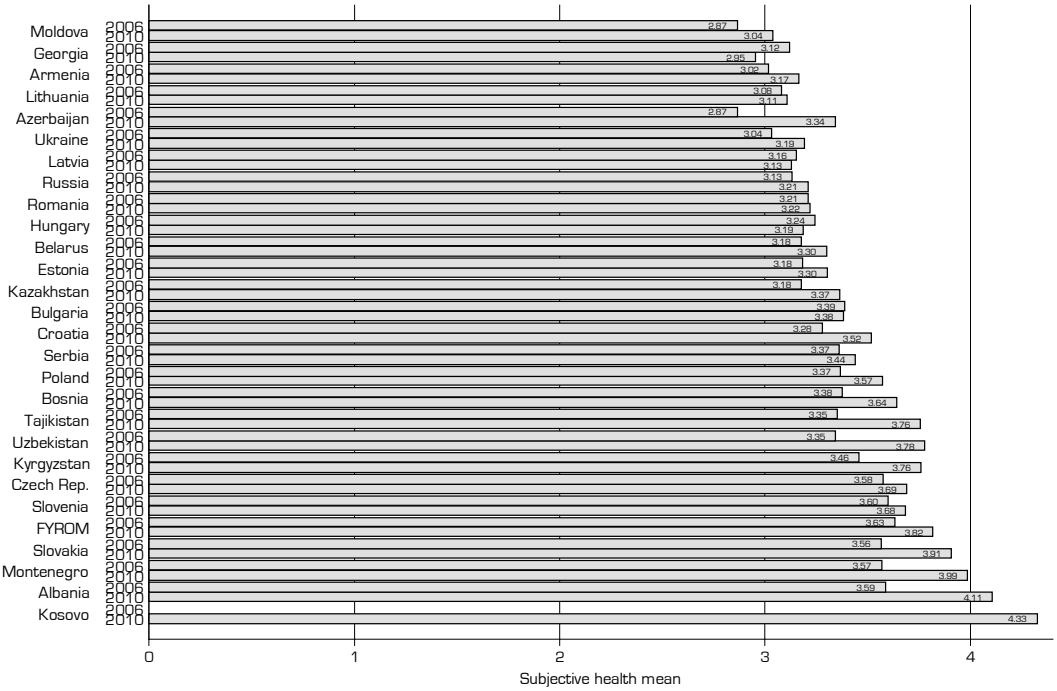


Figure 4.2. Average subjective health in transition countries by country and year, LiTS I-II.



4.2.2 INDEPENDENT VARIABLES

According to the theoretical framework, the determinants can be divided into three main groups: *demographics*, *social*, *economic* and *political* determinants, and *health care*[20]. Whenever possible I attempt to select the variables from each *group*, preferably from each *level*, and among both *objective* and *subjective* indicators. All the main independent variables are described below one-by-one, sorted by their respective groups. All summary statistics are available in Table 4.1. The full determinants' structure is presented in Table 4.2.

[20] Due to practical data limitations, it is unfortunately impossible to incorporate lifestyle variables in the current study.

Figure 4.3. Average subjective health in transition countries by country and gender, LiTS I-II.

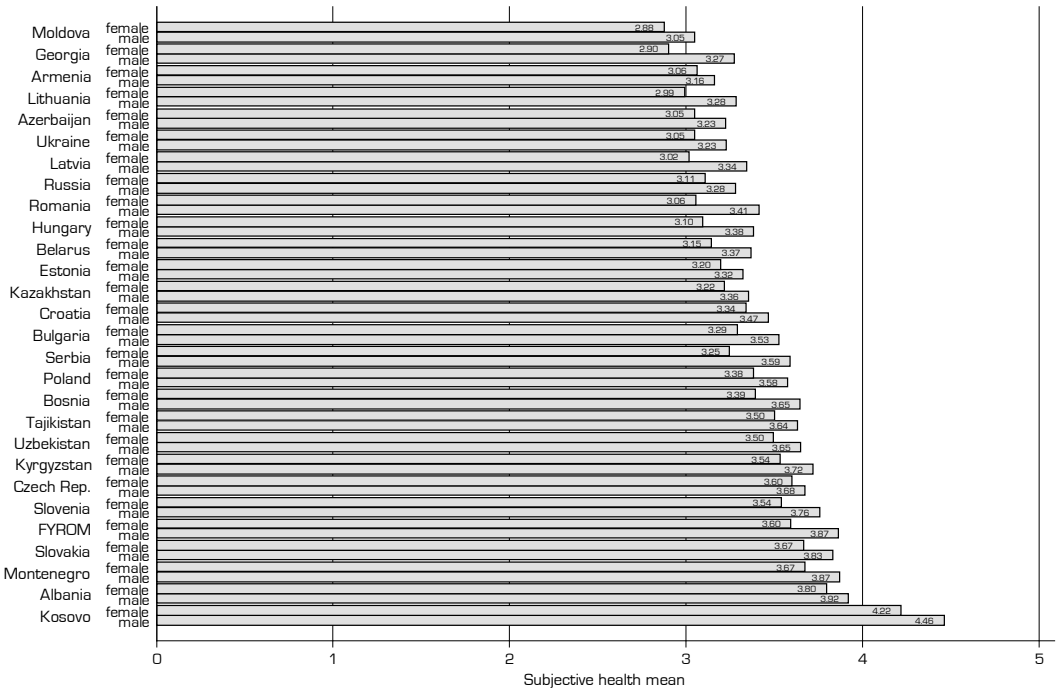
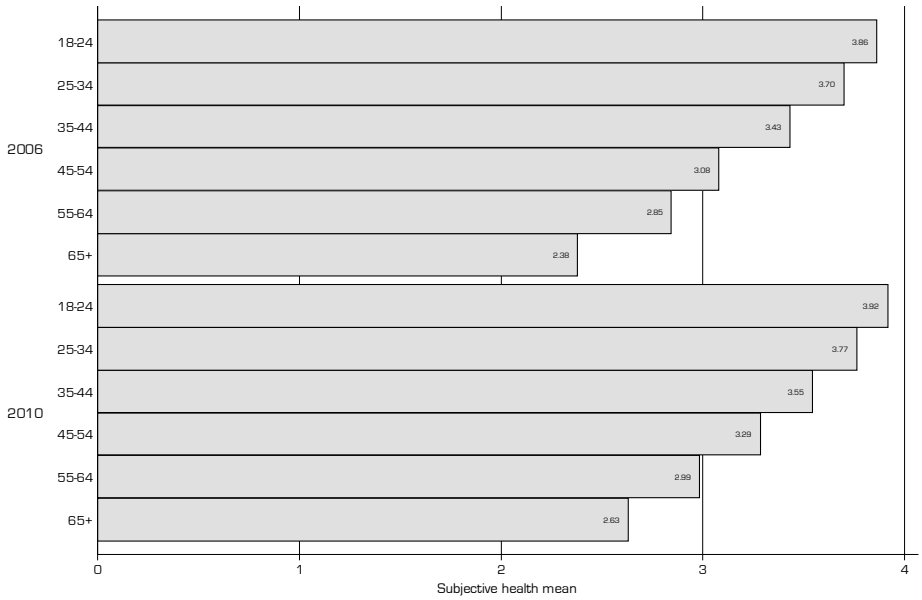


Figure 4.4. Average subjective health pooled across all transition countries, presented by age groups and years, LiTS I-II.



Demographic variables

The main demographic variables include gender (1=male), *age* (in years), and *education*. *Education* is expressed through the highest degree reported by individuals, which is the only indicator fully available in the dataset. *Life satisfaction* is also included in the analysis, so that positive subjective outlooks and overall satisfaction levels of individuals are controlled for.

Table 4.1. Summary statistics of all variables used from LiTS

Variable	Observations	Mean	Std. Dev.	Min	Max
DV: Subjective health	58187	3.39	0.98	1.00	5.00
Gender	58316	0.40	0.49	0.00	1.00
Age	58352	0.00	17.65	-44.18	52.82
Degree	58341	0.00	1.19	-2.36	2.64
Work	58357	0.48	0.50	0.00	1.00
Internet access	58333	0.29	0.45	0.00	1.00
Income evaluation	57471	0.00	1.71	-3.32	5.68
Political activity	56349	0.18	0.38	0.00	1.00
Preference of democracy	54013	0.55	0.50	0.00	1.00
Member of association	58080	0.14	0.35	0.00	1.00
Trust	55653	0.00	1.14	-1.82	2.18
HC usage	58027	0.62	0.49	0.00	1.00
Informal payments in HC	56807	0.00	1.39	-1.33	2.67
Life satisfaction	57202	0.00	1.11	-2.10	1.90
lnGDP	57266	9.02	0.73	7.31	10.12
CPI	57266	3.46	1.25	1.70	6.60
Membership in associations (soc.)	58358	0.14	0.08	0.02	0.36
Trust in society	58357	0.33	0.10	0.08	0.56
ALOS	54610	9.51	2.17	5.70	15.05
Year dummy (2010)	58357	0.54	0.5	0	1
CEE liberalised	50648[21]	0.08	0.27	0	1
CEE hybrid states	50648	0.33	0.47	0	1
Ambivalent systems	50648	0.2	0.4	0	1
Restricted quasi-Semashko	50648	0.22	0.41	0	1
Loosely regulated	50648	0.08	0.27	0	1
Regionally diverse	50648	0.05	0.22	0	1
Semashko-type	50648	0.04	0.2	0	1

Economic determinants

LiTS provides several options for objective economic determinants' proxies, including living conditions (access to facilities, type of dwelling, etc.), possessions (mobile phones, computer, internet access, etc.), work and profession, evaluation of income on a 10-step income ladder, satisfaction with economic situation. I select two proxies for objective economic determinants, which reflect the individual living conditions and circumstances of individuals: *work* and *internet access of the household*. The first proxy is phrased as follows: "Did you work for income during the past 12 months?" with binary responses (recoded into 1 – yes, 0 – no). This question unites unemployed, students and retirees in one group, but the meaning of "being economically involved and earning stable income" is more important (and essential to capture) than the exact employment status of individuals. Internet access is measured through a straightforward yes-no question of "Does anyone in your household have access to internet at home?" Internet access might reflect the status of the household from the economic side, as well as the point of view of communications and modern

[21] Not all of the 28 countries present in the LiTS datasets are included in classification (due to qualitative data problems). Kosovo, Serbia, Bosnia and Herzegovina, Montenegro were not included in the classification, while Turkmenistan is not present in LiTS.

technologies as it is evident that having access to internet at home also requires a computer (or other device).

Table 4.2. Variables and indicators used for the analysis with LiTS I-II.

		Demographic	Economic	Political	Social	HC
Objective	1 level	Gender Age Education	Work Internet access	Political activity	Membership in associations	HC services usage
	2 level	-	lnGDP (WB)	CPI (TI)	Membership in associations in the society in percent (aggregated from LiTS)	ALOS (WHO) *HC groupings*[22]
Subjective	1 level	Satisfaction with life	Economic position evaluation on 10-step ladder	Preference of democracy	Interpersonal trust	Informal payments into HC
	2 level	-	-	-	Trust in the society (aggregated from LiTS)	-

As a subjective economic proxy the *self-assessment of household's economic position in the society* is selected, which is phrased as "Please imagine a ten-step ladder where on the bottom, the first step, stand the poorest people and on the highest step, the tenth, stand the richest. On which step of the ten is your household today?" This indicator reflects the subjective self-evaluated relative income, hence is a suitable indicator for testing the effect of perceived income on health.

Generally, people who are better off economically and who are working and earn sufficient funds for a comfortable life, tend to have better health (Deaton, 2006; Jen, Jones, and Johnston, 2009b; Wilson, Jerrett, and Eyles, 2001). Work and health can also capture a more subtle psychologically-enhanced link: those people who are unemployed tend to be more depressed, which reduces mental and physical health. Similar relationships are assumed between subjective economic determinants and subjective health.

Political determinants

Political indicators are deemed positively influential for health, thought the links might not be necessarily direct. While I can't control for the complex indirect links in this analysis, I simply control for political determinants. As was discussed in Chapter 1, there are several main pathways of political influence on health: through social capital of political participation (Blakely, Kennedy, and Kawachi, 2001; Kawachi and Kennedy, 1997; Kawachi, 1999; Szreter and Woolcock, 2004; Veenstra, 2000; Veenstra and Lomas, 1999), institutions (Kawachi, Kennedy, and Glass, 1999) and psycho-social circumstances (Wilkinson, 1996; 1997; 1999).

There are not many objective political measures in LiTS, but it was possible to use a set of indicators related to the notion of "*political activity*", in line with 'political participation',

[22] Health care groupings are used in a separate model, as the number of macro-level independent variables has to be limited to a maximum of 5-6, as I have 28 units at the highest level. The groups are based on the classification of health care systems in Central and Eastern Europe, developed in Chapter 2.

which captures how active people are in political life. The original question was asked as "How likely are you to…" with four parts of it: "Attend lawful demonstrations"; "Participate in strikes"; "Join a political party"; "Sign petitions". The choices of answers were 1 – "have done", 2 – "might do", 3 – "would never do". The indicator was constructed by combining the four parts of political actions into one dummy (1-0) where 1 measures those who have done any political activity (demonstration, strike, political party or petition). While this unites four qualitatively different political actions, the interest and engagement in political life in general is the targeted measure for this analysis.

The subjective political determinant *preference of democracy*, was asked as: "With which one of the following statements do you agree most?" with choices; 1 – "Democracy is preferable to any other form of political system"; 2 – "Under some circumstances, an authoritarian government may be preferable to a democratic one"; 3 – "For people like me, it does not matter whether a government is democratic or authoritarian". The variable was transformed into a binary (1-0) indicator of those who prefer democracy to any other political system (option 1).

Social determinants

The selection of social indicators is grounded in the literature on effects of social capital and cohesion on health, which is numerous (e.g. Berkman, 2009; Bolin *et al.*, 2003; Braveman and Tarimo, 2002; Carlson and Chamberlain, 2003). Social capital has been shown to influence health through support networks (e.g. Kawachi and Kennedy, 1997; Kawachi, Kennedy, and Glass, 1999; Keating, 2000), relative inequality (Wilkinson, 1996; 1999) and unequal access to resources (e.g. Lynch and Muntaner, 1999; Smith, 1996).

For the purpose of this analysis I select two often used indicators of social capital: membership in associations and trust. *Membership in associations* is an objective proxy, and is a compound variable created from diverging question in LITS I and II. In LiTS I two questions were asked "Are you a member of a) a political party and b) other civic/voluntary organisation (club, association)?" Party membership is not included in this analysis, hence only membership in associations is taken into account. This is done to clearly separate the social and political associations. In LiTS II the question was asked separately about different types of associations, e.g. labour union, church, sport, professional association and so on, with a diverse degree of membership: active, passive and none. This battery of questions was transformed into a binary variable reflecting active membership in any of the associations.

Trust is present in both LiTS I and II in the same form, phrased as "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" on a scale from 1 – complete distrust to 5 – complete trust. By analysing the social capital indicators, objective with *participation* and subjective with *trust*, this analysis aims to contribute to the field of literature on the effects of social-related indicators on health which argues that those individuals who have higher social capital, tend to be healthier – first because they potentially can get more help, and second, because they tend to be less stressed and more satisfied with their lives (e.g.Berkman, 2009; Carlson and Chamberlain, 2003; Gupta and Kumar, 2007; Habibov and Afandi, 2011).

Health care

The usage of health services can also influence health. On the one hand, preventive visits to doctors tend to associate positively with health. On the other hand, however, the visits to the doctor when people are sick tend to have negative association with health, as the more often those visits are necessary, the worse is health being treated. The indicator used in this

study featured in LiTS is phrased "During the past 12 months have you personally received medical treatment in the public health system[23]?", hence while it uses the phrasing "treatment" it specifically makes reference to "using health care system when sick", as preventive visits rarely involve medical treatment. Therefore, I expect that this indicator would have a negative relationship with the assessment of health. The indicator is a binary variable.

To account for subjective evaluation of a health care system, an indicator reflecting the necessity to pay informal payments within health care is used. Arguably, the more often it is necessary to pay informally, the worse is the general functioning of the public medical system evaluated. The question was phrased "In your opinion, how often is it necessary for people like you to have to make unofficial payments / gifts in these situations? – Receive medical treatment in the public health system" with coding ranging from 1 – never to 5 – always. The relationship with health is expected to be negative.

Macro-level data

Contextual variables are particularly important for this analysis. First and foremost, *per capita GDP* at purchasing power parity (PPP) in 2005 constant US dollars from the World Bank is considered. This is the indicator, which is considered one of the main determinants of public health at the macro level, and it is transformed into a natural logarithm based on its demonstrated relationship elsewhere (e.g. Deaton, 2006; Kenny, 2009). The next contextual effects are political, for which I use the *proxy for corruption* in transition societies: Corruption Perceptions Index from Transparency International (CPI TI), which is measured on a scale from 0 to 10, where 0 indicates that the country is perceived as highly corrupt, and 10 – as most clean. Therefore, the scale is reversed, and I expect a positive relation to health – in the least corrupt societies people should report (and have) better health due to a better functioning of public health care institutions, social security and insurance. As for *social indicators* I include membership in associations and trust at the macro level. The indicators are aggregated from LiTS and both represent the percentage of people in each country, who are members of associations, or have some or complete trust. This is deemed to reflect overall contextual social cohesion in the society (Coburn, 2000; Wilkinson, 1999). Finally, contextual health care is measured as average length of stay (ALOS), a proxy for the functioning of health care: normally the shorter it is, the more efficient the system tends to be, and this also reflects the seriousness of diseases treated in hospitals.

Another health care indicator tested in this analysis is the classification of health care systems in the Central and Eastern European countries, based on the Health in Transition Reports of WHO and arrived at in Chapter 2 (see also Borisova, 2011). It reflects the overall functioning of health care systems. While the classification is provided for three different time periods, I use only the third period, which covers the years under interest for us, and classifies the transition countries into seven groups. The groups constitute of the most liberalised CEE (Czech Republic and Slovakia), CEE hybrid states (Bulgaria, Croatia, Estonia, Hungary, Latvia, Poland, Romania, Slovenia), ambivalent systems (Albania, Kyrgyzstan, Lithuania, Moldova, Macedonia), restricted quasi-Semashko[24] systems

[23] This question is directed at *public* health care system, excluding the usage of private medical establishments. While this is indeed a weakness, as I potentially would be interested in *any* medical treatment, this is unfortunately the only indicator available in the dataset.

[24] Semashko is very often referred to as a name for the Soviet-type health care system, as it was initially conceptualised and created by Nikolai Semashko in early Communist rule. The main principle of the Semashko system was a collectivistic and planned public provision of inpatient care, fully covered and controlled by the state.

(Azerbaijan, Kazakhstan, Tajikistan, Turkmenistan, Ukraine, Uzbekistan), loosely regulated model (Armenia, Georgia), regionally diverse (Russia) and Semashko-type (Belarus) (ibid.: 338). Due to methodological considerations (e.g. lack of degrees of freedom) I cannot use this classification together with other macro-level indicators; hence, it will be tested in a separate model.

Summary statistics for all variables are presented in Table 4.1.

4.2.3 BI-VARIATE RELATIONS BETWEEN THE MEASURES

To initially investigate the simple relations between the dependent and independent variables, correlations are presented in Table 4.3. The highest correlate with subjective health (-0.504) is age – which is expected, as older people tend to have worse health, as reported in their subjective evaluations. The next highest correlate (0.316) is economic position in the society. Correlation between subjective health and work is also relatively high.

Table 4.3. Correlations between subjective health and all independent variables

Individual-level variables		Macro-level variables	
gender	0.110	ln GDP	0.033
age	-0.504	CPI	0.018
degree	0.178	membership in associations	0.134
work	0.269	Trust in society	0.018
internet access	0.260	ALOS	-0.098
income ladder	0.316		
political activity	0.100		
democracy preference	0.134		
membership	0.060		
trust	0.099		
HC usage	-0.092		
HC informal payments	-0.024		
life satisfaction	0.250		

NOTE: All correlations are significant at 0.001.

4.3 ANALYSIS AND METHODS

4.3.1 GENERAL STRATEGY

To analyse health and determinants of health at both the individual and societal levels simultaneously, multi-level analysis (MLA) [25] is used, which controls for the grouped structure of the dataset, adjusting the errors accordingly. The choice of estimation techniques is restricted to several alternatives, among which maximum likelihood (ML) estimation is the most widely used. In this study I use restricted maximum likelihood (RML or REML) estimation, which despite providing more lengthy and complicated estimation procedures, also produces less biased results compared to the full maximum likelihood (FML) estimation technique (Hox, 2010: 41).

The analysis is performed in a step-wise approach (ibid.: 56-59). First, an *empty model* (which will be identified in the analysis as M0), which does not contain any explanatory

[25] It is also often referred to as "hierarchical linear modelling (HLM)", however the term "MLA" is utilised throughout the paper.

variables at any levels, is estimated. From the empty model the intraclass correlation (ICC) statistic[26], also referred to as "intracluster correlation", which represents the ratio of *total variance* explained at the *group level*, can be calculated.

In the second step the determinants of health at the micro-level within the fixed part of the regression are added. I first run the model with only essential demographic controls (e.g. age, gender, etc. – M1), and then add the other dependent variables (M2). After arriving at a working model at the lowest level, I then add the explanatory variables at the higher level first one by one, and then altogether (M3). Only when consistent estimates are arrived at, the random part of the equation can be specified.

4.3.2 POST-ESTIMATION AND MODELS' COMPARISON STATISTICS

At each step I calculate the summary statistics of *deviance*; *Akaike's Information Criterion (AIC)* (Akaike, 1987); *Schwarz's Bayesian Information Criterion (BIC)* (Schwarz, 1978); and R^2. Smaller *deviance* indicates better fit, and the test of significance of difference in deviance is very often performed for nested models. Non-nested models are compared using *AIC and BIC* statistics. R^2 is a standard statistic used in ordinary regression to evaluate the fit of the model: it reflects what proportion of the variance explained by the fitted model. It is also possible to arrive at R^2 for MLA (linear) models, as suggested by Hox (2010) and extended by Snijders and Bosker (1993; 1994).

4.3.3 VARIABLES TRANSFORMATIONS AND LEVELS

All variables are *grand mean centered* whenever appropriate (binary variables are left in their initial form). Centering in MLA is essential, due to the usage of random effects: the "currency" has to be the same in order to understand the coefficients across groups. Centering the variables around the grand mean enables us to interpret the coefficients and intercepts better (we create a meaningful "zero" for all groups). There are detailed discussions on the differences between using raw scores, grand mean and group mean centered variables (Enders and Tofighi, 2007; e.g. Kreft, de Leeuw, and Aiken, 1995; Paccagnella, 2006), hence it is not discussed in detail here.

There are two main levels in the dataset: individuals and countries. Most of the data are available for different time-periods as separate cross-sectional datasets. Therefore, I first merge the data across all years for the first part of the analysis (Analysis A), and in the second half I use years (rounds or waves) as the second level, and countries – as the third (highest) level (Analysis B). There are a total of 28 countries in LiTS pooled dataset, which is sufficient for the analysis I are intending to carry out. The two time points (2006 and 2008) nested in the countries create a total of 50 year-level units[27].

All calculations are performed using Stata SE 10 (StataCorp, 2007), with utilisation of the *runmlwin* Stata module (Leckie and Charlton, 2011) for the multi-level modelling linked to MLwiN 2.25 programme (Rasbash *et al.*, 2012).

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[26] In education research it is generally accepted, that a multi-level structure is needed when the ICC is equal or higher than 10% (0.10 is a reasonable ICC, 0.20 – average and somewhat high) (Hox, 2010: 244). However, in the large survey research, where the individual respondents are very often clustered in countries, and the samples are considerably larger than the ones of classrooms and schools (thousands as opposed to dozens), a lower ICC is expected, as individuals share less similarity in bigger groups. In country-level analysis therefore, ICC of 0.10 is often considered to be large, hence it is still important to account for the cluster design to produce more accurate standard errors (Groves, 1989; Hox, 2010: 6)

[27] Kosovo was not present in LiTS I; in Belarus and Tajikistan the battery of questions on political activity was not asked in 2006.

4.4 RESULTS

First, analysis A (Table 4.4, p.96) and B (Table 4.5, p.97) demonstrate that the (Intra-Correlation Coefficient) *ICC* is reasonably high for multi-level analysis: the country-level ICC is between 9 and 10 percent. In analysis B the statistic can be disentangled into the parts formed by country- and year-levels. There is a certain degree of interdependence within groups (countries), and subjective health has strong cross-country variation. Therefore, it is important if not essential to take the nested-nature of the dataset into account, and try to model cross-country variation through country-level as well as individual-level variables.

During the analysis adding random slopes did not produce any better fitting models, and some of the models have fitted the data worse. Therefore, the models arrived at in step three are the final. This indicates that even though subjective health is different across countries, as the cross-country variation is rather high, the overall *structure of determinants of health follows similar patterns in all countries.*

The final-step models (A-3.1-2 and B-3) have a reasonably *good fit* (as the difference in deviance is high) and explain some variation in subjective health. A steady increase of R^2 from model 1 can be observed, and in the end the models explain about 60% of variation at the macro-level, and 35% at the micro. In analysis A model 3 is reported with and without controlling for year changes, which do not change the model much. In both series A and B all the changes in deviance from one model to the next are significant.

In analysis B (Table 4.5), model 3, which opposite to analysis A incorporates the second level (years), has the highest R^2 – 0.63, the variation of which is relatively well explained by individual-level variables in step two (B-2). This means that the year change was significant, but much of it happened at the individual-level, rather than country-level. It is important to note that year-level variation also encompasses country-level variation, as years are nested in countries. Both individual and macro-level variables explain the variation at the country-level to a similar degree: compared to M1 R^2_3 (0.15) increases by a similar percentage change in M2 (0.33) and M3 (0.58). Models within analysis B consistently have the smaller AIC and BIC, compared to the equivalent models in analysis A. This again points to the significance of year changes.

Models 4 (Table 4.6, p.98) of analysis A and B include the *health care classification* of the transition countries in an attempt to account for medical system diversity at the contextual level. The deviance changes tremendously from M2 – both in analysis A and B. Moreover, the change is higher than the one present when other contextual level variables are introduced in models 3. The R^2 are equivalent. Comparing the AIC and BIC statistics between all models, models 4 have both statistics lower.

Within the estimators themselves, *age* has a negative effect on self-assessed health as expected; *education* and being *male* are positive effects on subjective assessment of health. Both *economic indicators* at the individual-level influence health in an expected way: they are all positively related, and are significant throughout the models (both objective and subjective economic indicators).

Political determinants meanwhile give diverse findings in the different models. In the A analysis political activity is highly significant and affects health in a positive way. When year-level is added to analysis B, with the exception of model 4 (Table 4.6), political activity of individuals loses its significance. This suggests that firstly, political activity did change between years 2006 and 2010, and secondly, it has perhaps changed inconsistently across countries. Preference of democracy behaves the same in all models: it has a positive relation with subjective health, but the coefficients are small.

Table 4.4. Multi-level regression: Analysis A. DV: subjective health. Pooled data

	A-0 Empty model	A-1 Demogr.	A-2 Level 1 predictors	A-3.1 Multi-level	A-3.2 Multi-level with year-dummy
			Fixed part		
Intercept	3.401***	3.345***	3.283***	3.481***	3.34***
Gender		0.134***	0.103***	0.102***	0.103***
Age		-0.026***	-0.022***	-0.022***	-0.022***
Degree		0.114***	0.061***	0.061***	0.07***
Work			0.147***	0.146***	0.146***
Internet access			0.117***	0.118***	0.059***
Income evaluation			0.068***	0.068***	0.068***
Political activity			0.021**	0.021**	0.021**
Preference of democracy			0.046***	0.048***	0.057***
Member of association			0.011	0.017	-0.007
Trust			0.043***	0.044***	0.034***
HC usage			-0.105***	-0.11***	-0.143***
Informal payments in HC			-0.015***	-0.015***	-0.017***
Life satisfaction			0.099***	0.098***	0.102***
lnGDP				0.0619	0.073
CPI				-0.075	-0.069
Membership in associations (soc.)				1.111	1.089
Trust in society				-0.532	-0.609
ALOS				-0.051**	-0.053**
Year dummy (2010)					0.184***
			Random part		
σ^2 v	0.095	0.077	0.059	0.036	0.036
σ^2 e	0.886	0.641	0.59	0.59	0.583
			Summary and post-estimation statistics		
AIC	158267.1	139285.1	109437	107575.6	107035
BIC	158294	139338.9	109577.2	107759.2	107227.4
Deviance	158261.1	139273.09	109412.8	107539.9	106994.2
Difference in deviance		18988.03	29860.3	1872.9	545.7
R^2_1 (SB)		0.268	0.338	0.362	0.369
R^2_3 (SB)		0.189	0.37	0.62	0.612

NOTE: ** p<.05, *** p<.01. ICC=0.096, Number of observations: 46,452

Social capital produces consistent findings: membership in associations is not significant in any of the models, while trust stays significant throughout. On the one hand this confirms the findings that social capital influences health, but only the subjective social capital (trust) affects subjective health. This might be due to the peculiarities of associations' memberships in transition countries, where the legacy of the Communist regimes left a lot of superficially functioning clubs and organisations, which in reality do not add to individuals' senses of social inclusion and cohesion. *Health care usage* and *evaluation of informal practices* have both the expected signs (negative) and are significant in all models. As expected health care usage is negatively associated with perceived health as it does not refer to preventive medicine. *Life satisfaction* is also a significant control, and the sign is positive as expected.

Table 4.5. Multi-level regression: Models B. DV: subjective health. Waves as levels

	B-0 Empty model	B-1 Demographics	B-2 Level 1 predictors	B-3 Multi-level
		Fixed part		
Intercept	3.394***	3.337***	3.316***	2.869***
Gender		0.134***	0.101***	0.095***
Age		-0.026***	-0.022***	-0.022***
Degree		0.122***	0.07***	0.07***
Work			0.147***	0.154***
Internet access			0.07***	0.073***
Income evaluation			0.067***	0.067***
Political activity			0.019	0.018
Preference of democracy			0.058***	0.061***
Member of association			-0.012	-0.009
Trust			0.032***	0.031***
HC usage			-0.137***	-0.143***
Informal payments in HC			-0.019***	-0.018***
Life satisfaction			0.102***	0.103***
lnGDP				0.108
CPI				-0.067**
Membership in associations (soc.)				1.169***
Trust in society				0.573***
ALOS				-0.07***
		Random part		
σ^2 v	0.077	0.062	0.046	0.038
σ^2 u	0.023	0.023	0.022	0.004
σ^2 e	0.875	0.63	0.581	0.586
		Summary and post-estimation statistics		
AIC	157630.4	138375.8	108797.1	102574.8
BIC	157666.3	138438.6	108946.1	102766.3
Deviance	157622.4	138361.8	108769.3	102536.3
Diff in deviance		19260.62	29592.49	6232.98
R^2_1 (SB)		0.267	0.335	0.356
R^2_2 (SB)		0.386	0.55	0.627
R^2_3 (SB)		0.153	0.327	0.577

NOTE: ** p<.05, *** p<.01. ICCyear=0.024; ICCyear,country=0.103; ICCcountry=0.08. Number of observations: 44,390

The contextual variables are of particular importance, and interestingly enough, the different models produce *diverse and controversial findings*. *First*, in model 3 of series A most of the contextual indicators are not significant. Indeed, in agreement with Gravelle and Jen et al., as soon as I control for the individual circumstances and conditions, the contextual features of society are no longer significant. *Second*, when year is accounted for, I find that all contextual variables are significant, with the exception of GDP. It is an important finding that first, GDP – or economic affluence of the society – is not significant in any of the models; and second – the yearly change does not happen solely at the individual-level as the effects are also significant at the country level. It is interesting that

the only variable that is persistently significant in all models is the health care proxy of the average length of stay (ALOS). The controversial finding that the CPI index has a negative relation with health is surprising, this suggests that the 'cleaner' the institutions are in each country, the worse people tend to evaluate their health. One of the possible explanations in the context of transition countries could be that sometimes the level of corruption, particularly petty corruption and informal practices, tends to reflect the connectedness of individuals in the society, hence is a somewhat unusual "social capital" indicator. This is however, merely speculation and requires further analysis.

Table 4.6. Multi-level regression. DV: subjective health. Health care classification.

	A-4 with health care classifications	**B-4 with health care classifications**
	Fixed part	
Intercept	3.38***	3.458***
Gender	0.097***	0.094***
Age	-0.022***	-0.021***
Degree	0.067***	0.066***
Work	0.147***	0.148***
Internet access	0.067***	0.079***
Income evaluation	0.066***	0.064***
Political activity	0.027**	0.025**
Preference of democracy	0.065***	0.067***
Member of association	-0.005	-0.005
Trust	0.032***	0.03***
HC usage	-0.149***	-0.148***
Informal payments in HC	-0.015***	-0.017***
Life satisfaction	0.106***	0.107***
CEE hybrid states	-0.123	-0.121
Ambivalent systems	-0.09	-0.08
Restricted quasi-Semashko	-0.33**	-0.317**
Loosely regulated	-0.366	-0.37
Regionally diverse	-0.387	-0.38
Semashko-type	-0.636***	-0.546**
Year (2010)	0.173***	
	Random part	
σ2 v	0.035	0.026
σ2 u	-	0.019
σ2 e	0.568	0.565
	Summary and post-estimation statistics	
AIC	93770.6	93676
BIC	93968.9	93874.4
Deviance	93724.57	93630.018
Diff in deviance (M2-M4)	15688.24	15139.28
R^2_1 (SB)	0.385	0.374
R^2_2 (SB)	-	0.543
R^2_3 (SB)	0.627	0.544

NOTE: ** p<.05, *** p<.01. Number of observations: 41,157

Finally, the results from models 4 (both A and B) show that firstly, most of the relations at the individual-level are similar as those in models 3, and secondly, even though models 4 produce better fits for than models 3, the groupings are not generally significant. Only two groups which both capture the Semashko-type systems are significant in models 4. This might signify that context does matter, but not in all countries. Therefore, the way contextual factors influence individual health could be different for different countries of the transition region.

4.5 DISCUSSION AND CHAPTER CONCLUSIONS

This study has comprehensively investigated factors which impact *subjective health* in *Central and Eastern Europe*. The determinants of health are often analysed separately as either objective or subjective. This analysis brings them together, and additionally enters the debate over the influence of contextual variables on individual health by utilizing multi-level modelling. Finally, this study incorporates a variety of determinants which have previously been used sporadically in different studies, and puts them together within one empirical framework.

While the goals were manifold, these analyses inevitably met certain limitations. There were measures deemed to be important for health such as *lifestyles* and *income inequality*, at the centre of Wilkinson-Gravelle-Jen and colleagues discussion, which were not available due to data restrictions. Besides that the analysis only looks at subjective health, and it would be interesting to replicate similar studies for the more objective measure of health, as there are studies that argue that these two measures are different (e.g. Jylha *et al.*, 1998; Krause and Jay, 1994; Mathers, 2003; Murray *et al.*, 2003), hence, should be differently determined. Finally, the results are limited to a particular area in the world – transition countries of CEE. This is arguably a very different social reality from that investigated by Gravelle and Jen et al. when they looked at the world at large.

Despite these limitations, there are many useful findings in this study. *First*, I find that objective and subjective determinants at the individual-level influence subjective health differently. While the economic determinants have a significant impact on health, only subjective social and political indicators tend to influence health in transition countries. This suggests a stronger psycho-social link to subjective health, at least where the political and social are concerned. Perhaps because of the Communist legacy and rapid changes in the past twenty or so years, political and social actions are less important in transition countries than how people feel about political and social conditions where they live. Despite the fact that the main dependent variable was subjective, the analysis in this chapter shows it is still highly linked to health care – both objective and subjective.

Second, the results of this study indicate the presence of a very strong year-dependency pattern in the transition countries between 2006 and 2010. Health changes over the years, but so do other determinants. Evidently, things happened between 2006 and 2010 that influence such a strong time-dependent change. The financial crisis of 2008 could have shaken the individual perceptions and evaluations. Further research is needed to investigate the effects of the 2008 financial crisis on health.

Finally, I find that contextual effects depend strongly on yearly changes, which again brings up the idea that the financial crisis 2008 had a stronger impact on people's lives than is apparent. When yearly changes are controlled for, the analysis indicates that political, social and health care contexts are significant for the most part. When analysing the effects of health care classification, it is found that only some groups are significant. Nevertheless, consistent with Jen et al., no influence of the economic context was observed – even though

it is economy, which is influenced directly and first by the financial crisis. Thus, more work will be necessary to sort out what happened between 2006 and 2010 in terms of individual health.

All in all, the findings of this paper suggest that a *more comprehensive approach to determinants of health should be used*. When analysing health, both subjective and objective determinants should be taken on board, as I find they have different influences on health; and should not be used interchangeably. It seems that some studies carried out at the individual level simply select the indicators, conveniently available in the datasets. One of the examples is selection of the 'proxies' for income among any available variables – whether subjective of objective. For instance, Carlson (2004) argues that lack of money can result in poorer living conditions and cause health worsening; hence, he refers to 'objective' circumstances, but uses 'income satisfaction' – a subjective indicator – as the proxy for financial problems. The findings of this Chapter imply that this practice could create bias and should be avoided, as objective and subjective determinants influence (subjective) health differently. More objective measures should be sought for more objective concepts, and the other way around for subjective.

The present study also makes an important contribution to the literature on the contextual factors influencing health (e.g. Gravelle, 1998; Jen, Jones, and Johnston, 2009a; 2009b), as it finds that *context might have an effect under certain circumstances, namely when there is a change over time*. However, to confirm the latter finding, more research should be done on a wider range of countries, and ideally with a longer series of time.

The next chapter proceeds to analyse firstly, a broader range of countries by incorporating the West European states into the analysis. Secondly, the next chapter also raises the question whether this chapter's results for transition countries can be generalised to other regions of the world, or if the CEE is unique in its health causes and consequences.

CHAPTER 5

'BEING' OR 'FEELING' HEALTHY: DETERMINANTS OF OBJECTIVE AND SUBJECTIVE HEALTH IN 'DIVIDED' EUROPE

ABSTRACT

The East-West health divide in Europe is well documented, both in objective and subjective health. Ever since the Cold War, the West European countries have fared better in terms of health than their Eastern neighbours. However, the question still remains whether this divide is determined simply by differing socio-economic conditions or whether determination of individual health is qualitatively different and cannot be generalised between East and West. Therefore, this chapter analyses the determinants of both objective and subjective health in Eastern and Western Europe. Using multi-level analysis on the dataset of the European Social Survey (ESS), which covers 31 countries and 228,874 individuals over five rounds, reveals that determinants of objective and subjective health are not the same between East and West. The determinants are measured at both the individual and country-levels, and are divided into economic, political, and social determinants, and lifestyles and health care. The standard demographics – age, gender, education and marital status – are also controlled for. Clear differences in determinants of health exist between West European and East European countries particularly in terms of objective health. Furthermore, context does not influence health as much in the East. All these findings once more reinforce the anomaly of the East European region, and recommend that researchers treat comparisons of different health indicators between these two regions with a high degree of caution.

5.1 INTRODUCTION

After a focus on the transition countries, this chapter provides an expanded framework covering the European continent to explore in more detail the East-West divide in European health. This chapter builds on the methodology and theoretical framework outlined earlier. As discussed in the General Introduction and Chapter 1, the East-West divide in Europe takes its roots in the era of the Cold War, and persists throughout the following years. Arguably, while the Western European countries managed to adjust to new epidemiological challenges, Eastern European countries lagged somewhat behind. By the 1980's a steady health gap has developed much of which could be attributed to the stagnation of the pro-Semashko health care systems. However, the living standards, economy, institutional and political scenes have also developed differently and mostly to Eastern Europe's disadvantage.

With the start of transition some of the post-Communist states sprinted towards Western Europe economically, culturally, and politically. However, changes happened to different degrees among the group of transitioning societies. Therefore, while transition countries have developed very differently, this chapter argues that there is a need to compare the East and West beyond simple economic and health care development contexts. It aims to explain the East-West divide as more than simply a socio-economic developmental lag.

5.1.1 BRIEF BACKGROUND

The European East-West divide in health is well documented both for objective (Bobak and Marmot, 1996) and subjective (Carlson, 1998; Carlson, 2004) health. Some research suggests a variety of determinants influencing health such as socio-economic situation (Sala-i-Martin, 2007), policy and institutions (Eikemo *et al.*, 2008b) , social capital (Carlson and Chamberlain, 2003; Mansyur *et al.*, 2008) and lifestyles (Contoyannis and Jones, 2004). However, as identified in the previous chapters, much of the literature on Eastern European transition countries concentrates on peculiarities such as high alcohol consumption as part of unhealthy lifestyles (Leon *et al.*, 2007; Pridemore *et al.*, 2010), transitional stress (Brainerd and Cutler, 2005a) and institutional changes (Stuckler, King, and McKee, 2009). These determinants might indeed be significant part of the factors influencing health in transition countries; however, putting them in the overall framework is also important.

Determinants of health are analysed in this chapter following the ***augmented health production function*** outlined in detail in Chapter 1. The augmented health production function unites the determinants of health used in the various types of studies of health, both objective and subjective:

$$H = f(dem, oE, sE, oP, sP, oS, sS, oHC, sHC, LS),$$

where *H* stands for the concept of health, which according to the theoretical framework can be separated into the objective (oH) and subjective health (sH); *dem* are the demographics commonly associated with health: age, gender, education, and marital status. oE and sE – objective and subjective economic determinants, oP and sP – objective and subjective political factors; oS and sS – objective and subjective social determinants; *oHC* – objective health care; *sHC* – subjective health care services; and finally *LS* – lifestyles and health behaviours.

The augmented health production function leaves space for introducing the 'level-dilemma' of determinants of health analysed in more detailed in the previous chapter, i.e. does context matter for individual health? Therefore, the empirical framework that incorporates the diverse determinants from both objective and subjective perspective will be again

implemented and tested, this time on a dataset of both *Eastern* and *Western Europe* (together and separately) in a multi-level setting, where both objective and subjective determinants on the micro-level and contextual-level are taken into account.

5.1.2 AIMS OF THE CHAPTER

The aims of this paper are twofold. First, I aim to analyse the determinants of health in both Eastern and Western Europe and discover whether they are structurally different. This is done to better understand whether health determinants are universal, in both East and West, regardless of the context, or whether factors are differently accountable for health in these two regions[28] of Europe. Second, objective and subjective health are analysed, and through determinants of each, I try to decipher whether objective and subjective indicators reflect different measures of the same concept, or are essentially different concepts of their own. The goal is therefore to determine whether subjective and objective health have diverse sets of determinants, and are essentially same or different. If both objective and subjective health are determined by the same factors similarly, I can hypothesise that using them interchangeably in research is a valid assumption. If, however, their determinants are strongly diverse, it raises the question of whether the two can really be assumed the two sides of the same coin.

5.1.3 CHAPTER OUTLINE

This chapter is organised the following way. First, section 5.2 describes the data and presents the dependent and independent variable measurements for the multi-level analysis (MLA). Section 5.3 provides details for the methods used. The analysis was conducted in two steps – pre-analysis and main analysis. Section 5.4 presents in detail the results from the main analysis. A discussion and conclusions follow in Section 5.5.

5.2 DATA

Individual-level data are taken from the *European Social Survey (ESS),* which is currently a five-round cross-sectional survey established, handled and funded by the European Science Foundation (ESF), and in addition handled and funded by the European Commission and a co-operation of several academic institutions. The dataset provides information on attitudes towards economic, political and social matters, as well as evaluations of institutions and services. More information is available on the ESS website (ESS, 2012). ESS was conducted five times[29] biannually between 2002 and 2010 in most of the European Union (EU) and many Eastern European countries (within and outside of the EU); therefore it presents an ideal dataset for the current comparative framework. For this analysis, all rounds were merged separately one-by-one into a pooled dataset, hence some countries have observations in more than one round. Overall 228,874 respondents clustered in 31 countries were included into the final dataset[30], 12 of the countries were classified as East European and 19 as West European (Table 5.1). It is important to note that with the exception of Russia

[28] From here on the term "region" is not used for the territorial country-level division, but rather to reflect the two broad regions of Europe: Western and Eastern Europe. This division here is understood in its classical form between the modernised Western states and post-Communist transition countries of Eastern Europe. The broad term of Eastern Europe also includes Central-Eastern, South-Eastern and Central-Asian post-Communist nation-states.

[29] As of December 2012.

[30] In some countries (e.g. Lithuania) the ESS was conducted, but the data are not added to the final dataset by ESS – due to difficulties in comparisons or other data-quality reasons.

and Ukraine, all the countries are now part of the European Union[31]. This is not fully representative of the whole transition region, but there is no other comparative data that covers as many countries with such detailed questions.

Table 5.1. ESS respondents per round per country, in the traditionally West and East Europe.

	Countries	Abbreviation	2002	2004	2006	2008	2010	Total
West Europe	**Austria**	AT	2,257	2,256	2,405	-	-	6,918
	Belgium	BE	1,899	1,778	1,798	1,760	1,704	8,939
	Switzerland	CH	2,040	2,141	1,804	1,819	1,506	9,310
	Cyprus	CY	-	-	995	1,215	1,083	3,293
	Germany	DE	2,919	2,870	2,916	2,751	3,031	14,487
	Denmark	DK	1,506	1,487	1,505	1,610	1,576	7,684
	Spain	ES	1,729	1,663	1,876	2,576	1,885	9,729
	Finland	FI	2,000	2,022	1,896	2,195	1,878	9,991
	France	FR	1,503	1,806	1,986	2,073	1,728	9,096
	United Kingdom	GB	2,052	1,897	2,394	2,352	2,422	11,117
	Greece	GR	2,566	2,406	-	2,072	2,715	9,759
	Ireland	IE	2,046	2,286	1,800	1,764	2,576	10,472
	Iceland	IS	-	579	-	-	-	579
	Italy	IT	1,207		-	-	-	1,207
	Luxembourg	LU	1,552	1,635	-	-	-	3,187
	Netherlands	NL	2,364	1,881	1,889	1,778	1,829	9,741
	Norway	NO	2,036	1,760	1,750	1,549	1,548	8,643
	Portugal	PT	1,511	2,052	2,222	2,367	2,150	10,302
	Sweden	SE	1,999	1,948	1,927	1,830	1,497	9,201
East Europe	**Bulgaria**	BG	-	-	1,400	2,230	2,434	6,064
	Czech Republic	CZ	1,360	3,026	-	2,018	2,386	8,790
	Estonia	EE	-	1,989	1,517	1,661	1,793	6,960
	Croatia	HR	-	-	-	1,484	1,649	3,133
	Hungary	HU	1,685	1,498	1,518	1,544	1,561	7,806
	Latvia	LV	-	-	-	1,980	-	1,980
	Poland	PL	2,110	1,716	1,721	1,619	1,751	8,917
	Romania	RO	-	-	-	2,146	-	2,146
	Russia	RU	-	-	2,437	2,512	2,595	7,544
	Slovenia	SI	1,519	1,442	1,476	1,286	1,403	7,126
	Slovakia	SK	-	1,512	1,766	1,810	1,856	6,944
	Ukraine	UA	-	2,031	2,002	1,845	1,931	7,809
	Total		**39,860**	**45,681**	**43,000**	**51,846**	**48,487**	**228,874**

SOURCE: (ESS, 2012)

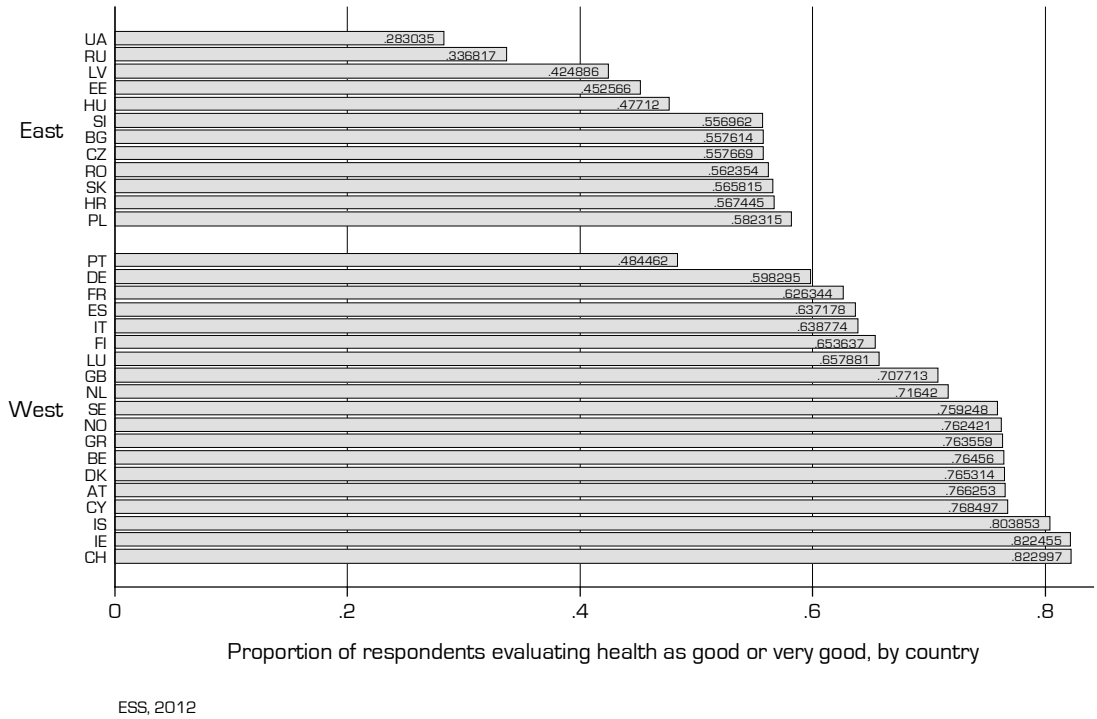
The individual-level ESS data were complimented with economic and social macro-indicators from the *World Bank World Development Indicators (WDI)*; reporting economic, developmental and societal data for most countries worldwide since 1960. A political indicator, reflecting political stability in the countries since 1996 is adopted from the *Worldwide Governance Indicators of the World Bank*. The macro-level indicators were merged with the individual-level data with a *one year lag* (i.e. data from 2001, 2003, 2005, 2007 and 2009 for ESS rounds 1-5 respectively), similar to the previous analyses in Chapter 4.

[31] Croatia has become a member on the 1st of July 2013.

5.2.1 DEPENDENT VARIABLES

One of the advantages of the ESS dataset is that it provides two health indicators for the main dependent variables (DV). A more ***subjective health*** is a commonly used measure on a 5-point Likert-scale, phrased as "How is your health in general? Would you say it is … 1 Very good; 2 Good; 3 Fair; 4 Bad; 5 Very bad?" Using subjective health on a 5-point scale as continuous carries all the advantages of Likert-scales, see Chapter 4 (Dolan, 1994). However, health 'continuity' is often questioned (Manderbacka, Lahelma, and Martikainen, 1998; Smith, Shelley, and Dennerstein, 1994) and scaling is often *dichotomised* in health research. For the purpose of exploring the different option of health measurement and synchronising the objective and subjective health into the same scale, self-assessed health is dichotomised into 0-1, where "very good" and "good" health reflect positive subjective health (and are equal to 1), and "fair", "bad" and "very bad" are reflecting negative or 'other than good' health[32]. Figure 5.1 presents the proportion of people in the ESS dataset (pooled rounds) in each country by respective European 'region' (East or West) evaluating their health as good or very good. The cross country and overall East-West differences are striking. Only 28% of respondents in the dataset from Ukraine evaluate their health as good or very good, while this number is 82% for Switzerland and Ireland. While Portugal is one outlying 'underachiever' among the West European countries, the *rest* of the Western states *all* fair better than even the highest Eastern achiever (Poland) on average (Figure 5.1).

Figure 5.1. Subjective good health on a binary scale by country and East-West divide, ESS 2002-2010 pooled.



NOTE: Cross-country variation is significant: F(30, 228547) = 678.46, p<0.0001.

A proxy for a more ***objective (negative) health*** is identified through the question of whether a respondent is prevented from full engagement in daily activities due to health issues: "Are you hampered in your daily activities in any way by any longstanding illness, or disability, infirmity or mental health problem? If yes, is that a lot or to some extent? 1 Yes a

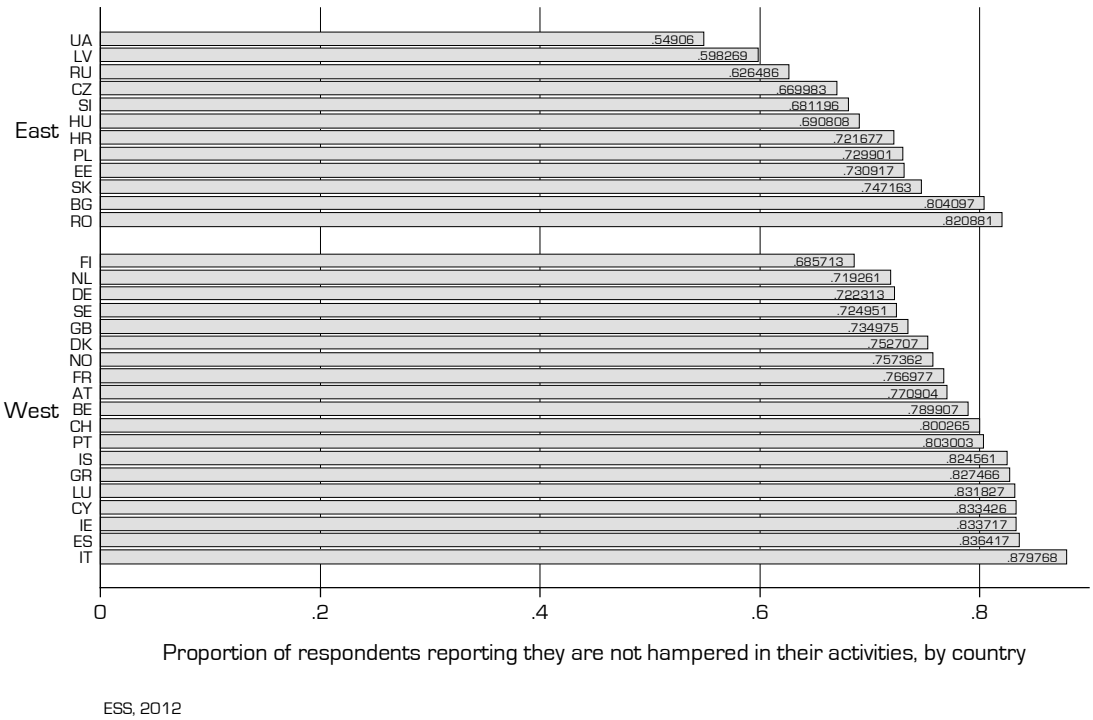
[32] 5-point scaled subjective health and the dichotomised variable correlate at the individual-level at 0.99, which clearly signifies a very strong relationship between the two variables.

lot; 2 Yes to some extent; 3 No". While this indicator is identified as an 'objective health' proxy as it reflects the functional status, which often expresses health, I acknowledge that it reflects the somewhat subjective health status, as it is still *evaluated* by respondents. For the purpose of this study it is still treated as a *more* objective health, but this serious limitation is taken into account and the results will be treated with caution.

In order to easier compare the subjective and objective health, the objective indicator was also recoded into a binary variable of being hampered to any degree and thus assumed to be physically unhealthy (responses 1 and 2) as opposed to not being hampered at all and; and the categories are reversed in order to match the logic of the dichotomous subjective health. Therefore, 0 identifies respondents, who *are* hampered to *any* degree in their everyday activities, while 1 stands for 'being healthy' or *not hampered* to any degree. This indicator is only a proxy for *physical health* because it measures disability and severe illnesses in particular, hence it is *negative health* and in an extreme form. It does not take into account minor illnesses or health problems that do not hamper daily activities.

Figure 5.2 presents cross-country averages of objective health by East and West Europe, with higher scores indicating better health, i.e. that less people identify themselves as hampered to some extent in daily activities.

Figure 5.2. Objective negative health ("hampered in daily activities due to health") on a binary scale by country and East-West divide, ESS 2002-2010 pooled.



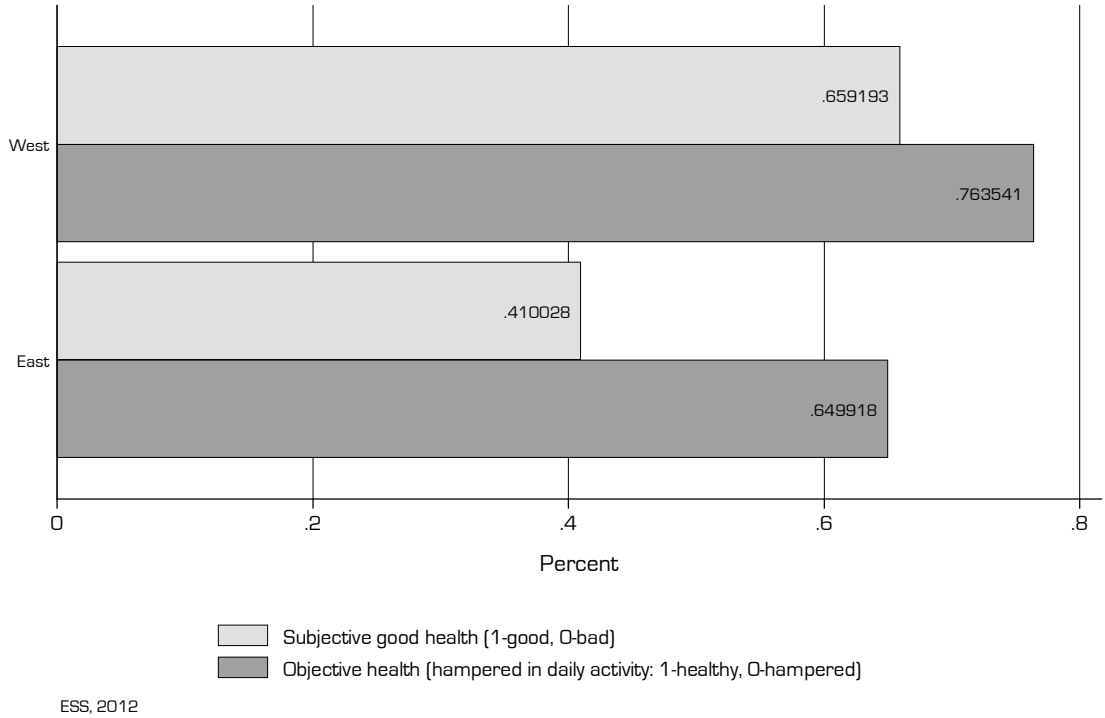
NOTE: Cross-country variation is significant: $F(30, 227535) = 182.00$, $p<0.0001$.

Generally, cross-country variation is rather high. Ranging from respondents who identify themselves as "healthiest" in Italy, where about 88% of respondents do not report any illnesses or disabilities stopping them from full daily functioning to Eastern European countries, such as Ukraine with only just over half of the respondents (55%) identifying themselves as not hampered in their daily activities. This dramatic difference is echoed to a lesser degree in all the Western countries' better reported health than the Eastern ones. However, the split between East and West is less radical compared to subjective health as previously shown in Figure 5.1. For example, the best performers among the Eastern

European countries – Bulgaria and Romania – report better objective negative health than many of the Western countries. Overall therefore, *country* and *region* differences in health are more pronounced for subjective rather than objective health.

When objective and subjective health are compared on average for the two regions of Europe, significant differences (T-tests for objective health: $t(227533) = -40.1193$, $p<0.0001$; and subjective health: $t(228545) = 101.5892$, $p<0.0001$) are easily noticeable (Figure 5.3). The averages for both objective and subjective health are strikingly different: roughly 25% more people in the West compared to the East report good or very good health, and about 12% more report not being hampered in daily activities due to illness. This is the overall descriptive evidence of the presence of the East-West divide in Europe in terms of *individual health*, both more objective and more subjective on average by country. The question of whether simply less favourable socio-economic and political conditions in the East influence this difference or whether there are unique processes beyond these typical explanations for health, still remains.

Figure 5.3. Objective and subjective health in Eastern and Western Europe, ESS 2002-2010.



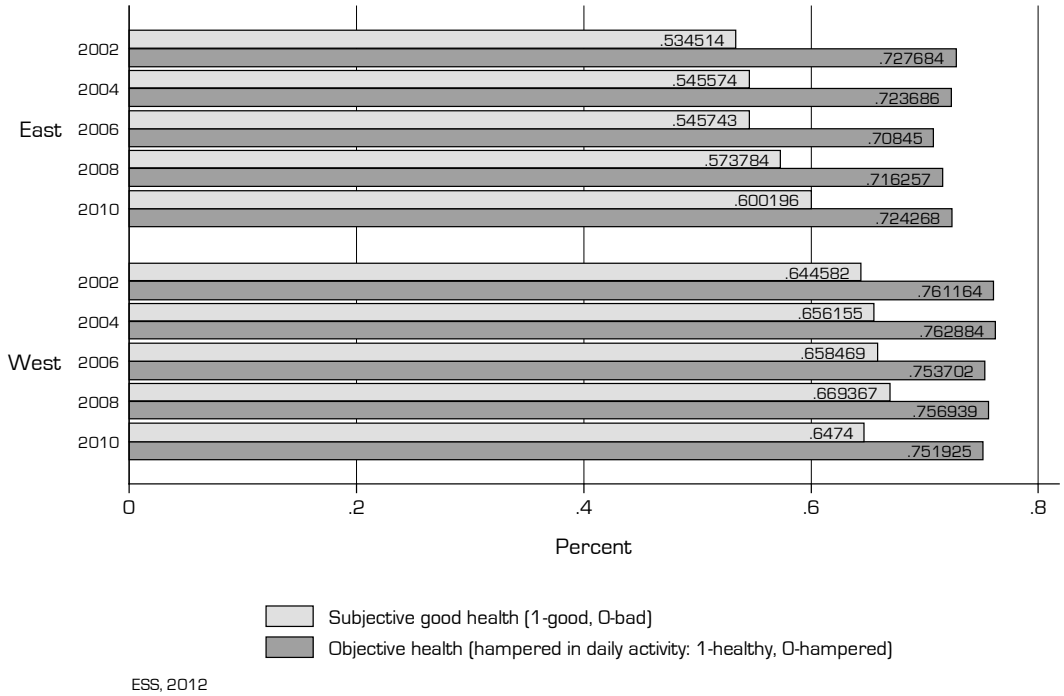
NOTE: East-West differences are significant.

To further expand the descriptive pictorial puzzle of objective-subjective health differences, Figure 5.4 presents the average objective and subjective health broken down by years between these two regions. To make the groups and years comparable, only the countries, which are present in all rounds, are included in calculating the averages. On the one hand, this narrows down the dataset, as only 16 countries have data across all five rounds. In particular, the East European average is elevated as the weakest performers do not have data over all rounds: Ukraine and Russia only joined the survey in 2006. On the other hand, however, limiting the dataset this way allows me to compare the objective-subjective differences across years.

From Figure 5.4 it is evident that there is no overall singular pattern in either objective or subjective indicator. However, if one looks at health indicators in Eastern Europe exclusively in the years the data was available for in the previous Chapter 4 – Life in

Transition Survey (LiTS) was carried out only in 2006 and 2010 – the effect is similar to the one observed in Chapter 4. Both objective and subjective health improve between 2006 and 2010, even if slightly. At the same time, this possible pre-crisis and post-crisis pattern is not present in the West. Hence, interestingly, similar trends are reported by two different datasets independent from each other for Eastern Europe, while no yearly differences are identified in the West. This once again points at the importance of including year-dimension in the analysis.

Figure 5.4. Objective and subjective health pooled across countries present in five rounds of ESS, presented by years and East-West divide, ESS 2002-2010



NOTE: Cross-year variation is significant for both objective ($F(4, 227535) = 20.99$, $p<0.0001$) and subjective ($F(4, 228547) = 97.02$, $p<0.0001$) health. Countries included: BE, CH, DE, DK, ES, FI, FR, GB, IE, NL, NO, PT, SE (West); HU, PL, SI (East)

All in all, despite certain differences, objective and subjective health are correlated at the individual-level (Table 5.4) at 0.52[33]. This points at a relationship, but is not conclusive evidence that these two notions express the same underlying concept. The aggregated subjective and objective health correlate even stronger – at 0.66.

5.2.2 INDEPENDENT VARIABLES

As outlined in the theoretical background, objective-subjective pairs of determinants of health are selected in four main arenas of country and individual characteristics: economic, social, political and health care institutions[34]. Moreover, to account for cross-country variation and the influence of contextual effects, indicators have been recorded from both individual and macro levels for all countries from both East and West Europe.

[33] All correlations are significant at 0.001.

[34] Life styles were not available for the whole dataset. Some lifestyle indicators are, however, present in several of the rotating modules of the ESS, therefore they are available for 1-2 rounds.

Individual-level indicators

Table 5.2 presents the 'determinants structure' and all the variables used in the multi-level analysis (MLA). The demographic variables deemed important for health and controlled for are age (in years), gender, marital status and education (in years). Satisfaction with life is taken on board as a subjective level demographic control in order to account for individuals' general levels of satisfaction and positivity. These measurements follow a similar framework as the previous chapter.

Table 5.2. Variables selected for the analysis in the ESS dataset.

		DV	Demographic	Economic	Political	Social	HC
Objective	1 level	Hampered in daily activities (0-1)	Age Gender Marital status Education in years	Income 10-step ladder	Voted in last elections	Social activity	-
	2 level			lnGDP per capita PPP (WB)	PSAV	-	HE as % of GDP
Subjective	1 level	Self-assessed health (0-1)	Life satisfaction	Satisfaction with economic situation	Satisfaction with democracy	Interpersonal trust	Satisfaction with HC
	2 level					Trust in the society (aggregated, ESS)	

NOTE: Lifestyles were analysed in a separate analysis, hence are not presented in this table. Lifestyles variable in use: recent activity of people, measured on a 6-point scale.

Economic determinants – both objective and subjective indicators – are present in the dataset and there are several to choose from. The most commonly used objective and subjective economic indicators – income and satisfaction with it – were eventually selected for the analysis. While *income* is the most common indicator of economic status it presents some problems in the ESS as measurement of it changed between the waves. It was measured on the same 12-point scale across all countries in 2002-2006, which was then changed to a country-specific 10-point scale in 2008-2010, where the income scale is adjusted by the income in *each* country. Therefore, this variable requires transformations to become one standard metric for analysis. As I can't generalise the country-specific income categories from rounds 4-5, I create the opposite – transform the scales in rounds 1-3 from general cross-country to a country-specific measure in quintiles, calculated by country and year. This way, a 5-point scale country and year-specific variable was developed for income in rounds 1-3 and 4-5, which reflected the quintiles of reported income distribution per country per year, and allowed me to merge the rounds. Therefore, the bottom and top categories reflect the lowest and highest 20% of earnings of a household, in which the respondent lives, per country per year. *Satisfaction with income* is measured by the evaluation of how well a household lives on its current income measured on a 4-point scale, which was dichotomised to reflect whether people are satisfied with their income or not (1-0). For the exact phrasing of all the relevant questions in the ESS see Chapter 5 Appendix.

Political indicators are also quite rich in the ESS. However, to clearly separate political indirect influences on health through links of social capital with health (membership in political parties or engaging in political activities), I choose indicators which are purely political and could provide an 'institutional' link between political determinants and health.

Therefore, objective political indicator is measured as *voting* – whether respondents voted or not in the previous elections. The subjective counterpart to voting is *satisfaction with the political order* – how democracy and hence democratic institutions work in a particular state.

Social indicators were selected so that they reflect the notion of social capital, and the link between health and social cohesion. An objective social indicator is expressed as *social activity* in a society: how often respondents met with people outside of work on a scale from 1 to 7, where 1 indicated "never" and 7 "every day". The subjective proxy of social determinants is *trust* on a scale from 0 to 10, where 0 stands for "you can't be too careful" and 10 is "most people can be trusted".

There is no indicator available for ***lifestyles*** across all rounds, but some lifestyle proxies are present in the rotating ESS module[35] "Family, Work and Well-Being". The module is only present in rounds two and five (years 2004 and 2010 respectively), hence I utilise the lifestyle indicator in a *separate analysis* restricted to those two rounds. Active lifestyles are measured from this module with a question reflecting *activity of people in the past two weeks*: how active and vigorous people felt. It reflects on the one hand whether people are generally active in their lives, as well as how they felt (active or not) during the defined timeframe. Therefore, it reflects a certain degree of both the lifestyles status and evaluation of it by the respondents. The indicator is measured on a 6-point scale, where 1 is most active and 6 least active.

There are no available and appropriate variables for *objective health care* in the ESS. However, subjective health care is measured as evaluation of health services by individuals from 0 to 10 with 10 being an "extremely good" state of health care.

Country-level indicators

At the macro level most of the variables available are more objective indicators, and subjective qualities of societies are taken from aggregations of the individual-level data. Three main objective variables are used in the MLA at the macro level: GDP per capita, health expenditures (HE), and political stability. GDP and HE were extracted from the World Bank Group World Development indicators (WB, 2012b). *GDP* is expressed in per capita purchasing power parity (PPP) US 2005 dollars, and for the analysis the natural logarithm of the initial indicator is used. *Health expenditures (HE)* are provided by the total HE in percent of GDP.

Political stability and absence of violence (PSAV) [36] from the Worldwide Governance Indicators (WGI) from the World Bank Group measures the risk of violent demonstrations, civil unrest, social conflicts, political arrests and killings, repressions, political terror, etc.[37] One might argue that political stability can be somewhat 'repressive' – particularly in transition countries, where opposite to cleaner developed states stability might be more indicative of an authoritarian regime, for instance in Belarus or Kyrgyzstan. However, the PSAV is not so much about the stability per se, but also the popular public legitimacy of the

[35] In each wave the ESS has three constant modules and two to three rotating modules, which are different from round to round, and repeat occasionally.

[36] The exact definition provided by WGI: "Political stability and absence of violence measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism" (WB, 2012a: 1)

[37] Initially Corruption Perception Index (CPI) from Transparency International (TI) was considered as the macro-level political indicator. However, for various reasons of development, that index is highly correlated with GDP, even on the European continent; therefore a different political indicator was sought.

current regime and its stability, as well as political oppression of opposition which is characteristic of totalitarianism but not the PSAV. Hence, not surprisingly, the lowest score in the dataset is Russia and then Ukraine. All in all, PSAV is taken as an indicator of the political situation in the country which is not highly correlated with the general economic situation. All summary statistics for both dependent and independent variables used in MLA are available in Table 5.3, some correlations are reported in Table 5.4.

Table 5.3. Summary statistics for variables used, ESS rounds 1-5.

Variable	Observations	Mean	Std. Dev.	Min	Max
Good subjective health (0-1)	228,547	0.633	0.482	0	1
Hampered in daily activities	227,535	0.255	0.436	0	1
Age	227,715	47.621	18.5	13	123
Gender	228,596	0.459	0.498	0	1
Education	226,225	12.022	4.042	0	56
Married	222,026	0.525	0.499	0	1
Life satisfaction	227,628	6.77	2.348	0	10
Income	162,701	2.679	1.4	1	5
Income satisf.	222,788	0.717	0.451	0	1
Social activity	227,790	4.897	1.61	1	7
Trust	227,886	4.921	2.49	0	10
Voted	228,874	0.715	0.451	0	1
Democracy satisf.	217,880	5.121	2.516	0	10
Activity	93,700	2.962	1.35	1	6
HC satisf.	225,255	5.069	2.594	0	10
GDP PPP pc	228,874	26722.01	10356.2	4777.993	63930.24
PSAV	228,874	0.8	0.49	-0.892	1.577
Country-level trust	228,874	4.92	0.943	3.343	7.02
HE as % of GDP	228,874	8.614	1.735	4.993	11.797
East-West divide (1-East)	228,874	0.329	0.47	0	1

SOURCE: (ESS, 2012; WB, 2012b; WB, 2012c)

Table 5.4. Correlations between subjective and objective health, and all independent variables used in the final MLA analysis.

	Good subjective health (0-1)	Good objective health(0-1)
Subjective health (1-5)		
Good subjective health (0-1)	1	
Hampered in daily activities	0.517	1
Age	-0.371	-0.338
Gender	0.078	0.056
Education	0.234	0.170
Married	-0.018	-0.016
Life satisfaction	0.308	0.192
Income	0.219	0.199
Income satisfaction	0.236	0.153
Social activity	0.185	0.135
Trust	0.166	0.077
Voted	-0.027	-0.037
Democracy satisfaction	0.184	0.084
Activity	-0.359	-0.328
HC satisfaction	0.146	0.057
GDP pc PPP	0.216	0.068
PSAV	0.1645	0.043

Society trust	0.167	0.010
HE as % of GDP	0.144	0.048
East-West divide	-0.208	-0.084

NOTE: All correlations are significant at 0.001.

As one can see from Table 5.4, both objective and subjective health are strongly correlated with age. Other correlations are lower, even though still present. Interestingly, subjective health is stronger correlated with the independent variables than is the more objective health. This reflects particularly the macro-level indicators. For instance, GDP and subjective health are correlated at 0.22, while objective health correlates with health at only 0.07. The correlation between the dependent variables themselves (more objective and more subjective health) is relatively high (0.52) and all the directions of relationships between proxies of health and determinants are expected and are consistent between the two dependent variables. Nevertheless, due to the difference in the correlation coefficients, I would still argue that the indicators are different and might reflect different concepts. That is why a detailed determinants analysis is essential.

5.3 METHODS AND ANALYSIS

5.3.1 GENERAL STRATEGY

In order to account for country and individual-level variations, MLA is carried out. I conduct the analysis in the commonly-used step-wise approach (Hox, 2010: 56-59), where the empty model is estimated in the first step, followed by fixed-effects estimation of individual-level effects in the second step. In the third step the macro-level variables are added, which are then followed by the random effects and cross-level interactions. Therefore, several models for each of the dependent variables will be presented, compared and analysed.

The dependent variables are dichotomous and this precludes the possibility that the measure is normally distributed along with the standard errors in a linear modelling setting. Therefore, alternative estimation techniques to the linear models were sought. One way to account for non-normality in the error distribution is to estimate the models through a *logit link function*, which applies logistic transformation (Hox, 2010: 114-115). The resulting 'regression coefficients' are no longer explaining a linear relationship of x with y, and instead offer the change in likelihood of 'y' being in a state of 1 (versus 0) given 'x'.

Among the possible estimation techniques, direct maximum likelihood (ML) is one of the most common. However, in combination with the logit link function and accounting for the dichotomous dependent variable, it may over-complicate estimations. Therefore, simplifying techniques are used, where non-linear functions are 'linearised' using the so-called Taylor expansion with first and second order approximations (Hox, 2010: 118), which in turn can be estimated using the marginal quasi-likelihood (MQL) or penalised quasi-likelihood (PQL) of first and second order (in non-mathematical specificities these may be understood similarly to maximum likelihood estimations with certain restrictions). More details on these methods can be found elsewhere (Goldstein, 2010; Hox, 2010; Rodríguez and Goldman, 1995), for the current analysis it is important to note that second-order PQL is used within the restrictive iterative generalised least squares (RIGLS) estimation method. RIGLS is the equivalent of the restrictive maximum likelihood procedure and produces more robust results particularly when the sample at the highest level is not sufficiently large[38]. PQL is chosen as the more accurate procedure (Rasbash *et al.*, 2012:128) , even though it increases the computational time. It is generally considered that second order

[38] This can particularly happen when I split the sample into East and West Europe.

PQL produces reliable estimates compared to other more complex and timely techniques like Laplace maximum likelihood (Hox, 2010: 122-23). All calculations are performed using Stata SE 10 (StataCorp, 2007), with utilisation of the *runmlwin* Stata module (Leckie and Charlton, 2011) for the multi-level modelling linked to MLwiN 2.26 programme (Rasbash *et al.*, 2012).

5.3.2 POST-ESTIMATION AND MODELS' COMPARISONS

Nested models of *continuous* dependent variables can be compared using deviance, Akaike's information criterion (AIC), Bayesian information criterion (BIC) and R^2. Deviance indicates a better fit when it is smaller, AIC and BIC statistics are compared for nested models and R^2 reflects the amount of variance explained by the model at each level (Hox, 2010). None of the statistics above are appropriate for methods used to analyse dichotomous outcomes (Hox and Roberts, 2011). However, I first ran the RIGLS with a linear function on subjective health on a 5-point scale in order to estimate the intraclass correlation (ICC), as well as overall fit-estimators and explained variances. This is done to check the overall fit of the model on a non-dichotomised subjective health indicator. The results (available on request) encouraged to proceed with the analysis, as the fit of the theorised models was found satisfactory.

5.3.3 GENERAL VARIABLE TRANSFORMATIONS AND LEVELS

All variables included in the analysis, except for dichotomous variables with a natural state of "0", were *grand mean centred*. More on using raw scores, grand and group mean centring is explained elsewhere (Goldstein, 2010; Hox, 2010; Paccagnella, 2006).

Due to the nature of the dataset, I am able to distinguish at least *three levels*: individual, year-country and country (territorial divisions within countries are not taken into account). I include years into the analysis in the form of year-country level to account for the year clustering. This is essential, first, to account for the time changes in the transition countries between 2006 and 2010, and second, to address the data structure properly. This is a more correct way to calculate the standard errors in this dataset. Therefore, the dataset contains 31 countries at the highest level, and 105 groups form the intermediate level of country-years.

5.4 RESULTS

The analysis consisted of several parts. *First*, the multi-level logistic models with two binary dependent variables are carried out; objective health (hampered in daily activities) and subjective health. In order to investigate the differences between East and West, the dataset is analysed in two ways: pooled with an East-West binary control introduced and separated into two different datasets of East and West. This provides a chance to compare side-by-side the results of the same models run on the same dependent variables in two different regions. Therefore, I concentrate primarily on the results from the separate datasets with reference to the analysis carried out on the pooled dataset for comparison purposes. *Second*, part of the results section presents the models for only two rounds, when the lifestyle proxy is included. All results are reported below in a similar fashion, when the steps of the regression are presented. Model 0 indicates the empty model, model 1 – next step model, and so on.

5.4.1 DETERMINANTS OF HEALTH: THE EAST-WEST DIVIDE

The models were first implemented on the full dataset and then run separately for Eastern and Western countries. For ease of presentation, the step-wise tables are only presented for

the full dataset, and only the final full models are reported for the split datasets[39]. Table 5.6 presents the final models for the two datasets of East and West European countries both for objective and subjective health. Table 5.5 reports the models with only individual-level determinants both for objective and subjective health on the pooled dataset, and Table 5.7 then reports only the macro-level determinants, controlling for the micro-level indicators, but not reporting them, as they do not change with the addition of these macro-level indicators. All the results are presented in odds ratios.

Individual-level determinants

In terms of individual-level determinants, most of the results have expected direction of effects: on majority respondents who are younger and male, and have higher levels of education, income, life satisfaction, social and political activity, trust, political satisfaction and positive evaluation of their health care provisions tend to report greater subjective and objective health (Table 5.5 and most of the models in Table 5.6).

There are, however, some nuances. Although most of the demographic variables have an effect on health similarly in the separate analyses by East and West region (Table 5.5 – Table 5.6), marital status, which is insignificant for subjective health when all the other micro-level indicators are controlled for, has a divergent pattern. Therefore, as soon as the individual socio-economic status and political preferences are controlled for, the difference in subjective health between married and unmarried respondents disappears, as can be seen in Table 5.5.

Table 5.5. Multi-level generalised linear models, logit link. DV's: objective, subjective health. Individual-level predictors.

	DV: objective health (1-0)			DV: subjective health (0-1)		
	M0: OH	**M1: OH**	**M2: OH**	**M0: SH**	**M1: SH**	**M2: SH**
			Fixed part			
Intercept	3.390***	3.390***	2.636***	1.893***	1.690***	1.310**
Age		0.957***	0.960***		0.954***	0.958***
Gender		1.190***	1.144***		1.310***	1.219***
Education		1.056***	1.033***		1.070***	1.044***
Married		1.180***	1.073***		1.091***	1.015
Life satisfaction		1.213***	1.165***		1.279***	1.219***
Income			1.101***			1.119***
Income satisfaction			1.442***			1.402***
Social activity			1.038***			1.066***
Trust			1.025***			1.048***
Voted			1.056**			1.132***
Democracy satisfaction			1.019***			1.030***
HC satisfaction			1.014**			1.025***
			Random part			
σ^2v	0.166***	0.259***	0.269***	0.395***	0.349***	0.306***
σ^2u	0.015*	0.014**	0.0152**	0.011***	0.012***	0.01**
σ^2e						
Number of observations	227,535	216,093	147,309	228,547	217,039	147,775

NOTE: * p<0.05, ** p<0.01, *** p<0.001. Reporting odds ratios.

[39] All other results are available on request.

Interestingly, marital status is only significant for *objective health in the East European* countries (Table 5.6). This is an important observation for the East European countries, in which welfare states are perhaps not as strong and well-established as in the West, hence the welfare-support "net" is not as developed. People in the East, where interpersonal general and institutional trust is low and informal practices are extremely high (Ledeneva, 2006; Ledeneva, 2009), tend to rely on relatives and family – often their spouses – rather than the state or institutions to solve any problems. This might be explained by the political trust deteriorating throughout the transition time in many of the post-Communist countries (Mishler and Rose, 2001; Wallace and Latcheva, 2006). It is family who would and has to take care of the sick and disabled at the end of the day – the shortage or even the lack of nursing and elderly homes is a clear indication of that[40]. This is clearly reflected in this analysis, and perhaps suggests one of the first important distinctions between the East and West, which stems both from cultural and institutional differences (Breznau, 2010; Sztompka, 2004).

Table 5.6. Multi-level generalised linear models, logit link. DV: objective health, subjective health. Separate datasets for East and West Europe.

	DV: objective health (0-1)		DV: subjective health (0-1)	
	East	**West**	**East**	**West**
		Fixed part		
Intercept	2.208***	3.330***	0.978	1.733***
Age	0.948***	0.964***	0.942***	0.963***
Gender	1.141*	1.141**	1.373***	1.159***
Education	1.041***	1.035***	1.057***	1.048***
Married	1.048*	1.062	0.957	1.036
Life satisfaction	1.137***	1.181***	1.170***	1.242***
Income	1.092***	1.104***	1.109***	1.122***
Income satisfaction	1.369***	1.463***	1.342***	1.402***
Social activity	1.050***	1.028**	1.083***	1.049***
Trust	1.009	1.034***	1.031***	1.056***
Voted	1.073	1.049*	1.150***	1.131***
Democracy satisfaction	1.011	1.024***	1.037***	1.028***
HC satisfaction	1.017*	1.01	1.038***	1.018*
lnGDP pc PPP	0.757	0.82	0.746	1.136
PSAV	1.262	0.706**	1.094	0.743**
Society trust	0.977	0.740***	1.156	0.957
HE as % of GDP	0.937	0.968	1.074	0.953*
		Random part		
σ^2v	0.266*	0.103***	0.345**	0.208***
σ^2u	0.0173***	0.0142*	0.00726	0.00908***
σ^2e				
Number of observations	40,007	107,302	40,334	107,441

NOTE: * p<0.05, ** p<0.01, *** p<0.001. Reporting odds ratios.

Life satisfaction is quite influential for health, and gender has a stronger effect on subjective rather than objective health, particularly in the East, but in the West as well.

[40] Simple look at the HfA DB data on nursing and elderly homes is shocking. In 2010 Sweden for instance had 1423.01 nursing and elderly beds per 100,000 (Belgium - 1227.87), while in most of the countries of CEE this number is below 100, reaching as low as 1.16 in Tajikistan (WHO, 2012).

The relationship is positive, which indicates that males evaluate their general health better and report being not hampered more often than females. This indeed reflects the general trend of more positive responses by males.

Some differences emerge again between the East and West European countries in terms of objective health. Neither of the two individual-level political indicators or trust are significant determinants of objective health in the East. This again could be linked to the earlier discussion of marital status. Regardless of the feelings of trust in the society, or political affiliation and activity, respondents in the East perhaps tend still not to rely on institutions and political leaders as much when it comes to health. General scepticism towards social security, health care and nursing systems is very often present in the East European states; hence, many people tend to turn to self-remedy and family support, rather than official institutions. Similar logic follows the election of political leaders and participation in political life, which in many countries of the East might be believed not to bring any change to health-related areas of policy-making and society in general. This is further supported when I find that satisfaction with health care institutions is not significant for objective health in the West: regardless of respondents' satisfaction, the institutions may work well enough in all cases that health does not significantly differ between them, at least not at the level of individual perceptions of these institutions.

Overall, with the exception of objective health in the East, health is determined similarly at the individual-level in both regions. Objective health in transition countries, however, is a different story. What is important to note, however, is that the results for objective health are very different once Western countries join the dataset. Table 5.5 shows almost no differences whatsoever between the objective and subjective health determinants at the individual-level, while the results on the separated dataset (Table 5.6) points to the opposite. This is a very important finding, which can serve as caution: even though the concept of health exists in every single country, it can be understood and determined differently in different parts of the world. Hence, in this example, East and West European countries should be joined together in the analysis of health with a degree of caution, as this might produce strong bias – particularly in terms of more objective health.

Country-level determinants

The context variables present an interesting picture (Table 5.6 and Table 5.7). While the indicators appear to mostly be insignificant, there are several, which do play a role, but again the East-West differences exist. While Table 5.7 reports that society trust is significant for objective health, one can see from Table 5.6 that it is only true for the Western Europe. Moreover, other indicators also become significant, when the datasets are separated. Thus, PSAV and societal trust are significant in determining objective health, while health expenditures – subjective health. The directions of these relations in the West are, however, the *opposite* from expected: they have a negative effect on health. This could reflect certain cultural phenomena, where for instance better and less oppressed political situation reflects a certain culture of more open and straightforward reporting by respondents. This, however, requires further analysis, which it outside of the scope of this thesis.

The lower societal trust resulting in better health evaluations could also be the feature of strong and developed welfare state and health care systems: West Europeans do not need the "security net" of the society and relatives, when they have welfare support to fall into. In terms of health expenditures, when I look at the countries with lowest expenditures as per cent of GDP, they include Italy, Cyprus, Spain – countries in which respondents are generally more positive. Therefore, while health expenditures are indeed an important

indicator of health care system investment, when I control for it in the developed countries of Western Europe, it produces somewhat illogical results.

It is important to note, that in Table 5.7 the East-West dummy (with 1 representing the East European countries) is significant and both for objective and subjective health – after controlling for all other determinants – being in the Eastern country would reduce the likelihood of a positive health by 40 or 48% for objective and subjective health respectively. This presents a very big difference between the East and the West.

Table 5.7. Multi-level models, logit link. DV: objective health, subjective health. Pooled ESS data, East-West divide as dummy. Macro-level predictors.

	DV: objective health (1-0). OH M3 with divide	DV: subjective health (0-1). SH M3 with divide
	Fixed part	
	Individual-level indicators are controlled for as above (Table 5.5)	
lnGDP pc PPP	0.921	1.073
PSAV	0.822	0.865
Society trust	0.788***	0.977
HE as % of GDP	0.988	0.989
East (dummy)	0.605*	0.519***
	Random part	
σ^2v	0.163***	0.243***
σ^2u	0.0161**	0.00968***
σ^2e		
Number of observations	147,309	147,775

NOTE: * p<0.05, ** p<0.01, *** p<0.001. Reporting odds ratios. East-West divide is a binary variable with East=1, West=0

All in all, there are only minor differences between the way objective and subjective health are identified, when the whole dataset is taken into account. At the same time, the East-West divide is clear in health particularly for *objective health*, with the East lagging behind the West after taking into account a variety of controls at the individual and country level. Marital status, interpersonal trust, and political indicators at the individual-level and some contextual variables used in the analysis are significant in determining health in the West, but not in the East (Table 5.5). Nevertheless, subjective health models are more or less universal in both Western and Eastern Europe. These slight, but significant differences between the East and the West indicate a danger of pooling the wider Europe in the analysis all together, as reflected by models in Table 5.5 and Table 5.7 where in the pooled models the differences of the East are simply wiped out, and the models are similar to the models only on Western Europe. This may be driven by the fact that there are more countries in the Western dataset, as well as *twice* as many individual observations.

5.4.2 LIFESTYLE AS A DETERMINANT

In the second part of this analysis, I run the same models, but the lifestyle indicator is included to control for the lifestyles of individuals. The variable used is based on the question of how active respondents felt and were in the past two weeks. Table 5.8 (p. 118) presents only the final models, which were run only on the datasets from two rounds – rounds two and five. Due to this reduction of the dataset, I cannot split the dataset more and test the models separately for the East and West, however the East-West divide dummy is accounted for.

First and foremost, being active has a strong positive effect on health – both objective and subjective. The odds ratio below 1 is explained by the negative coding of the variable in question. It is evident that respondents, who were and felt more active in the past two weeks, have a much higher odds of reporting better health – both subjective and objective. As the scale of this indicator is reversed the odds ratio of 0.66 and 0.64 for objective and subjective health respectively indicate a 34-36% decrease in likelihood of having 'good' health for those, who are *less* active.

Table 5.8. Multi-level generalised linear models, logit link. DV: objective health, subjective health. ESS dataset for rounds two and five.

	DV: objective health (1-0). OH M3 with divide	DV: subjective health (0-1). SH M3 with divide
	Fixed part	
Intercept	3.758***	1.963***
Age	0.961***	0.957***
Gender	1.086*	1.115*
Education	1.030***	1.036***
Married	1.055*	0.991
Life satisfaction	1.104***	1.149***
Income	1.071***	1.108***
Income satisfaction	1.370***	1.355***
Social activity	1.013	1.040***
Trust	1.020**	1.043***
Voted	1.01	1.137***
Democracy satisfaction	1.025***	1.034***
HC satisfaction	1.011	1.027**
Active	0.661***	0.641***
lnGDP pc PPP	0.793	0.892
PSAV	0.895	0.97
Society trust	0.740***	0.962
HE as % of GDP	0.988	1.005
East-West divide	0.544*	0.458**
	Random part	
σ^2v	0.153***	0.311***
σ^2u	0.021	0.017*
σ^2e		
Number of observations	60529	60718

NOTE: Countries: 28; country-years: 44. Performed using the dataset from two rounds: years 2004 and 2010. East-West divide is a binary variable with East=1, West=0

Second, as soon activity is controlled for, some of the individual-level indicators fail to influence health to a similar degree as in the models above – particularly for objective health. For instance, once life activity is taken into account, social activity and satisfaction with health care are no longer significant. Perhaps, social activity depends strongly on the physical activity of individual, hence their effect on objective health is lost.

Third, the inclusion of the lifestyle proxy does not change the effects of the context variables, with East-West divide still playing an important role in the likelihood of reporting positive health.

5.5 DISCUSSION AND CHAPTER CONCLUSIONS

This chapter has investigated differences in health and its determinants between Eastern and Western Europe – both in terms of objective and subjective health measures. This was done by splitting the ESS sample into the Eastern and Western countries and running identical multi-level logit regression models on each sample, and run on both objective and subjective health as dependent variables.

A number of caveats should be mentioned. To begin with, the analysis was carried out on binary variables of health, which limits the concept of health to two extremes unhealthy and healthy. Although this is a simplification of empirical reality (i.e. reduction of continuous variance (Cohen, 1983), which otherwise includes individuals in a broad range of health from extremely unhealthy and terminally ill, to those with a simple cold or flu, through those who are somewhat healthy and those who are very fit, data limitations left little other options. Additionally, due to the specifics of the data used, methods were limited, and the overall goodness of fit statistics were difficult to obtain. Finally, the proxy for objective health might reflect a slightly different concept: reported disability or functional status rather than health or poor health. Moreover, what is referred to as "objective health" also has a high degree of subjectivity – as it indeed is the self-evaluated disability, rather than an independent reporting of health status by an expert. Nevertheless, even though the two indicators – subjective health and more objective health – both reflect some degree of subjectivity, they are still very different, as the results suggest. Finally, while keeping these limitations in mind, the analysis still presents robust findings, some unexpected, which are important for our further understanding of health differences in the East and West Europe.

First and foremost, health in Eastern and Western Europe is determined differently, and these differences are manifold. Subjective and objective health indicators have certain differences in their determinants' structures – across East and West. Researchers have been arguing for some time over whether the two concepts are different or reflect one broad, underlying idea of health (e.g. Benyamini, Leventhal, and Leventhal, 1999; Cappeliez *et al.*, 2004; Chandola and Jenkinson, 2000). While it is impossible to answer that with complete certainty, it is relatively easy to argue, following the findings in this chapter, that while more objective and more subjective individual-level indicators of health are determined differently, they should be used interchangeably with great caution. The results of this chapter clearly argue that in the East European transition countries objective and subjective health differ – not only are the health outcomes worse than in the West, they are also determined differently. Therefore, arguably, one should be very careful using the two indicators of health interchangeably, as the way they are defined and, perhaps, understood could be not simply different, but also region-specific.

Second, talking about setting, these individual-level objective-subjective differences also are specific to the East-West diversity. There is no question about the existence of the East-West differences in health (mortality belt, differences in life expectancies, etc.), as well as socio-economic, cultural and political developments. But this is perhaps not the full story. Health might not be determined universally across Europe, but the determinants themselves are different and have different effects on health in the East and West.

Third, contextual factors also influence individual health differently in the East and West, as they influence objective and subjective health differently. The country-level indicators do not have a strong influence on health – particularly on the objective health in the East European countries. Therefore, while some of these countries do try to catch up in socio-economic and political life with their Western neighbours, the 'modernisational' aspects are still not so important for objective individual health there. Perhaps, there other aspects of

societies, which are still more important for health in the East – i.e. culture, happiness, overall values.

All in all, it is clear that transition countries are different in the way health is determined compared to the West in Europe. The differences are present particularly in objective health, while subjective health determinants are more similar in the East and West. At the same time, context does not play a significant role for objective health in the East. Moreover, when one looks at the countries within the "East" sample, it is easy to note that most of them are EU member states[41], and hence do not reflect the full spectrum of variability of Eastern Europe, which would only add more evidence to the findings in this chapter. Despite these limitations on the Eastern European group, the differences between East and West are striking. The interesting fact partially explaining the East-West contextual differences is the somewhat reversed relationship between objective and subjective socio-economic indicators: while overall political and economic conditions improve, people in transition countries are more and more dissatisfied and less happy. This paradox might explain the low and negative influence of contextual determinants in the East.

Overall, the findings in this study partially confirm previous research, but also show that when incorporating different approaches to studying health – objective-subjective and macro-micro – the health determinants set is more comprehensive and there are potential discrepancies between objective and subjective health. There are also strong differences between Eastern and Western Europe, which is an important issue to note when the European continent is analysed. A certain degree of universality still remains – particularly for the West and subjective health, but both researchers and policymakers have to be careful in using these two health indicators interchangeably, as well treating transition countries as a unique health case in comparison with Western Europe. Research should either be done separately for the two, or a clear acknowledgement of the differences made. The degree of this diversity and the border of this divide are still questionable.

[41] Bulgaria, Czech Republic, Estonia, Croatia, Hungary, Latvia, Poland, Romania, Russia, Slovenia, Slovakia, Ukraine: Russia and Ukraine are the only non-EU countries in the East sample.

CHAPTER 6

THE CHANGING BORDERS OF THE EUROPEAN EAST-WEST HEALTH DIVIDE: BLURRING, SHIFTING OR MULTIPLYING?

ABSTRACT

The European East-West health divide is a popular topic of analysis for sociology of health researchers. The health divide takes its roots in the historical Cold War divide in Europe and persists today, but with perpetual transformations. Some research indicates that the health divide is moving eastwards, while other – that there are multiple subdivides developing. Most of these findings are based on the traditionally-used proxies for health: mortality and life expectancy (LE). Rarely is the divide analysed in detail using more comprehensive health profiles and using advanced quantitative techniques. Therefore, this study aims to address this gap by first, performing factor analysis on health-related indicators to determine whether all of them express a similar concept or in fact could be understood as different aspects of the broader notion of health. Second, indicators selected through the factor analysis are analysed separately in longitudinal and cross-sectional models in order to examine the clustering of the European countries according to their health trajectories. The World Health Organization "Health for All" database is used for all macro-level health indicators across 45 countries over 29 years. I find that, firstly, health indicators could be separated into four clusters, out of which the mortality-based indicators form the biggest and most communal factor. This indeed validates the usage of mortality and LE indicators as the best available proxies for health, but a more comprehensive approach is recommended when a deeper analysis of health is involved. Second, I find that the European health divide is not simply between "East" and "West" any longer, but there are three concrete and very distinct groups forming. Moreover, the group comprising of mostly the new EU member-states (with several exceptions) is moving closer and closer to the Western countries, away from their Eastern neighbours. This finding is particularly important for any research related to the East-West divide, as uniting all the transition countries under one umbrella is potentially faulty and might result in erroneous findings and conclusions.

6.1 INTRODUCTION

The previous chapters looked at the determinants of health at the macro level, at the individual level and in the multi-level setting. They concentrated on the diversity of transition countries and then extended to the wider European context. While this approach assumed the traditional East-West health divide, the health-related differences between the East and West European countries have not been addressed in detail. Therefore, this concluding chapter attempts to analyse in a greater detail the East-West health divide at the macro-level.

6.1.1 BACKGROUND OF THE EUROPEAN HEALTH DIVIDE

Differences between East and West have been discussed earlier both theoretically (Chapter 1) and empirically (Chapter 5), and it is abundantly clear that some divide exists (Andreev, McKee, and Shkolnikov, 2003; Bobak and Marmot, 1996; Carlson, 1998; Carlson, 2004). However, after analysing the transition countries and arriving at the conclusion that they are very different by themselves, the question of where to place the exact border of the divide is most acute.

The "classic" or "traditional" East-West border has been based on the Cold War[42](with the exception of Germany, of course). Hence, all the previously Communist and Soviet states of Europe are defaulted to the "East" side (Figure 6.1), even if some of their geography is in fact more "Western" compared to some of the EU member states. Indeed, purely geographically, Czech Republic, Poland, Balkan countries and some others are located more to the West than Finland or Greece. Therefore, the name of the divide itself does not have much to do with the geographical location, and the divide itself is rather determined by the Cold War and post-Cold War developments on the European continent.

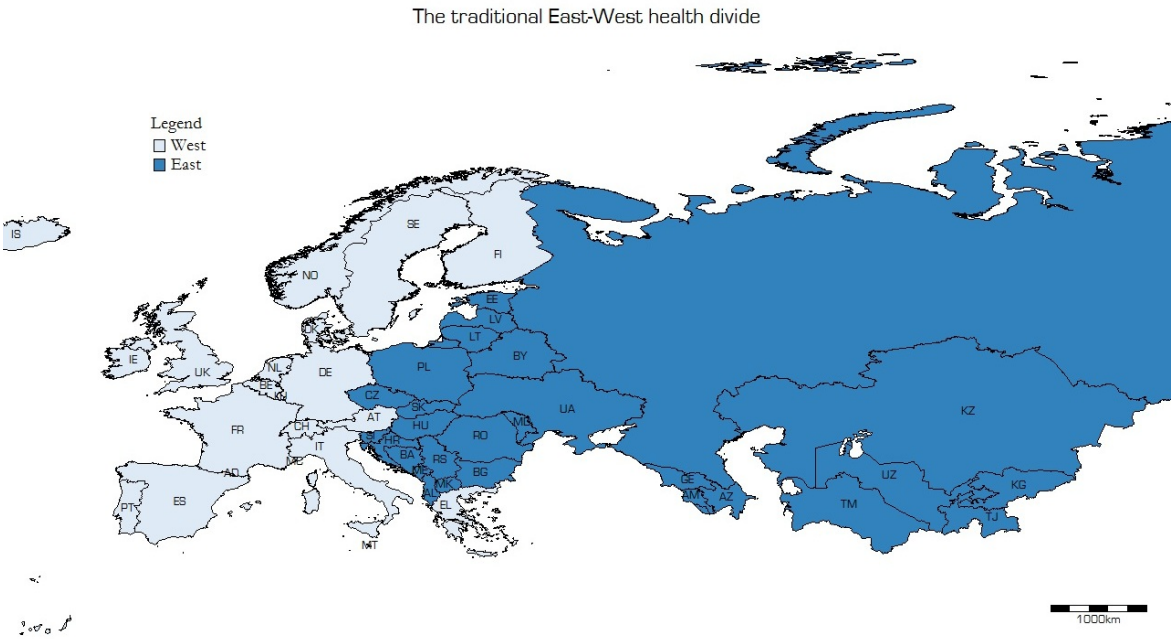
Despite uniting all transition countries in the "East" block, it is acknowledged that while the Communist states did follow (even if unwillingly) the lead of the Soviet Union (SU) when it still existed, they were also quite different. This diversity only increased with the fall of the Berlin Wall and the start of transition (Brainerd, 1998; Chawla, Betcherman, and Banerji, 2007; Cornia and Paniccià, 2000; Figueras *et al.*, 2004). During the transition years most of the former *Communist* republics strived towards economic and political modernisation and liberalisation, and became part of the EU. The former Soviet states – with the exception of the Baltic countries – started their transitions with economic and political shocks, and many of them have not completely recovered up to now. Similar situation have happened with the health of the populations in these countries: some have managed to improve and somewhat reverse the worsening health, while the others are still struggling.

An interesting example of just what transition can do to health is the recent study of Vogt (2013), who investigates how life expectancy would have been different in Eastern Germany had unification never happened. He states, that while Eastern Germany would have improved its life expectancy, it would have done it to a lower degree: 4 years less for women and 5.7 years less for men, with the primary effect coming from the difference of mortality

[42] Germany presents an interesting case, as the country itself was divided during the Cold War. Analysing Germany in detail could be a worthwhile research, as it also faced the health gap between its two parts before the re-unification in 1989 (Helmert, Mielck, and Classen, 1992; McKee *et al.*, 1996; Nolte, Shkolnikov, and McKee, 2000), and some of this socio-economic and health gap still persists (Nolte and McKee, 2004a). However, as it is difficult to analyse the data on Germany at the region-specific level, as most of the countries are analysed at the country-level, in this thesis I take Germany at the country-level as well.

change in adults of 60 and older. This is a great example of a Communist-block country filling the gap more quickly by joining with its Western counterpart.

Figure 6.1. 'Traditional' East-West health divide in Europe

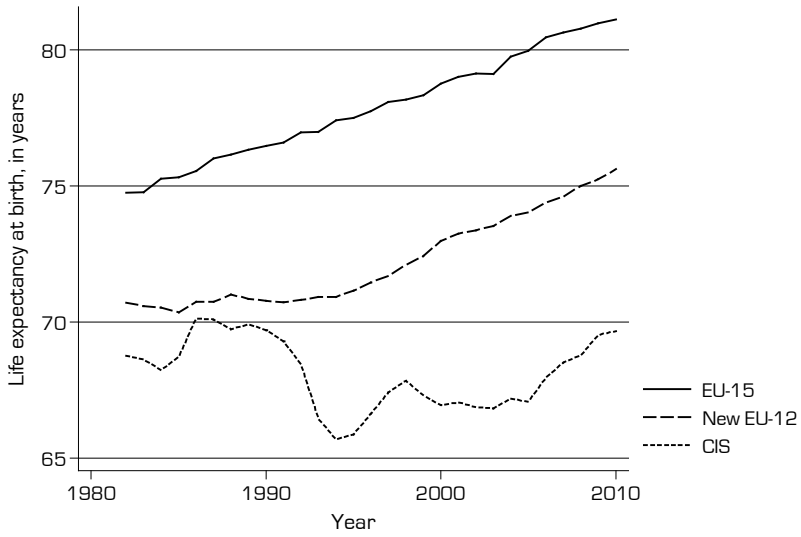


NOTE: mapping done with ADePT amap (Lokshin, Sajaia, and Radyakin, 2008), shapefiles from GISCO, Eurostat (2010).

A simple illustration could be the life expectancy at birth (LEB) average trajectories for three European groups of countries (Figure 6.2): Western EU countries, the new EU member states and the Commonwealth of Independent States (CIS) – former SU republics. It is clear that the gap in LEB levels between EU-15 and the rest of Europe already existed at the beginning of the 1980's. Moreover, while LEB in the EU-15 has been steadily increasing over the last three decades (and longer), the new EU CEE and CIS countries had on average a rather diverse fate. Starting with 1990's the new EU CEE states have indeed stepped onto the road of health improvement, almost similar to the EU-15, but only at a lower level; hence, they are developing somewhat in parallel. At the same time the CIS countries on average have been experiencing unprecedented shocks – one after another.

Therefore, it is evident that the traditional East-West health divide has changed – or even perhaps was not so clear-cut to start with. Nowadays, the "Eastern" countries are extremely diverse in their health outcomes. Hence, there is a need to analyse in depth the extent of this diversity, and where the divide can now be located. Vågerö (2010) argues that the divide has indeed been *shifting* eastwards, and questions whether it will persist or not. *Shifting* of the East-West health border further East is one of the possibilities of the health-related change on the European continent. This entails the post-Communist countries levelling out with their Western neighbours, with the rest of the Eastern states lagging behind. The second possibility could be the *multiplying* of the divide in Europe, as for instance, Marmot and colleagues (Marmot *et al.*, 2010) argue. They note that there are three distinct groups within the European continent in terms of health by now, which results in a 'double-divide'. However, many of the post-Communist countries have turned towards the Western states for guidance, and indeed in the political and economic spheres have moved closer to the West evidenced by the 2004 and 2007 EU accessions. Could the new EU-member states be a somewhat 'blurred boundary' between West and East? This chapter will concentrate on the East-West divide in terms of health and try to disentangle this health divide puzzle: are the borders shifting, blurring or multiplying?

Figure 6.2. Life expectancy at birth for EU-15, new CEE EU-12 and CIS.



SOURCE: (WHO, 2012)

It is important to note that most studies on the East-West divide usually analyse exclusively life expectancy and mortality indicators (Andreev, McKee, and Shkolnikov, 2003; Bobak and Marmot, 1996; Hertzman, Kelly, and Bobak, 1996; Marmot *et al.*, 2010; Vågerö, 2010), with some focus on subjective individual health (Carlson, 1998; Carlson, 2004; Sungurova, Johansson, and Sundquist, 2006). All of the mentioned indicators are usually assumed to be proxies for *overall health*, without further investigation of what constitutes health. While LEB can be a reasonable proxy for health, same time it may reflect only part of the concept of health. The definitions of health often refer to health beyond physical health, for instance, according to World Health Organisation (WHO), health is "... not merely the absence of disease or infirmity" (WHO, 1976: 2). In the meantime, mortality-based indicators only measure physical health or presence of a serious illness. At the same time, incidences of non-life-threatening diseases and mental illnesses are not taken into account. While it is difficult to measure people's health other than physical health, this chapter will try to arrive at a more encompassing 'health profile' – a range of health indicators, reflecting different sides of the concept of health.

6.1.2 AIMS OF THE CHAPTER

The aims of this paper are two-fold. *First*, macro-level health as a concept is assessed. Various macro-level public health indicators are analysed in order to understand whether all of them reflect the *overall* concept of 'health' or whether they describe *different aspects of health*?

After this being established, I move to the *second* aim of this chapter, which is to summarise health trajectories in Europe and to analyse the development of the East-West health divide in detail. Throughout this dissertation the East-West divide in its classic form has been taken for granted: all of the EU-15 countries were considered to be on the one side, all the rest – on the other. The transition countries were all bundled together, but the transition countries themselves are extremely different and probably diverging, and this diversity is addressed. This chapter tries to answer the main questions: Has the boundary of the European health divide *shifted*, become more *fuzzy* or perhaps can we now talk about European *divides*, rather than *one divide*? It is also crucial to understand whether the

original classical health divide existed to begin with or perhaps it was mislabelled from the beginning.

The chapter proceeds as follows. First, the data and methods used are outlined in section 2. I turn the focus of the analysis to the macro-level and concentrate exclusively on the health indicators' dynamics in the broad Europe, East and West. Section 3 presents the results, which are then discussed in the concluding section 4.

6.2 METHODS AND DATA

6.2.1 DATA USED

This chapter returns to macro-level analysis, this time of Europe on the whole. As the focus is on the East-West divide in terms of *health*, World Health Organisation (WHO) "Health for All" database (HfA DB) updated in 2012 (WHO, 2012) is used. The dataset provides rich information on the health indicators, both mortality- and illness-based, for 53 countries of the European continent. As the East-West divide refers to the divide between the Western and post-Communist transition countries, only the countries that can be classified as such were included. Hence, Turkey and Israel were excluded from the dataset on purpose, as neither of them belongs to the post-Communist transition or West European countries. In the end, 45 countries were included in the analysis (Table 6.1), as data for some countries, particularly the smaller ones, was missing.

Table 6.1. Countries included in the analysis.

1	Albania	16	Greece	31	Portugal
2	Armenia	17	Hungary	32	Republic of Moldova
3	Austria	18	Iceland	33	Romania
4	Azerbaijan	19	Ireland	34	Russian Federation
5	Belarus	20	Italy	35	Slovakia
6	Belgium	21	Kazakhstan	36	Slovenia
7	Bulgaria	22	Kyrgyzstan	37	Spain
8	Croatia	23	Latvia	38	Sweden
9	Czech Republic	24	Lithuania	39	Switzerland
10	Denmark	25	Luxembourg	40	Tajikistan
11	Estonia	26	Malta	41	TFYR Macedonia
12	Finland	27	Montenegro	42	Turkmenistan
13	France	28	Netherlands	43	Ukraine
14	Georgia	29	Norway	44	United Kingdom
15	Germany	30	Poland	45	Uzbekistan

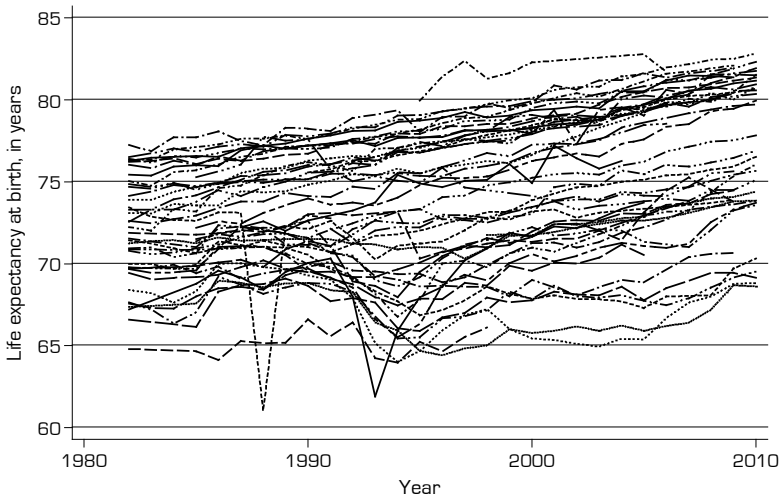
NOTE: Andorra, Bosnia and Herzegovina, Cyprus, Monaco, San Marino and Serbia were excluded due to data unavailability. Israel and Turkey were excluded for the reasons of thematic fit.

HfA DB is publicly available and is provided for the years 1970-2010[43]. I focus on the years 1982-2010, as the main focus is the transition years and the years just before, but also much of the data from earlier years are missing. A panel dataset was created for 45 countries over 29 years. Overall this created 1,479 observations, but there are missing values for some of the variables in some countries, hence the final amount of observations is different according to each indicator (see Table 6.2 for summary statistics).

[43] Even though the last update was in August 2012, the data for 2011 for most countries is still not available.

Figure 6.3 demonstrates the trajectories of change in life expectancy at birth (LEB) for all countries in the sample. This is one of the essential indicators, which takes into consideration mortality and the age at which deaths happen. It is clear from the graph that from the starting conditions in 1982 up to 2010 the trajectories of LEB are different in different countries, but it is difficult to distinguish the exact patterns. One can see that some of the countries experienced harsh shocks in LEB in the 1990's – these are many of the post-Soviet countries. It is also possible to notice that the countries have become somewhat more dissimilar over the last decades, even though the range has not increased so much.

Figure 6.3. Life expectancy at birth (LEB) trajectories for 45 European countries.



SOURCE: HfA DB (WHO, 2012), LEB in years

6.2.2 METHODS

Several methods were used in this study. First, *exploratory factor analysis (EFA)* is conducted on a big set of diverse health indicators. This is done to identify whether health can be explained by just one underlying factor or whether different factors of health can be distinguished. Within the factors (if more than one) several indicators would be selected for the second step of the analysis. Thus, the second part of the study concentrates on selected indicators and analyses their trajectories over time. Using *longitudinal cluster analysis* it is possible to arrive at different clustering of the health trajectories. The trajectories' groupings, which were created for each of the indicators, are synthesised and analysed. Finally, cluster analysis is carried out at the start of transition and then in one of the recent years in order to better understand the health divide in the beginning and at the end of the timeline.

Factor analysis

Generally speaking, factor analysis is a method, which analyses whether several variables are linearly related to a more general unobservable factor or factors (Tryfos, 1998). It can be used for assessing scale validity, developing theoretical constructs and summarising the relationships between different variables (Thompson, 2004: 4-5). The goal in this chapter is to summarise all the available health indicators in order to determine whether they fall into one single category of 'health' or whether they describe different aspects. This also reflects the discussion in sociology of health (Gold, Stevenson, and Fryback, 2002) about the definition of health: are there different aspects to it?

There are two types of factor analysis: exploratory and confirmatory. When there is no strict theoretical grounding reflecting the components of unobserved factors, exploratory factor analysis (EFA) is used. Meanwhile, confirmatory factor analysis (CFA) assumes an a priori existence of a certain theoretical model, which a researcher is testing empirically (hence, "confirming"). While one might have a hypothesis about the health indicators' groupings, the aim in this chapter is to explore whether there are any empirical similarities or dissimilarities in the health indicators, therefore, *exploratory factor analysis (EFA)* is used.

Sample size considerations in EFA are important to note. Guadagnoli and Velicer in (1988) suggested that factors can be identified in three ways: by four or more components with structural coefficients (loadings) greater than 0.6 if the sample is smaller than 150; ten or more components with 0.4 score when sample size is bigger than 150; or when the sample size is over 300 (ibid.). At the same time, MacCallum and colleagues (1999) argue that an even smaller sample size can produce accurate results, as it depends on the nature of the data. Costello and Osborne (2005) suggest that while indeed EFA is a "large-sample" procedure, hence the more the better, it is still more accurate to look at the 'subject to item ratio' in each analysis, rather than simply sample size. Authors do find that the larger datasets provide more accurate results, and the ratio of for instance 20:1 produce 70% of correct factor structure, only 0.07 error in factor loadings and no failures to converge (Costello and Osborne, 2005: 7). Overall, the sample size in this chapter is far above 300 and the subject to item ratio is expected to be larger than 20 (will be reported in the results) therefore no problem is envisioned in this regard.

Rules for locating items within certain factors are also diverse. Some criterions were mentioned above: 0.6 being a necessary factor structural loading if the number of items is small. Stevens (1992), however, argues that the significance of the structural loadings is highly related to the sample size and suggests for a structure coefficient higher than 0.364 for samples greater than 200. Tabachnick and Fidell (2007) suggest 0.32 as a good rule for the minimum factor structural loading on an item, with a preference for stronger loaders. In this chapter the 0.32 rule is used.

Factor loadings were determined using a *principal (axis) factor* method, as the traditional principal component analysis possesses a lot of weaknesses (Costello and Osborne, 2005: 2). *Orthogonal methods of rotation* assume no correlation between factors (ibid.), while indeed health indicators might intertwine and correlate in a complex structure. Therefore, the *oblique oblimin criterion* rotation method with the default delta (0) was selected to rotate the initial factor analysis results[44]. Scree plot and eigenvalues were examined in order to identify the appropriate number of factors. The standard rule for selecting the number of factors is the Kaiser criterion, which states that factors should be retained if the eigenvalues exceed 1 (Thompson, 2004: 32). However, this rule is often considered outdated and inaccurate, hence scree test is used. First no factor-number restriction is included in the initial stages, but after examining the scree plot and eigenvalues only the relevant number of factors is further examined. All the EFA procedures were performed in Stata SE 10 (StataCorp, 2007).

[44] Orthogonal varimax rotation will also be performed to report the 'accounted variance' statistic, which is not available with the oblique rotation. More on factor analysis methodology can be found elsewhere (e.g. Thompson, 2004; Tryfos, 1998).

Longitudinal and cross-sectional cluster analysis

General strategy

Cluster analysis groups observations based on the data provided so that the objects in the same group are more similar to each other than to the objects in other groups (Tan, Steinbach, and Kumar, 2005). Similar to factor analysis, cluster analysis does not provide any explanations, and it is often used in data-mining and initial data analysis. Generally, there are several types of cluster analysis, which can be separated into two big families: model-based and classical algorithmic approaches, which in turn distinguishes partitioning (e.g. k-means) and hierarchical [45] methods (Han and Kamber, 2001). Both have their advantages and disadvantages, but the major advantage of the algorithmic approaches is in the absence of assumptions of normality, which for longitudinal data is particularly relevant (Genolini and Falissard, 2010).

Longitudinal datasets, however, pose some difficulties for cluster analysis, as the data are not recorded in a static form cross-sectionally. *Longitudinal (or time-series) cluster analysis* does precisely what the name suggests: it clusters objects in a dataset by time (Genolini and Falissard, 2010). This way, not cross-sectional patterns, but rather patterns of trajectories over time are analysed and clustered into groups. This type of analysis is relatively new and is not often used due to the lack of software availability and clear instruments (Genolini and Falissard, 2010; Warren Liao, 2005). However, it has a potential to become in demand, particular in epidemiology, where the need to compare the trajectories of patients' illnesses and recoveries often exists.

Longitudinal cluster analysis adopts many of the techniques of the static cluster analysis and adjusts them to the time-series dataset. More details on longitudinal cluster analysis are discussed elsewhere (Han and Kamber, 2001; Warren Liao, 2005). For this chapter it is important to acknowledge the choice of the main cluster analysis technicalities: method, clustering algorithm and similarity measure.

Analysis using KmL

In this paper I use the publicly available package "KmL" (Genolini, 2012a) in the R Project statistical programme (R Core Team, 2012). KmL stems from **K**-**m**eans for **L**ongitudinal data, and is using the partitioning method with the *k-means algorithm*. KmL provides a choice of distance measure, but to keep the analysis simple, *Euclidean distance* is used. The optimal number of clusters is chosen based on the *Calinski and Harabatz criterion*, adjusted by Genolini measures of this criterion will also be reported in the results section.

One of the strengths of KmL is that it allows the researcher to run the algorithm many times, and retain the best solution – this ensures the weaknesses of k-means as a hill-climbing algorithm are dealt with (Genolini and Falissard, 2010: 320). Besides that, KmL deals with missing data by calculating the Gower adjustment and imputing the missing values where possible (ibid.: 320-321).

The variables for cluster analysis were selected within each factor identified by factor analysis: between one and four variables within each. Cluster analysis was run separately on each health indicator, as the KmL package only deals with single-variable clustering[46].

[45] There is also research on density-based and grid-based methods (Han and Kamber, 2001), however, as they are not essential for the longitudinal cluster analysis, they are skipped in this section.

[46] Genolini also developed KmL 3D package (Genolini, 2012b) for cluster analysis with two variables, however, as in the current paper more than two variables are used, it is more reasonable to run single-variable cluster analysis and synthesise the results it later on instead of complicating pair-wise clustering.

The analysis was run using 40 redraws and the amount of missing data was a maximum of 15 time-points out of 29 per country. K-means algorithm was run using two, three, four and five clusters, and the optimal number of clusters was chosen according to Calinski and Harabatz for each variable. After that all the results were merged and synthesised.

Cluster analysis synthesis

The countries, which fall in the same grouping across all variables involved in the cluster analysis were immediately grouped together. Then the rule of majority was used, and finally individual cases discussed and clustered. When all the clusters are identified, mapping of the groupings is carried out to illustrate the health divide in Europe. Stata-run ADePT Automated Mapping Tool Version 2.0 (Lokshin, Sajaia, and Radyakin, 2008) was used for the mapping of the final clusters. World shapefile was used for mapping the whole continent obtained from Eurostat (GISCO, 2010).

Cross-sectional cluster analysis in 1991 and 2008

While KmL generates answers about the dynamics of health change, there is little known about the clustering in each single year across the whole European health profile. Therefore, the final part of the analysis consists of a simple cross-sectional cluster analysis, described earlier and performed in certain time-points of transition. This is done in order to understand the dynamics of the change of the divide better: has the divide/s existed throughout transition or developed in the meantime? Thus, the years are chosen pre-transition or in the very beginning and one of the recent years. Due to data limitations, the years prior to 1990 could not be selected hence 1991 is chosen, as the closest year to the start of transition. The final year is 2008 – later years don't provide full statistics. In each of the selected years cluster analysis using weighted pair-group average (WPGMA) method is performed with the Gower measure of dissimilarity as a distance measure. I used the Duda-Hart and Calinski-Harabasz stopping rules for determining the best number of clusters, as well as dendrograms are presented in the Appendix. The results from the whole analysis are then summarised.

6.3 RESULTS

6.3.1 PART 1: EXPLORATORY FACTOR ANALYSIS

EFA was performed on the whole pooled dataset using all variables without panel dataset structure. The selection of the variables for the EFA was a long process. While WHO DB (2012) provides more than 200 health-related indicators, it was essential to be restrictive: the analysis simply cannot be done on all the available indicators. Therefore, I set the goal to choose about 30 of them. Initially the most commonly used in health sociology variables were selected. Out of these, the variables that could most reflect the differences between the traditional East and West, were identified. This was necessary to be able to better trace the differences in health in Europe. Those included several life expectancy indicators, death rates from cardio-vascular diseases, cancer-related indicators. Factor analysis was provisionally run on a set of 30 variables without factor-number limitation as a means of data reduction[47]. In the end 22 variables were used for the factor analysis, which are presented together with the descriptive statistics in Table 6.2.

[47] Which included for instance SDR from diabetes and crude death rate. Those are interesting to analyse, but this is beyond the scope of this study. There are different ways to deal with cross-loading items, and if there are other stronger loading items, it is considered to be reasonable to exclude them from the analysis (Tabachnick and Fidell, 2007).

As it was mentioned in the previous section, first the factor analysis was performed without the factor restriction and the eigenvalues and scree plot were analysed. As can be seen from Figure 6.4, the main break happens already at the second factor, which would identify that the main health indicators are clustering in the first cluster. However, as there is unequal quantity of mortality-related and incidence related indicators, it is valuable to look at the other factors as well. The next – smaller – "break" happens at four factors, which means that three factors can be identified. Therefore, for the purpose of the further analysis I retain five factors and run EFA with this restriction: three factors as the scree plot suggests, plus another two for analysis to make sure variables do not cross-load and there are no unexpected findings.

Table 6.2. Variables used for EFA and summary statistics

Var.	Explanation	Obs.	Mean	Std. Dev.	Min.	Max.
aidsinc	AIDS incidence per 100000	1429	1.26	2.51	0	32.14
cancinc	Cancer incidence per 100000	1009	329.27	162.22	23.53	875.84
hivinc	HIV incidence per 100000	1094	4.78	8.08	0	108.06
IM	Infant deaths per 1000 live births	1241	12	9.52	0	57.28
LE65	Life expectancy at age 65, in years	1201	16.21	1.88	12.18	21.3
LE65f	Life expectancy at age 65, in years, female	1201	17.72	2.06	12.45	24.22
LE65m	Life expectancy at age 65, in years, male	1201	14.25	1.88	10.58	19.17
LEB	Life expectancy at birth, in years	1228	74.04	4.33	60.98	82.83
LEBf	Life expectancy at birth, in years, female	1228	77.57	3.78	60.95	86.58
LEBm	Life expectancy at birth, in years, male	1228	70.45	5	56.62	80.44
MM	Maternal deaths per 100000 live births	1240	18.62	21.73	0	174.81
probdie5	Probability of dying before age 5 years per 1000 live births	1205	15.17	13.86	0.5	97.33
redLE65	Reduction of life expectancy through death before 65 years	1201	7.11	2.73	2.88	18.78
redLE65f	Reduction of life expectancy through death before 65 years, female	1201	5.08	2.05	1.94	19.75
redLE65m	Reduction of life expectancy through death before 65 years, male	1201	8.74	3.38	3.4	21.7
SDR	Standardised death rate (SDR) all causes, all ages, per 100000	1217	934.39	253.90	464.08	1622.78
sdrcirc064	SDR, diseases of circulatory system, 0-64 per 100000	1191	109.54	62.52	21.28	289.91
sdrinf	SDR, infectious and parasitic disease, all ages per 100000	1180	12.07	11.84	0	112.73
sdrment	SDR, mental disorder & disease of nervous system & sense organ, all	1171	20.42	11.41	0	75.35
sdrtub	SDR, tuberculosis, all ages per 100000	1133	5.46	6.69	0	46.92
suphinc	Syphilis incidence per 100000	1232	14.80	33.36	0	277.65
tubinc	Tuberculosis incidence per 100000	1374	34.59	31.85	0	186.38

SOURCE: (WHO, 2012)

NOTE: The data is polled across all years and countries.

After running the EFA on 22 indicators with five factors, both orthogonal and oblique rotations are performed. Only the latter rotation results are reported, however. Overall the final factor analysis included 690 observations: missing data was excluded. Table 6.3 reports the detailed results. When identifying to which factor each item belongs I first identified whether the loadings are above 0.32. Some of the still existing cross-loaded items are put in the factor, loading to which is higher for the indicator in question. One can see that half of the indicators load confidently in the first factor, with life expectancy at the age

65 (LE65) lading perfectly onto it. Other indicators only partially reflect factor 1, but are still important to take into account.

Table 6.3. Factor analysis loadings, after oblique oblimin rotation, five factors retained.

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Uniqueness
LE65	**1.02**	0.03	-0.03	0.04	0.10	0.01
LE65f	**0.97**	-0.05	-0.05	0.08	0.15	0.02
LE65m	**1.03**	0.14	0.00	-0.04	-0.08	0.04
LEB	**0.73**	-0.21	-0.08	-0.07	-0.16	0.00
LEBf	**0.68**	-0.36	-0.06	0.00	-0.03	0.02
LEBm	**0.74**	-0.10	-0.08	-0.12	-0.25	0.01
redLE65	**-0.47**	0.35	0.11	0.14	0.32	0.01
redLE65m	**-0.55**	0.23	0.12	0.15	0.32	0.02
SDR	**-0.82**	0.05	0.16	0.03	0.11	0.01
sdrcirc064	**-0.62**	0.14	0.26	0.07	0.15	0.07
sdrment	**0.71**	-0.18	0.18	0.03	0.15	0.48
cancinc	0.21	**-0.68**	-0.06	-0.02	0.28	0.29
IM	-0.13	**0.93**	-0.04	-0.06	0.00	0.03
MM	-0.03	**0.69**	0.21	-0.01	0.06	0.29
probdie5	-0.04	**0.99**	-0.06	-0.04	0.05	0.02
redLE65f	-0.29	**0.63**	0.06	0.08	0.21	0.04
sdrinf	0.23	**0.75**	0.34	0.14	0.04	0.20
sdrtub	-0.13	0.29	**0.65**	0.11	-0.05	0.08
suphinc	-0.21	-0.18	**0.68**	0.00	0.14	0.41
tubinc	-0.41	0.10	**0.41**	0.29	-0.23	0.22
aidsinc	0.15	-0.11	-0.17	**0.60**	-0.18	0.64
hivinc	0.01	-0.23	-0.03	**0.58**	0.07	0.65

NOTE: N=690, N/item = 31.36. 'Uniqueness' is the opposite of communality and identifies how unique the indicators are. SOURCE: (WHO, 2012)

Six other indicators load in the second factor (with probability of dying before age 5 being the strongest and perfectly loading in factor 2), whereas factors 3-4 are represented by three and two indicators respectively. This makes the latter factors rather weak, but they are still reported. None of the indicators load to the fifth factor[48]. Even though according to the scree plot (Figure 6.4) and eigenvalues, a maximum of three factors should be retained, and the fourth factor is rather weak, when I look at its composition, it does present interest, therefore is still reported. All the factors' compositions are presented in Table 6.4.

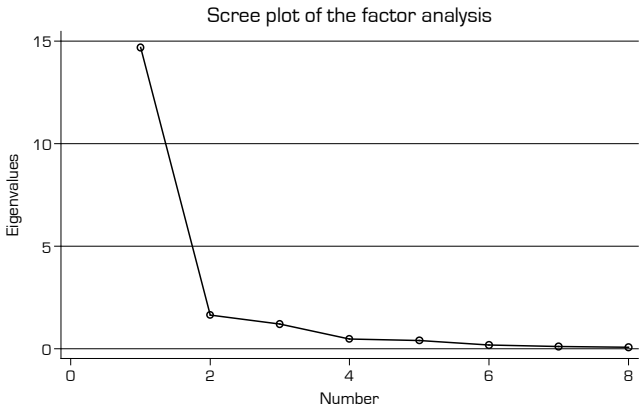
After examining the indicators in each factor, it is easy to note that the first factor is filled predominantly with mortality-based standard indicators: LEB, SDR. The second factor mostly unites the variables related to female and child health, with some exceptions, like cancer incidence and SDR from infectious diseases. Infectious diseases could be related to infant deaths for instance. The third factor consists of tuberculosis and syphilis, while the fourth is AIDS and HIV, which are characteristic of one 'disease'.

It is important to note that indicators loading in the first factor are the least unique, hence they share more communality. This is a very strong argument in favour of the researchers using the variables from factor one as the leading health indicators in research, as they do perhaps reflect health in the most comprehensive way, when just one indicator is sought. Interestingly, it is LE65 (total and male particularly) and not LEB that is the better representative of the whole 'mortality-based group'. This could be explained as much of the mortality-related difference between East and West is found in the mid-age male mortality,

[48] According to orthogonal varimex rotation factors 1-5 account for 0.53, 0.3, 0.09, 0.04 and 0.03 proportion of variation in the data respectively. All 5 factors together therefore account for 99.25% of variation, 4 – 96.23%, 3 – 92.44%, 2 – 83.41%.

which is much higher in the East (2005a; Brainerd and Cutler, 2005b; Gerry, 2007). Most unique are AIDS and HIV indicators, which is not surprising.

Figure 6.4. Scree plot of eigenvalues of the first eight factors.



NOTE: Eigenvalues Factor1:14.73; Factor2:1.65; Factor3:1.2; Factor4:0.48; Factor5:0.39.

Table 6.4. Indicators' loading within the factors.

Factor	Thematic name	Indicators
1	Standard mortality-based indicators of health	Life expectancy at birth, in years
		Life expectancy at birth, in years, male
		Life expectancy at birth, in years, female
		Life expectancy at age 65, in years
		Life expectancy at age 65, in years, male
		Life expectancy at age 65, in years, female
		Reduction of life expectancy through death before 65 years
		Reduction of life expectancy through death before 65 years, male
		SDR, diseases of circulatory system, 0-64 per 100000
		SDR all causes, all ages, per 100000
		SDR, mental disorder & disease of nervous system, all
2	Female and child health related indicators	Cancer incidence per 100000
		Infant deaths per 1000 live births
		Maternal deaths per 100000 live births
		Probability of dying before age 5 years per 1000 live births
		Reduction of life expectancy through death before 65 years, female
		SDR, infectious and parasitic disease, all ages per 100000
3	Infectious and tuberculosis	SDR, tuberculosis, all ages per 100000
		Syphilis incidence per 100000
		Tuberculosis incidence per 100000
4	AIDS	AIDS incidence per 100000
		HIV incidence per 100000

6.3.2 PART 2: LONGITUDINAL CLUSTER ANALYSIS

In the previous part of the analysis I arrived at a four-factor structure of the concept of health. In order to cluster the European countries according to their *full* health profiles, I include indicators from each of the four factors, which are then used for longitudinal cluster analysis one by one. I also include a different number of indicators from different factors according to their size in order to not skew the analysis to any of the aspects of 'health profile', arrived at in the section above. Hence, five indicators are included from factor 1, three from factor 2, two from factor 3 and one from factor 4, which are all listed in Table 6.5. KmL was performed on all indicators separately one by one. Below the results from one of the indicators from each factor are presented, the full details for all indicators are reported

in Chapter 6 Appendix. The results for the best-fitting number of clustering are presented in Table 6.6, based on the Calinski-Harabatz stopping rule criterion suggests.

Table 6.5. Indicators used for the longitudinal and cross-sectional cluster analysis.

Factor 1	Factor 2	Factor 3	Factor 4
Life expectancy at birth, in years	Cancer incidence per 100000	SDR, tuberculosis, all ages per 100000	AIDS incidence per 100000
Life expectancy at birth, in years, female	Infant deaths per 1000 live births	Tuberculosis incidence per 100000	
Life expectancy at birth, in years, male	Maternal deaths per 100000 live births		
SDR, diseases of circulatory system, 0-64 per 100000			
SDR all causes, all ages, per 100000			
Five indicators	***Three indicators***	***Two indicators***	***One indicator***

As one can easily identify, seven out of eleven indicators under review cluster into three or four trajectories, while only four still have two groups as the optimal number of clusters (like the two-group traditional East-West divide), with three or four being the next best. Interestingly, all the indicators in factor 1 land in three clusters, while others are diverse. What is also important is that the indicators which generally have very particular disease structures – e.g. AIDS and cancer, separate optimally in two groups. The graphs below report only the optimal number of clustering for one indicator from each factor.

Table 6.6. Optimal number of clusters of health indicators' trajectories (Calinski-Harabatz criterion).

	Optimal number of clusters	Next optimal number of clusters
Life expectancy at birth, in years	3	2
Life expectancy at birth, in years, female	3	2
Life expectancy at birth, in years, male	3	4
SDR, diseases of circulatory system, 0-64 per 100000	3	4
SDR all causes, all ages, per 100000	3	2
Cancer incidence per 100000	2	3
Infant deaths per 1000 live births	2	4
Maternal deaths per 100000 live births	4	3
SDR, tuberculosis, all ages per 100000	2	3
Tuberculosis incidence per 100000	3	2
AIDS incidence per 100000	2	3

Figure 6.5 presents the graphical result of the KmL for LEB, which conveniently illustrates the stopping rule and the potential trajectories' clustering. While the optimal grouping is three clusters, a two-cluster combination also comes close. On Figure 6.5 LEB trajectories are very clear. Most of them are improving, however divergently. In cluster A the improvement mostly happens evenly, whereas there are greater shocks in group B, and cluster C fairs worse overall. After shocks in the 1990's, the LEB in cluster C returns to

more or less the same level as in the initial period. Not surprisingly, countries landing in cluster A are most of the West-European states, while cluster C comprises of for instance, Russia, Belarus, Ukraine, Moldova, Kazakhstan and some other former-Soviet countries.

Figure 6.6 presents one of the indicators from factor 2: cancer incidence (other indicators are reported in the Chapter 6 Appendix). Cancer incidence can cluster in two or three groups. Interestingly, the tendencies for cancer incidence are opposite to the mortality-based indicators: cancer is more prevalent in the developed Western states than in the East-European ones. Therefore, the countries of the trajectories at the bottom of Figure 6.6 are the least-developed EE countries.

Figure 6.5. KmL: Life expectancy at birth, in years.

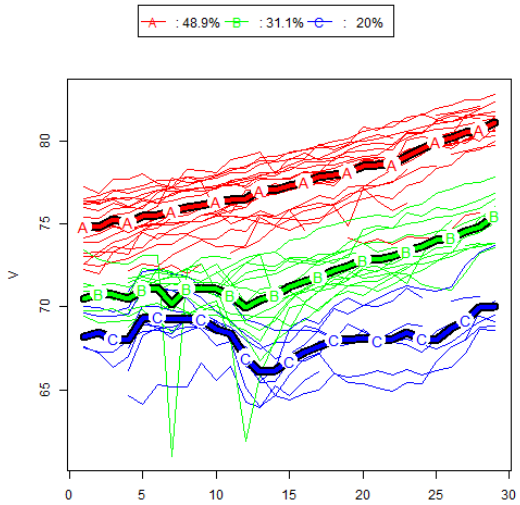


Figure 6.6. KmL: Cancer incidence per 100000.

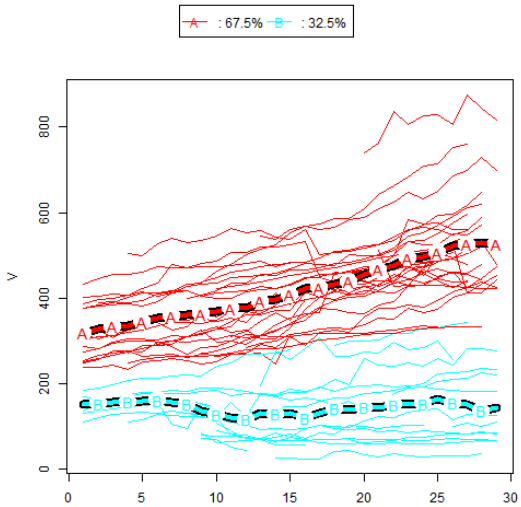


Figure 6.7 (p.135) illustrates the trajectories according to tuberculosis (TB) incidence, and similar to the factor 1 variables, here Russia, Moldova, Kazakhstan are clustered together in the C cluster with the highest incidence of TB and most turbulent trajectories.

AIDS incidence doesn't provide a very good and clear clustering of trajectories (Figure 6.8, p.135) as most countries – both West and East land in the same trajectory. AIDS statistics are extremely hard to note and record, are often missing or misleading in many countries, and do not share much of communality with the other health indicators.

All in all, there is some diversity of clustering according to each indicator. Most of the health outcomes point towards a three- or four-cluster structure of the health trajectories in Europe, while only four identify smaller number of groupings. Generally, there is unanimity of the pattern within each factor, but not between, which points towards the idea that the measurement of health is extremely diverse. This implies that in order to have a more comprehensive health measure, several indicators have to be used in analysis, as they are different and perhaps reflect various aspects of health.

6.3.3 PART 3: LONGITUDINAL CLUSTERING SYNTHESIS

To summarise and create a better understanding of health outcome clustering, all of the groupings are synthesised together and a colour-coded table is created for visualisation (Table 6.7, p.136). As was explained before, patterns of countries belonging together are sought. The clear cases are those countries which land in the same groups across all indicators. Next, these similar patterns of clustering are searched, and in the end individual "outlier" cases analysed.

Figure 6.7. KmL: Tuberculosis incidence per 100000.

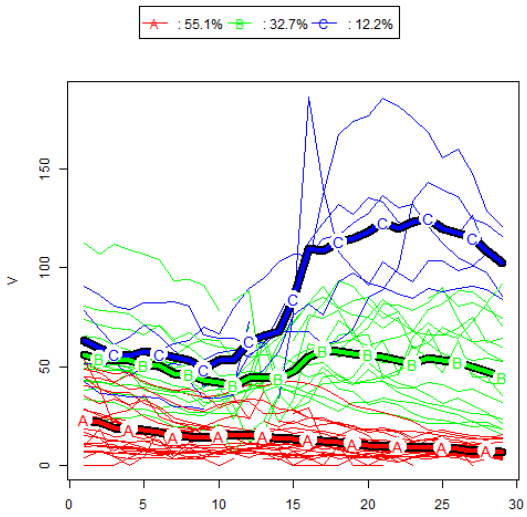
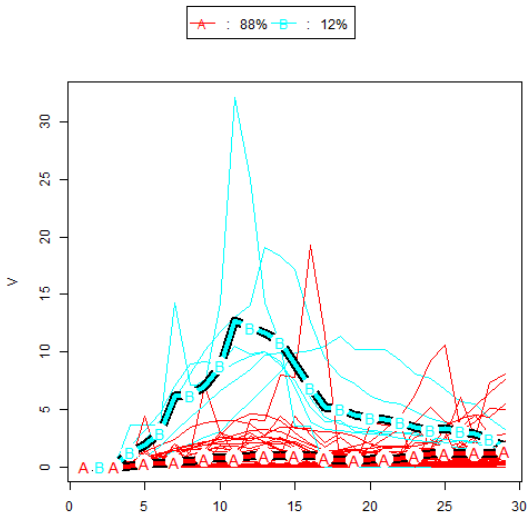


Figure 6.8. KmL: AIDS incidence per 100000.



As KmL analysis determined in the section above that European countries could be clustered into a different number of groups according to different indicators: between two and four. However, the graphs did not give a clear idea of which countries belong to which clusters – and for determining the change in border of the East-West divide, this is crucial.

Table 6.7 reports clustering of countries' trajectories in all the health outcome indicators examined. Only the optimal-number-of-clusters solutions are taken into account, hence countries land into two, three or four groups depending on the indicator in question. The cells in the table are colour-coded for ease of illustration and interpretation.

The last two columns in Table 6.7 summarise all the indicators' clustering into two alternative solutions of the final clustering: one with three and one with four clusters. I can see that according to the four-cluster classification, the first three groups are relatively obvious: the combinations of clusterings are rather straightforward. The fourth group, however, presents what was earlier called the outliers: countries which do not have any typical combination of clusters. Below each final cluster of the four-group solution is discussed.

First, it is easy to notice that almost half of the whole set of countries falls into the biggest cluster (group A). These are the countries of Western Europe, with only one *exception* – a country, which is most often clustered together with the Easter European block – *Slovenia*. Most of the countries are grouped in the same cluster across all indicators, from all four factors, with only several countries deviating from this pattern. Five of those deviants fall in a different group in AIDS incidence, and this is more of a theoretical than empirical factor.

The *second* group (overall group B) is also easily identifiable with countries in the clusters B on the majority of 3-grouped clusterings. These are primarily the countries of Central East Europe, particularly the newest members of the EU – Bulgaria, Czech Republic, Estonia, Hungary, Lithuania, Poland, Romania, and Slovakia. They are also joined by the former Soviet republics of Armenia and Georgia, as well as Croatia – all of which share a somewhat peculiar health culture, which comes very close to what is traditionally known as 'Mediterranean'. Interestingly, when it comes to the 2-group clustering on several indicators (cancer, infant mortality), these countries align with cluster A, rather than other East European states. Hence, these countries come closer and closer to the *Western European* states, rather than the rest of Eastern Europe.

Table 6.7. Summary of clustering according to all health indicators.

N	Country	LEB	LEB f	LEB m	sdr circ 064	SDR	canc inc	IM	MM	tub inc	sdr tub	aids inc	3 gr	4 gr
1	Austria	A	A	A	A	A	A	A	A	A	A	A	A	A
2	Belgium	A	A	A	A	A	A	A	A	A	A	A	A	A
3	Denmark	A	A	A	A	A	A	A	A	A		A	A	A
4	Finland	A	A	A	A	A	A	A	A	A	A	A	A	A
5	France	A	A	A	A	A		A	A	A	A	B	A	A
6	Germany	A	A	A	A	A	A	A	A	A	A	A	A	A
7	Greece	A	A	A	A	A		A	A	A	A	A	A	A
8	Iceland	A	A	A	A	A	A	A	A	A	A	A	A	A
9	Ireland	A	A	A	A	A	A	A	A	A	A	A	A	A
10	Italy	A	A	A	A	A	A	A	A	A	A	B	A	A
11	Luxembourg	A	A	A	A	A	A	A	A	A	A	A	A	A
12	Malta	A	A	A	A	A	A	A	A	A	A	A	A	A
13	Netherlands	A	A	A	A	A	A	A	A	A	A	A	A	A
14	Norway	A	A	A	A	A	A	A	A	A	A	A	A	A
15	Portugal	A	A	A	A	A		A	A	B	A	B	A	A
16	Slovenia	A	A	B	A	A	A	A	A	A	A	A	A	A
17	Spain	A	A	A	A	A		A	A	A	A	B	A	A
18	Sweden	A	A	A	A	A	A	A	A	A	A	A	A	A
19	Switzerland	A	A	A	A	A	A	A	A	A	A	B	A	A
20	UK	A	A	A	A	A	A	A	A	A	A	A	A	A
	Approximate 'traditional' East-West divide border													
21	Armenia	B	B	B	B	B	B	A	B	B	A	A	B	B
22	Bulgaria	B	B	B	B	B	A	A	A	B	A	A	B	B
23	Croatia	B	B	B	A	B	A	A	A	B	A	A	B	B
24	Czech Rep.	B	B	B	B	B	A	A	A	A	A	A	B	B
25	Estonia	B	B	C	B	B	A	A	B	B	A	A	B	B
26	Hungary	B	B	B	B	B	A	A	A	A	A	A	B	B
27	Lithuania	B	B	C	B	B	A	A	A	B	A	A	B	B
28	Poland	B	B	B	B	B	B	A	A	B	A	A	B	B
29	Romania	B	C	B	B	B	B	B	D	C	A	A	B	B
30	Slovakia	B	B	B	B	B	A	A	A	A	A	A	B	B
31	Belarus	C	B	C	C	C	A	A	A	B	A	A	C	C
32	Kazakhstan	C	C	C	C	C	B	B	C	C	B	A	C	C
33	Kyrgyzstan	C	C	C	C	C	B	B	C	C	B	A	C	C
34	Moldova	C	C	C	B	C	B	B	B	C	B	A	C	C
35	Russia	C	C	C	C	C	A	A	B	C	B	A	C	C
36	Turkmenistan	C	C	C	C	C	B	B	B	B	B	A	C	C
37	Ukraine	C	C	C	C	C	A	A	B	B	B	A	C	C
38	Uzbekistan	C	C	B	C	B	B	B	B	B	B	A	C	C
39	Albania	A	B	A	A	A	B	B	B	A	A	A	B	D
40	Azerbaijan	B	B	B	B	B	B	B	B	B	B	A	B	D
41	Georgia	B	B	B	B	B	B	B	B	C	A	A	B	D
42	Latvia	C	B	C	C	B	A	A	B	B	A	A	C	D
43	Macedonia	B	B	B	B	B	B	B	A	B	A	A	B	D
44	Montenegro	A	B	A		A		A				A	B	D
45	Tajikistan	B	C	B	B	B	B	B	C	B	B	A	C	D
	N Clusters	3	3	3	3	3	2	2	4	3	2	2	3	4

NOTE: Empty sells appear where more than 15 cases were missing.

The *third* group unites many of the countries of the former Soviet Union: Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Turkmenistan, Ukraine and Uzbekistan (group C). All of these countries, with minor exceptions, land in clusters C in the 3-cluster groupings and clusters B in the 2-cluster groupings. All of them have experienced dramatic shocks in their health outcomes across all indicators in the 1990's, all of them land in the weakest-performing clusters as well, with the exception of cancer – the "developed countries' disease"[49].

The *fourth* group (group D) is an interesting set of diverse countries from Central Asia and the Balkans: Albania, Azerbaijan, Georgia, Latvia, Macedonia, Montenegro, and Tajikistan.

[49] There is evidence that suggests that while cancer incidence is lower in CEE, survival rate is lower than in the Western EU (Levi *et al.*, 2004a; 2004b). CEE is also blamed for underreporting cancer incidences (Ferlay *et al.*, 2007), therefore all summary statistics are treated with caution.

Montenegro joins this group as it has a lot of missing data, hence the classification is somewhat incomplete. Most of the present clustering solutions land in cluster A, however, Montenegro might share more traits with nearby countries of Macedonia and Albania. Albania shares some clusters with the Western European group, and some with the Post-Soviet countries of cluster C, therefore it is somewhere in between. Macedonia shares the characteristics of cluster B and C. In the end, in the three-cluster classification all Balkan states are allocated together with Central Eastern countries in group B.

Azerbaijan and Georgia are similar to the case of Macedonia in the way of sharing the characteristics of both groups B and C, however, all of the factor-one indicators, which were determined to be the best overall health proxies, fall together into group B. Therefore, both of them are grouped with group B in the three-cluster classification. Tajikistan – while similar to the two countries discussed above, has more similarity to group C, and hence gets grouped with the rest of the post-Soviet countries in the final three-cluster classification.

Finally, Latvia presents a somewhat unexpected case. It shares the clustering patterns with all groups, and is particularly difficult to place as anything other than part of the "outlier group". Surprisingly enough, when Latvia is compared to the way it clustered in different groups, it is most similar in its pattern to Belarus with difference only on two indicators. Hence, Latvia joins the group C in a three-cluster solution.

All in all, I find the most workable the clustering of three groups. The fourth 'group' only unites the outlier cases, which could potentially be classified into other groups.

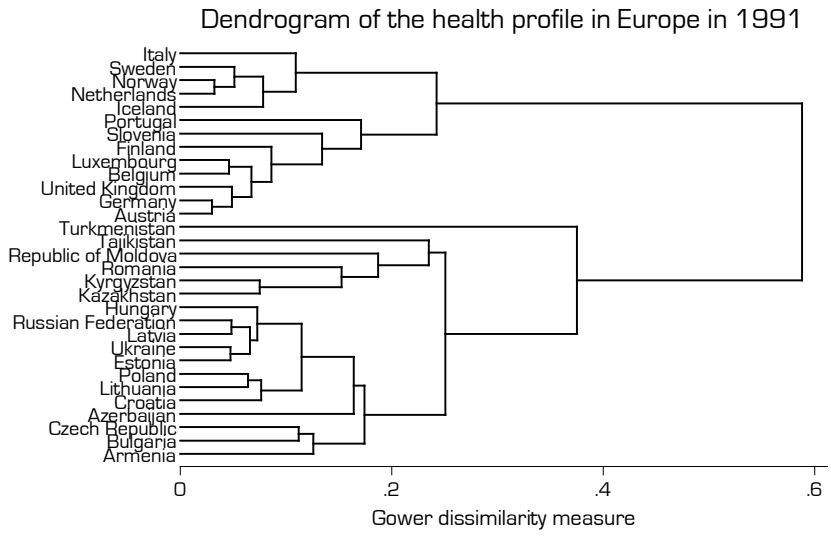
6.3.4 PART 4: CROSS-COUNTRY HEALTH PROFILE CLUSTER ANALYSIS IN 1991 AND 2008

After finding a three-cluster separation in Europe, the question still remains whether this divide has existed before the start of transition, and simply the divide was somewhat mislabelled for some countries; or whether the divide has changed throughout transition so that the European health divide has shifted – or multiplied?

Health divide in 1991

The cluster analysis is performed on the whole health profile for all the countries, where data are available. The dendrogram is presented in Figure 6.9, which clearly identifies the two-group divide: traditional West and East, with the East group separating into possibly two more groups with Turkmenistan being an outlier.

Figure 6.9. Dendrogram for the cluster analysis, 1991.



Here the most important statistics then are the results from the stopping rules, which give an idea of the group composition best fitting the dataset at hand. Table 6.8 presents the stopping rules for the cluster analysis in 1991, which according to both statistics identifies two clusters as the best division. According to Duda, three clusters is close, but the third cluster is Turkmenistan, hence this option is not considered.

Overall division is presented in Table 6.9, which clearly presents the traditional East-West divide, with only one exception: Slovenia joins the Western camp from the very beginning of transition. Hence, cluster analysis carried out on the whole health profile indicates that the initial health divide did exist in its classic form – before and in the very beginning of transition.

Table 6.8. Stopping rules for the health profile cluster analysis in 1991.

Number of clusters	Duda		Calinski
	Je(2)/Je(1)	T-squared	
1	0.3102	64.5	
2	**0.8108**	**3.73**	**64.5**
3	0.7757	4.34	38.77
4	0.5745	8.15	31.5
5	0.4269	4.03	27.51

Table 6.9. Health profile cluster composition: 1991.

Cluster A		Cluster B	
Armenia	Latvia	Austria	Portugal
Azerbaijan	Lithuania	Belgium	Slovenia
Bulgaria	Poland	Finland	Sweden
Croatia	Republic of Moldova	Germany	United Kingdom
Czech Republic	Romania	Iceland	
Estonia	Russian Federation	Italy	
Hungary	Tajikistan	Luxembourg	
Kazakhstan	Turkmenistan	Netherlands	
Kyrgyzstan	Ukraine	Norway	

Health divide in 2008

The second cross-sectional cluster analysis is carried out it in the most recent years, where data are available. The dendrogram in Figure 6.10 shows how the countries can be separated in the groups in 2008. It is clear from the cluster tree that there are two more dissimilar groups, one of which is comprised of essentially post-Soviet countries: Ukraine, Moldova, Kyrgyzstan and Kazakhstan. The rest fall into a different group, which in turn separates into two groups: Western Europe and mostly post-Communist countries, joined by Belarus and Armenia.

To establish the best fit of the number of clusters to the data, stopping rules are referred to. As seen from Table 6.10, combining both indicators of Duda and Calinski, three clusters can be identified. Five clusters also provide a good fit, but then firstly the clustering becomes too detailed, and secondly, Ukraine for example, then forms a cluster by itself. Therefore, the three-cluster structure fits the data better, which is in line with the dynamic cluster analysis in the previous part.

The separation of countries into clusters is presented in Table 6.11. The only outlier, which was differently clustered compared to the time-series cluster analysis, is Belarus. In 2008 it

joins post-Communist countries of Eastern and Central Europe. Nevertheless, while the cross-sectional cluster analysis only focuses on one year, the longitudinal cluster analysis is deemed to produce more accurate results for the overall classification.

Figure 6.10. Dendrogram for the cluster analysis, 2008.

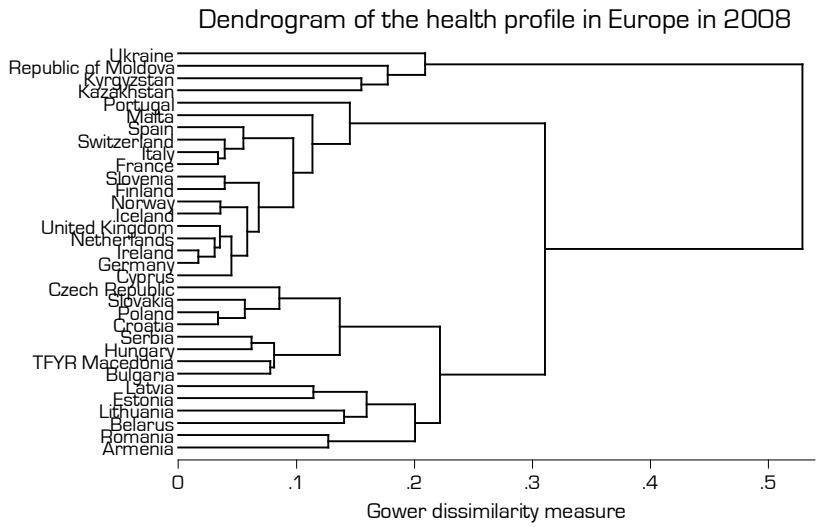


Table 6.10. Stopping rules for the health profile cluster analysis in 2008.

Number of clusters	Duda		Calinski
	Je(2)/Je(1)	T-squared	
1	0.5478	25.59	
2	0.1531	149.35	25.59
3	**0.6441**	**6.63**	**153.9**
4	0.7329	0.73	142.44
5	0.9185	0.36	105.92

Table 6.11. Health profile cluster composition: 2008.

Cluster A	Cluster B	Cluster C
Cyprus	Armenia	Kazakhstan
Finland	*Belarus*	Kyrgyzstan
France	Bulgaria	Republic of Moldova
Germany	Croatia	Ukraine
Iceland	Czech Republic	
Ireland	Estonia	
Italy	Hungary	
Malta	Latvia	
Netherlands	Lithuania	
Norway	Poland	
Portugal	Romania	
Slovenia	Serbia	
Spain	Slovakia	
Switzerland	TFYR Macedonia	
United Kingdom		

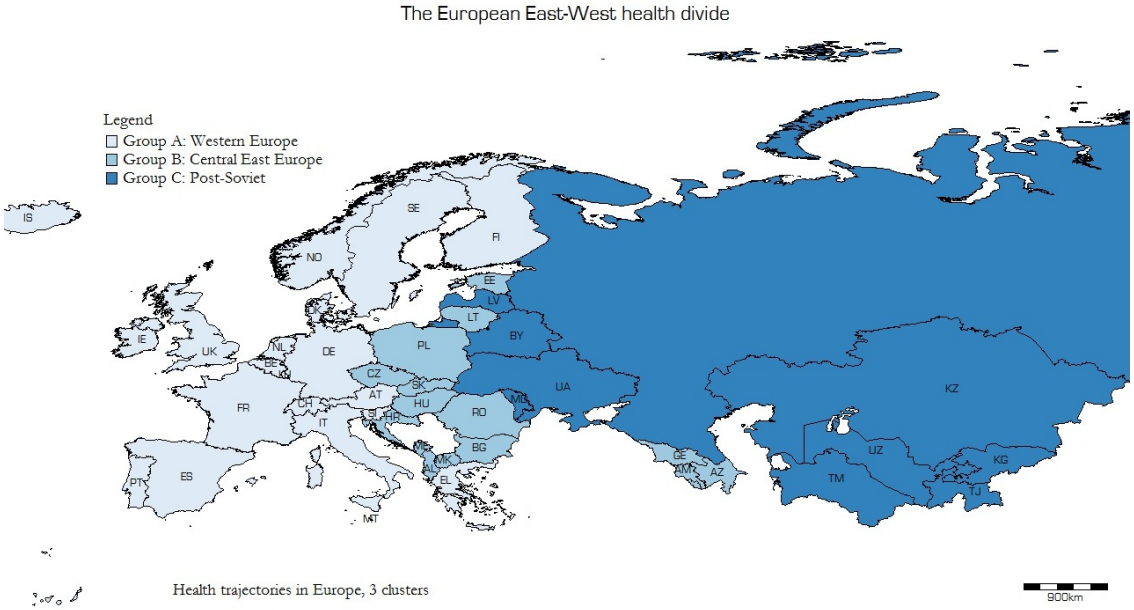
NOTE: Not all countries had the data available across all the indicators in the health profile, hence were excluded from the analysis. This cluster analysis, however is meant to reflect approximate borders in 2008, hence not all countries are necessary.

6.3.5 SUMMARY

Overall, all the analyses performed identified three general clusters on the European continent. The countries within the first group of the three-cluster solution can be identified as predominantly "Western European", the second – as "Central East Europe" or the "Post-Communist" (with several exceptions), whereas the third – as "Post-Soviet". The four-cluster solution suggests similar clustering with only a separate group of outliers – countries, which don't *exactly* follow the patterns of the above mentioned groups. While they do diverge, it was still possible to fit them within the three groups, if the "entry-criteria" is made a little wider. Therefore, the three-cluster solution is found more meaningful and interpretable.

A map (Figure 6.11) of clusters is the best illustration of the health divide, which portrays in a very visual form the adjusted European health divide. Overall, nearly half of the countries on the European continent fall into the group of the "West", but the rest do not fall in one category of the "East". There is one more group in between the 'very West' and the 'very East' and geographically it runs exactly in the middle as a kind of buffer or divider between the two.

Figure 6.11. Map of European East-West divide according to 11 health indicators, three clusters.



NOTE: analysis performed on WHO HfA DB (WHO, 2012), mapping done with ADePT amap (Lokshin, Sajaia, and Radyakin, 2008), shapefiles from GISCO Eurostat (GISCO, 2010).

6.4 DISCUSSION AND CHAPTER CONCLUSIONS

This chapter concentrated on macro-level health across all European countries measured in its traditional indicators of mortality and incidence of diseases in the population. The aims were two-fold. First, the measurement of the 'overall' concept of health was to be established from the existing macro-level indicators via factor analysis. The main question, which was addressed, was "Do all indicators load on the same factors, or do they reflect different aspects of health?" Second, the selection of health indicators, which created the 'health profile', were analysed in first a longitudinal and then cross-sectional cluster analysis. This was done to systematically identify the existing health divide of the European continent. Does the 'traditional' health divide still hold, and has it ever since the fall of Communism?

And are there any changes in the health divide in Europe? The analysis showed to be quite fruitful, and the findings are manifold and important.

In the ***first part***, the factor analysis identified several factors among the health indicators. The factors can be roughly characterised as mortality-based, female and child health, tuberculosis and AIDS- related. The first factor is still the biggest one and indicators in it possess the highest degree of communality. This means that on the one hand, it is justified to use traditional variables like LEB, LE65 and SDR as the most encompassing proxies for health, when only one indicator is required. On the other hand, the multi-factor structure indeed implies that when the most comprehensive measurement of the concept of health is sought, other aspects of health have to be taken into account as well. The full 'health profile' also contains the important female and child-health indicators, along with tuberculosis and AIDS measures.

The ***second part*** of the analysis provided food for interpretation and discussion. *First*, different health indicators provide different numbers of clusters for the European countries. While this is a bit of a confusing finding, it is also logical. The health indicators landing in different factors also provide diverse clustering: they are different not only in and by themselves, but also country-wise. Potentially it is possible to even say that the European health divide is different depending on different health indicators.

Second, when clustering of all indicators is summarised, *three groups* emerge on the European continent: "West Europe" (group A), "Post-Communist/Central East Europe" (group B) and "Post-Soviet" (group C).

Third, the traditional East-West divide existed prior to and in the start of transition, as evidenced by the cross-country analysis in 1991 and the health data going back to 1982. The traditional East-West divide separated Europe into two parts: East and West with the border roughly between the EU-15 and the rest post-Communist states. This, however, slowly changed throughout transition. The analysis throughout this dissertation pointed towards the strong transition countries' diversity, which was confirmed in this study. Even when generalisations are made, transition countries are no longer as coherent as the traditional East-West divide suggests, but rather confirms some findings of other researchers of an existence of a three-group divide (Marmot *et al.*, 2010). However, the divide found in this chapter is not so clear cut in geographical terms: some of the Post-Soviet countries, traditionally associated with the rest of the CIS states (Armenia, Azerbaijan, Georgia) end up together with the more economically-developed Central European countries.

The nature of the new divide is quite interesting. One group could appears to be a somewhat "fuzzy border" between the East and West. In fact it is not so fuzzy: there is a very clear double-divide with three separate groups. But even when one considers a two-group solution (which does not fit the data best), the border would rather move East of the traditional divide. The new members of the EU and some other post-Communist states have moved closer to the EU in their health trajectories and could join them and not their Eastern neighbours for a two-cluster divide. At the same time, the border has definitely ***not*** *shifted* yet: there are still considerable differences between groups A and B (i.e. traditional West and partially East). What is nevertheless clear: group B countries share some characteristics with group A and few with group C (the rest of the 'traditional' East). Hence, it is ***not*** *the fuzzy border* case of the merger between East and West, where both characteristics from the West and East are present in group B countries. Group B is a somewhat independent group in terms of the countries' health profiles and it strives for similarity with the West. Group C countries seem to have fallen further apart and contributed to widening the health gap within the transition region. Hence, the European

health divide has changed throughout transition: from the traditional two-group separation it *multiplied* into those catching the traditional West and those following unclear and potentially dissimilar paths.

All in all, the diversity within the *transition region* can no longer be questioned. What is more, there are clear similarities and differences between the countries, which makes it possible to distinguish at least two groups in terms of health profiles among the transitional countries. The East-West divide – as a singular divide – can no longer be supported, as a *double divide* has emerged in the past twenty years. Indeed, the start of transition brought many of the transition countries apart by widening health gaps, and doubling the European health divide. Technically, the divide can potentially be referred to as the "East-Central-West" divide. This finding systematically and consistently supports the idea of the strong diversity within the transition region, hence, using it as a whole should be done by researchers with caution and clear understanding of the pitfalls of doing so. It is, however, advised to take this diversity into consideration and use the appropriate methods, data and country selection when health in the Central East European countries is analysed.

GENERAL CONCLUSION

THE CHANGING HEALTH IN EUROPE

Understanding the paths of improving health in a society is crucial for any country's development. It is also of particular importance to any individual – as perhaps 'living life to the fullest' starts with living it healthy. This thesis dealt with the very important issues of public and individual health in Europe. To conclude this thesis I will first summarise the main goals, outline some of the limitations faced, and then discuss the overall findings placing them in a broader theoretical perspective. I finish with some implications and concluding remarks.

WHAT WAS DONE: A SUMMARY

The primary purpose of this thesis is to develop a better understanding about what health is and how it is determined. This was done by merging different strands of research on health determinants and analysing diverse factors influencing health in the same models. One strand of research concentrates primarily on the so-called negative (i.e. absence of disease) *objective* health of populations, influenced by more *objective* contextual societal and health care characteristics (e.g. Berger and Messer, 2002; Deaton, 2003; Deaton, 2006; Elola, Daponte, and Navarro, 1995; Marmot *et al.*, 2010). In contrast, another approach tends to evaluate the *subjective* determinants that are influencing *subjective* health at the individual level (e.g. Bobak *et al.*, 1998; Carlson, 1998; Subramanian, Kim, and Kawachi, 2002). The two approaches are rarely used together, however, I aimed at better understanding health by merging the differences and similarities between objective and subjective, individual and societal health, as well as objective and subjective determinants into one overarching analytical framework. This research was done on the sample of countries of the broader Europe with a special focus on the transition region with the goal of understanding the diversity of transition countries better, as well as analysing how different they are from the West. Therefore, two sets of research questions have been put forward for this thesis:

- *First*, the questions directly dealing with disentangling the links between the objective and subjective, and population and individual: Do objective and subjective, individual and public measures of health express the same concept? In what way do subjective and objective determinants influence health? Does context play a role for individual health?
- *Second*, the questions related to the particular choice of the area of study were put forward: Is health in transition countries differently determined compared to health in the West? Has the European health divide changed, for example blurred, shifted or multiplied?

In order to answer these research questions, five studies were conducted under the theoretical framework developed in Chapter 1, with an extended augmented health function approach. Two of the studies (Chapters 2-3) concentrated only on the population health and its determinants with a particular focus on health care systems in Chapter 2. Two more studies (Chapters 4-5) put individual health – both subjective and objective – at the centre of the story and tried to disentangle the links between health and its' determinants at different levels. While the first three studies (Chapters 2-4) carried out analyses the diverse, but still narrow, group of transition countries, Chapters 5-6 extended the approach to the whole of Europe. In particular, Chapter 6 concentrated specifically on the macro-level European health divide, and its concomitant change(s). Throughout the five studies very diverse methodologies have been used to suit the particular research questions and tasks at hand – from mixed methods health care classification to panel and multilevel regressions, to factor and cluster analyses. The theoretical and methodological richness allowed me to analyse the set of research questions from many different angles.

LIMITATIONS

In order to understand the expanse of this work fully, however, it is essential to point out the possible drawbacks and limitations faced throughout this work. *First,* the concepts of objective and subjective health were used in a somewhat narrow and approximate form. The usage of the individual-level indicators of subjective health and a more objective (but still relatively subjective) 'functional state' left a lot of room for interpretation. In this thesis I have not argued for absolute 'objectivity' or 'subjectivity' in the measures of health, but accepted that some of the measures are 'more objective', and others less. In order to understand better what people feel and how their reality is subjectively constructed, a completely different approach, research questions and focus would be needed, such as conducting in-depth interviews trying to understand the deeper meanings of health evaluations in survey questions, similar to what Krause and Jay (1994) do in their work. The more subjective assessment of 'general health' by individuals was compensated for by the great number of respondents in the data I utilized which help to normalize, or make up for diverse interpretations of health, across respondents. More in-depth research, however, is far out of reach of this thesis and the analysis is done based on the assumptions, outlined in Chapter 1, that 'more objective health' can be expressed through a more objective measure of self-evaluation of the functional state. Evaluation of the functional state creates some reference point for the respondents (ability to perform every-day tasks), while subjective health is more broad.

Second, the focus on *overall* determinants in their variety and entirety, rather than on one or two selected factors is a limitation. None of the determinants were brought up front as the 'singular most important' leaving health open to subsets of measures and open for further clarification. This can be considered a weakness or a strength of this thesis, but finding the single most important determinant of health was neither a goal, nor an intention of this research. Having one most important determinant is useful for seeking a way to improve the health function of a society, but having diverse factors helps to broaden, if not deepen general theoretical perspectives and understandings of health. The main purpose of the analysis conducted in the empirical studies was *bridging the gap between different approaches* to analysing health – hence, testing the proposed theoretical and methodological framework of augmented health production function

Third, due to the already complex framework, some of the indicators, shown to be important in other research, were not analysed at all – such as income inequality (e.g. Böckerman *et al.*, 2009; Hildebrand and van Kerm, 2009; Jen, Jones, and Johnston, 2009b; Lynch *et al.*, 2004), working conditions (Joyce *et al.*, 2010), social class (e.g. Coburn, 2004; Marchand, Wikler, and Landesman, 1998; Murray, Gakidou, and Frenk, 1999) or detailed lifestyles (e.g. Cockerham, 2000; Pampel and Denney, 2011). They were excluded for reasons of data limitation, and not enough scope to include 'everything' and give it a proper attention at the same time. These determinants are 'large' in-and-of-themselves and deserve alternative analysis as opposed to casual or sporadic usage. This is not seen as a major drawback, but rather an option for future work testing the functional hypothesis.

Fourth, one could say that the usage of *proxies* for economic, political, social and health care determinants might have been misleading, as some of the determinants were not the same throughout the different studies, but were 'representing' one or another 'sphere' of determinants. However, this also gave me the flexibility to adjust the framework slightly in each study, as well as compare the results between the studies. Ultimately there are not enough countries and measurements are too endogenous (i.e. GDP, democracy, LEB, and etc.) to be certain of what determines what.

Finally, a 'generalisation' debate can also be opened. While I want to make conclusions about health overall, the region of interest is still relatively narrow: mostly transition countries and Western Europe. One might ask if those are too 'special' to be able to represent valid links between health and factors influencing it. Indeed, I find that health is determined differently in East and West within Europe, but including Western European countries into the analysis makes it possible to observe health determinants in two still diverse, but re-unifying, regions. Therefore, the overall conclusions presented below refer to the findings in both regions, and are summaries of only the universal and general links. I do generalise to the theory introduced in Chapter 1, but it is acknowledged that Europe is the main population in this thesis. More research is needed to test the theoretical framework in other parts of the world.

EMPIRICAL FINDINGS AND OVERALL CONCLUSIONS

In this conclusion I attempt to synthesise all the findings (presented in detail in Chapters 2-6) around the main research questions and discuss some other unexpected results.

THE CONCEPT OF HEALTH: OBJECTIVE VS. SUBJECTIVE, INDIVIDUAL VS. POPULATION

One of the central topics of this thesis has been the concept of health itself. As I argue in Chapter 1, health is complex, and analysing it in sociology, or any other discipline, is inevitably 'simplistic'. There are several ways to look at health: it can be a negative or a positive notion, it can be measured through more objective or more subjective measures, or it can be referred to at the individual, or group-level. Negative and more objective health is often criticised for being too narrow (WHO, 2006), while positive, holistic health is immeasurable in quantitative research (Garner, 1979; Larson, 1996). Subjective health is often considered reflective of positive health (Idler and Kasl, 1995; Idler and Benyamini, 1997), but is still a very controversial indicator (Jylha *et al.*, 1998; Mathers, 2003). Therefore, there are supporters of both objective and subjective measures, and still many researchers use the two measures of health *interchangeably*, rather than clearly distinguishing between them as they have very different determinants structures (e.g. Mossey and Shapiro, 1982; Ratner, Johnson, and Jeffery, 1998; Sherman, Hughes, and Tavakoli, 1995).

In this thesis I set out to better understand the differences and similarities between objective and subjective measures of health by comparing their determinants: *are they determined the same or different*? It is clear that two concepts, determined and caused through different processes, cannot be the same. Through a series of analyses of both individual and population health, I find that ***regardless of the level of aggregation, objective and subjective health are differently determined*** (Chapters 2 – 5). Different factors influence objective and subjective health and to different degrees. While both objective and subjective health are measures of health – physical, psychological, positive, negative or a mixture of them – they do not reflect one and the same thing. I would therefore, agree with Jylha and colleagues (1998), Mathers (2003) and others (e.g. Krause and Jay, 1994), that the above indicators should be used interchangeably with caution. Considering the complexity of the concept of health, these measures are still all we have in health sociology and have to be used. But they can be named what they really are – "a more objective functional state" and "subjective general health", but not branded under the same broad concept of 'health'.

The second side of health analysed in this thesis, was the difference between individual and population-level health. Indeed, is health the state of an individual or the summary statistics of a country? Arah (2009) argues that these two notions are inseparable and

interrelated: individuals depend on the general health in the community, and a community depends on how individuals within it are doing. Starfield (2001) does not make a big distinction between the determinants of individual and public health: they are practically the same (ibid.: 453). But are they really? After analysing health at the macro- and micro-levels, I find that there are only minor differences in the way health is determined at different levels. Very generally, economic, political, and social factors, as well as health care influence health at the country-level, but so do equivalent individual-level indicators. At the same time, contextual determinants have only minor effects on individual health (see section below) – the same contextual indicators that determine population health. Therefore, ***the individual and population health – while determined similarly at their respective levels*** (hence, the existence of a general determinants of health frameworks is indeed possible), ***do not have a very straightforward relationship with each other*** (Chapters 4 – 5). This calls for further research in this area.

DETERMINANTS OF HEALTH: RESULTS OF MERGING DIFFERENT APPROACHES

The next most important focus of the thesis was clarifying the determinants of health by merging the approaches to analysing health: between objective-subjective and macro-micro (see Chapter 1, p.15). This was done within the developed augmented health production function.

First, ***subjective and objective determinants influence health differently***, regardless of which health measure we take into account – objective or subjective, individual or population. On the one hand, objective determinants tend to have a stronger relationship particularly with objective health, but subjective indicators seem to matter for both objective and subjective health (Chapters 3, 5). Therefore, separating the analysis of health into two distinct approaches, where subjective health is analysed within the 'subjective determinants' frame (e.g. Bobak *et al.*, 2000; Kawachi, Kennedy, and Glass, 1999; Ratner, Johnson, and Jeffery, 1998), and objective – in objective (e.g. Berger and Messer, 2002; Elola, Daponte, and Navarro, 1995; Nixon and Ulmann, 2006), is somewhat misleading, if not altogether wrong. Ignoring some of the determinants creates incomplete and biased models of health production. In agreement with Berger and Luckmann (1966), and Elias (1978), I find that how people experience their reality and construct it around them (hence, subjective indicators) is important, and should be taken into account – particular when *individual health* is analysed. After all, it is individuals who evaluate the conditions around them and compare these evaluations to what they perceive others' perceptions of the conditions, and at the macro-level subjective measures might simply reflect a certain climate or set of norms in the society.

On the other hand, going in more detail, there is more diversity in the effects of the determinants on health: economic, political, social and health care objective and subjective indicators influence health differently (Chapters 3, 5). Therefore, it is difficult to establish the *exact* differences between the more objective and more subjective determinants, as they also ***differ by sphere***.

Second, while the 'determinants' structures' (outlined in Chapter 1) are equivalent at different levels, the ***contextual effects on the individual health are low and weak*** (Chapters 4 – 5). This finding follows the arguments of Gravelle (1998) and Jen, Jones and Johnson (2009a; 2009b) about inequality: as soon as the individual-level indicators are taken into account, the context does not matter as much. I find in Chapters 4 – 5 that country-level indicators do not significantly influence individual health, objective or subjective. There are some exceptions, but they are not systematic across the East and West, datasets or analyses. What turned out to be a somewhat surprising finding was the effect of GDP on individual health: it was not significant in any of the studies and models

for individual health, whereas at the macro-level it is one of the leading determinants of population health (Chapters 2 – 3). This contributes to the debate of 'whether wealthier necessarily means healthier': while some argue that this link is indeed strong (e.g. Deaton, 2003; Pritchett and Summers, 1993; 1996; Sala-i-Martin, 2007), I support the findings of others (e.g. Biggs *et al.*, 2010; Deaton, 2006; Jen, Jones, and Johnston, 2009a; 2009b; Wilkinson, 1996) that the overall wealth of the country does not matter for *individual* health. In my work this is true at least in the European setting – where perhaps the income differences are not as dramatic as in the whole world. But maybe, the answer in this 'wealth-health' debate depends on the level of health measurement: overall health of a society might be influenced by national affluence, while for individuals the individual circumstances are much more significant.

EUROPEAN HEALTH DIVIDE: THEN AND NOW

Last, but not least, the final part of findings deals with 'revisiting' the European health divide (Chapters 5 – 6). The first three empirical chapters concentrated on the transition countries – similar, but diverse. The diversity of the transition countries is unquestionable, as Chapters 2 – 4 along with other studies illustrate (e.g. Brainerd, 1998; Chawla, Betcherman, and Banerji, 2007; Cornia and Paniccià, 2000; Figueras *et al.*, 2004). In order to understand this diversity better and make more sense of the European health divide, transition countries were compared with the West. While it is well-established that the general East-West divide exists (e.g. Bobak and Marmot, 1996; Carlson, 1998; Velkova, Wolleswinkel-van-den-Bosch, and Mackenbach, 1997), the nature of this health divide nowadays is rarely analysed in detail: has it changed since the start of transition?

First, my results confirm previous findings that the divide in health exists – even if I take only the traditional East-West divide into account. But it is not only health outcomes that are different, ***health is determined somewhat differently in the 'traditional' East and West parts of Europe***. While individual subjective health is determined somewhat similarly in the East and West, the biggest difference exists in objective health in the East (for details see Chapter 5). Besides that, contextual effects seem to have almost no effect in the East, compared to the West, which could be explained by the still existing instability of socio-economic and political situations in transition countries, as well as perhaps greater individual-level hardships as a consequence of weaker welfare states (e.g. Eikemo *et al.*, 2008b; 2010).

Second, while analysing the diversity of transition countries and concentrating primarily on the border of the European health divide, I find that the ***traditional separation of the European continent into 'East' and 'West' is outdated*** (Chapter 6). With the acknowledgement of the overall diversity of the Central and East European countries, studies started to appear trying to analyse the nature of the changing East-West health divide that argue it is either *shifting* (e.g. Vågerö, 2010) or *multiplying* (e.g. Marmot *et al.*, 2010). I test these hypotheses in Chapter 6 trying to understand whether the divide in public health has blurred, shifted or multiplied as suggested. I find that the transformation of this divide towards something more of an ***'East-Central-West' divide*** has happened over the 1990's and 2000's.

Interestingly, while this divide follows socio-economic and political differences, i.e. West, Communist transition and former Soviet Socialist Republics if we judge by EU membership (some countries have become members of the EU in 2000's, while others – still struggle with their transitions), it is still not equivalent to the EU – non-EU separation. Some of the countries of the former Soviet Union (for instance Armenia and Georgia) join the 'Central' group of primarily new EU members, hence, perhaps controlling simply for 'EU-membership' is not sufficient when analysing health. The European health divide has

evidently changed, and while the determinants of it are not absolutely clear and open a field for future research, it has to be taken into account. These findings took only public objective health into account, and more analysis is needed for tracing the divide changes according to subjective health.

OTHER FINDINGS

There are several other findings, which were not envisioned beforehand, but are worth mentioning. *First*, in Chapter 2, I find that health care systems are very different in the transition countries, and this diversity increased throughout the years of transition. While this was not at the centre of attention in the thesis, these results suggest that some of the reforms and systemic differences of health care explain some variation in health. Indeed, when I compare the results of health care groupings from Chapter 2 and health clustering from Chapter 6, I find certain similarities. While they are of course not equivalent, some of the similarities are striking. For instance, the discussed earlier Armenia and Georgia are grouped into a separate health care system group, which could explain their separation from the 'East' group and joining the 'Central' group in health-based clustering.

Second, I find that in the East marital status has a strong effect on individual objective health, while the usual social and political capital indicators – such as trust in the society, political participation – do not have any effect on health. All of these findings contradict with those of the West. While it is not surprising, as many have found the importance of marital status for health (Bolin *et al.*, 2003; Joung, 1996; Korenman and Goldman, 1993; Lillard and Panis, 1996; Verbrugge, 1979; Wood, Avellar, and Goesling, 2007), but in Central and Eastern European states this link might even be higher perhaps due to weaker welfare institutions (Eikemo *et al.*, 2008b), which results in a weak social security net being centered around the family unit. Therefore, further research might involve more in-depth study of the institutional and political differences in the East and West as determinants of health.

Third, while the goal of understanding the different measures of negative health was not essential, the analysis in Chapter 6 revealed findings important for the fields of health sociology and epidemiology. I confirmed that the universally used summary statistic of life expectancy at birth (LEB) does reflect the overall objective population health best: in the factor analysis (Chapter 6) LEB explains the first factor just on its own. Nevertheless, several sides to health can be identified when a more nuanced 'health profile' is sought: general mortality statistics, female and child health, infectious diseases and HIV-related indicators. Taking these four components into account would provide the most complete 'health profile' of the population health statistics, but for the purpose of analysis where health is not central or the measures are limited, LEB could be a good proxy for at least mortality-based negative health.

IMPLICATIONS

I add to the literature on differences and similarities of objective and subjective health often located in health sociology (Benyamini, Leventhal, and Leventhal, 1999; Cappeliez *et al.*, 2004; Chandola and Jenkinson, 2000; Fylkesnes and Forde, 1992; Idler and Kasl, 1995; Idler and Benyamini, 1997; Krause and Jay, 1994; Lundberg and Manderbacka, 1996; Miilunpalo *et al.*, 1997)I argue that as they are determined differently, they should not be used interchangeably. Furthermore, the findings in regard to the objective-subjective dilemma suggest that researchers should attempt to unite the approaches in order to control for the important determinants of health, and not discard some of the significant links. Finally, the findings about the change in the health divide in Europe extend the ideas of

Marmot and colleagues (2010) and Vågerö (2010). Finding a clear three-group divide, 'West-Central-East' in nature, is a significant extension of what is so far considered the European divide. This newly emerging divide has to be taken into account when analysing health.

Even though the analyses' added value is primarily academic, some policy implications are possible. The findings that context does not have a very strong impact on individual objective health in the East, are potentially relevant for policy-makers and politicians. It is a very general argument, but perhaps, policies targeted at the context do not have the direct effect on individual health compared to the policies targeted towards the individuals and their well-being. Hence, when improving health of individuals is the goal in transition countries, measures should be taken towards improving living conditions, health care provision and access, and social security. These factors might influence individual well-being and health directly. Measures targeted at improving overall economic performance of the countries on the international stage could for some time become a secondary interest. It is important to strengthen institutional support in the East and increase public trust in institutions.

All in all, perhaps the exact policy implications and changes could be a next step in this research. Moreover, while there were certain limitations and some new questions appeared throughout the analysis, further research is possible. Besides more detailed policy implications and study of institutions in the East, an analysis of European health divide borders according to subjective health measures, inclusion of income inequality, social class and detailed lifestyles as determinants of health are all possible options for future research. They are, however, out of scope of this thesis, and might be ideas for future post-doctoral work.

Winston Churchill once said: "Healthy citizens are the greatest asset any country can have" (Churchill, 1952). I can say that if this is true, it is in the interest of public workers, politicians and researchers to further our knowledge – even with small contributions – about how health can be improved. This thesis aimed at trying to better understand health and its determinants in the diverse region of Europe. This was done with the usage of a health production theoretical framework, complex and diverse methodology as well as various datasets collected both at the country- and individual-levels. I find strong differences between objective and subjective, individual and population health, which are also determined differently by objective and subjective indicators. Thus, in order to better understand health, we have to take into consideration not only the living and overall societal conditions people live in, but how satisfied they are with them as well, as this influences their psycho-social and mental health. The European health divide has changed as well since the beginning of 1990's: the simple East-West divide multiplied into a 'West-Central-East' divide. All these findings are important for our further study of health, as well as understanding of the differences on the European continent.

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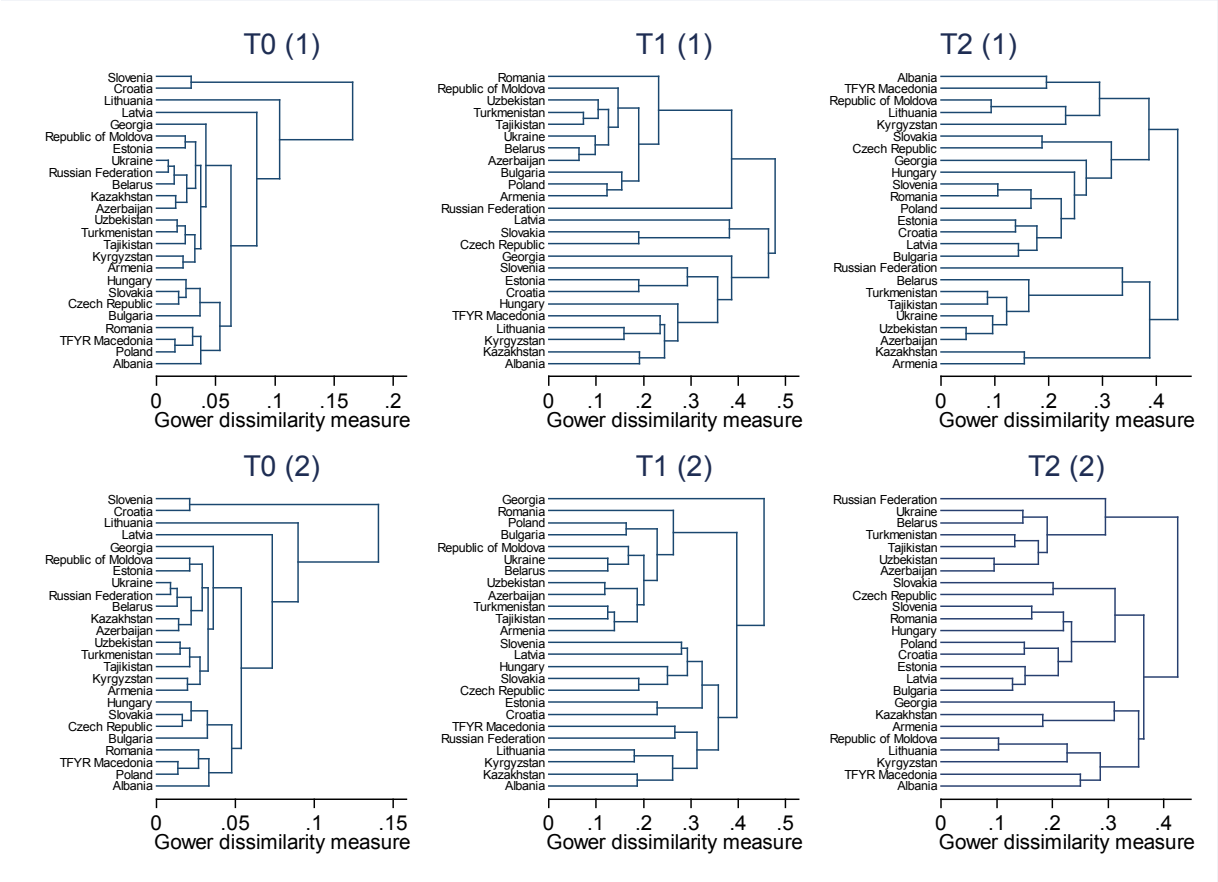
APPENDICES

CHAPTER 2 APPENDIX

Descriptive Statistics for the Cluster Analysis.

Variable	T_0			T_1			T_2		
	Obs.	Mean	St.Dev.	Obs.	Mean	St.Dev.	Obs.	Mean	St.Dev.
SHI	25	0.08	0.28	25	0.52	0.51	25	0.64	0.49
Earmark	25	0.00	0.00	25	0.44	0.51	25	0.52	0.51
Collect	25	0.00	0.00	25	0.36	0.49	25	0.44	0.51
Pool	25	0.00	0.00	25	0.44	0.51	25	0.52	0.51
Purchasing	25	0.00	0.00	25	0.28	0.46	25	0.44	0.51
Risk adj.	25	0.00	0.00	25	0.12	0.33	25	0.20	0.41
Split	25	0.04	0.20	25	0.44	0.51	25	0.68	0.48
VHI exists	25	0.00	0.00	25	0.32	0.48	25	0.76	0.44
VHI on paper	25	0.04	0.20	25	0.48	0.51	25	0.16	0.37
No VHI	25	0.96	0.20	25	0.20	0.41	25	0.08	0.28
THE	0			25	6.12	1.39	25	6.31	1.41
PbHE	0			25	65.11	20.76	25	59.42	20.04
GvHE	0			25	10.22	2.86	25	10.48	3.16
PrHE	0			25	34.89	20.76	25	40.58	20.04
OOP	0			25	90.22	15.98	25	90.36	12.40
SHI of PbHE	0			25	32.31	38.64	25	49.46	39.88
ExtHE	0			25	1.79	3.42	25	2.15	3.59
HE pc PPP	0			25	329.48	251.80	25	682.84	798.07
PbHE pc PPP	0			25	246.16	226.27	25	472.12	606.91
No funds	25	0.92	0.28	25	0.44	0.51	25	0.32	0.48
One fund	25	0.00	0.00	25	0.40	0.50	25	0.56	0.51
Multiple funds	25	0.08	0.28	25	0.16	0.37	25	0.12	0.33
Competition IF	25	0.00	0.00	25	0.08	0.28	25	0.08	0.28
Inpat. organisation	25	0.00	0.00	25	0.12	0.33	25	0.24	0.44
Public outp. ownership	25	1.00	0.00	25	0.64	0.49	25	0.48	0.51
Mixed outp. ownership	25	0.00	0.00	25	0.32	0.48	25	0.44	0.51
Private outp ownership	25	0.00	0.00	25	0.04	0.20	25	0.08	0.28
No provider choice	25	1.00	0.00	25	0.24	0.44	23	0.13	0.34
Limited prov choice	25	0.00	0.00	25	0.24	0.44	23	0.22	0.42
Free provider choice	25	0.00	0.00	25	0.52	0.51	23	0.65	0.49
Hospitals	25	5.60	2.99	25	4.91	2.50	25	4.05	2.04
HB	24	1030.00	282.88	25	817.09	218.69	25	652.61	192.98
Psych HB	25	103.30	40.66	25	80.29	35.41	25	66.35	30.43
Physicians	25	319.77	91.02	25	307.50	89.01	25	305.81	86.26
Dentist	25	40.46	13.18	25	41.62	15.13	25	44.40	20.89
Nurse	23	804.96	216.24	25	698.37	191.08	25	631.99	224.64
Midwife	24	81.91	35.49	25	61.63	27.33	23	44.71	22.27
Admissions	24	19.25	4.58	25	16.04	5.51	25	16.76	6.25
ALOS	24	15.22	1.81	25	13.41	2.49	25	10.25	2.21
Outp. contacts	25	8.51	2.56	25	6.63	3.21	25	6.99	3.52
GP not gatekeeper	25	0.00	0.00	25	0.24	0.44	25	0.24	0.44
GP – gatekeepr on paper	25	0.00	0.00	25	0.56	0.51	25	0.44	0.51
GP - gatekeeper	25	1.00	0.00	25	0.20	0.41	25	0.32	0.48
Immunisation	25	93.42	4.09	25	96.26	4.91	25	96.10	5.97
GP salaried	25	1.00	0.00	25	0.48	0.51	25	0.32	0.48
GP capitation	25	0.00	0.00	25	0.44	0.51	25	0.72	0.46
GP FFS	25	0.00	0.00	25	0.20	0.41	25	0.08	0.28
Outp specialists salary	25	1.00	0.00	25	0.80	0.41	25	0.60	0.50
Outp specialist FFS	25	0.00	0.00	25	0.28	0.46	25	0.52	0.51
Line-item budgeting of hospitals	25	1.00	0.00	25	0.56	0.51	25	0.36	0.49
PBP budgeting of hospitals	25	0.00	0.00	25	0.24	0.44	25	0.68	0.48
FFS budgeting of hospitals	25	0.00	0.00	25	0.28	0.46	25	0.20	0.41
Bonus to doctors	25	0.00	0.00	25	0.08	0.28	24	0.25	0.44
Bonus to hospitals	25	0.00	0.00	25	0.04	0.20	21	0.10	0.30
BBP	25	1.00	0.00	25	0.60	0.50	25	0.60	0.50
No prof organisations	14	0.36	0.50	25	0.16	0.37	25	0.08	0.28
Minor prof organisation	14	0.50	0.52	25	0.60	0.50	25	0.60	0.50
Dev prof organisation	14	0.14	0.36	25	0.24	0.44	25	0.32	0.48

Dendrograms for cluster analysis.



Descriptive Statistics and descriptions for the variables used in the Econometric Analysis

Variable		Mean	Std. Dev.	Observations	Descriptions and measurement
Life expectancy at birth LEB	overall	69.93	3.44	N = 485	Life expectancy at birth, measured in years
	between		3.24	n = 25	
	within		1.34	T-bar = 19.4	
GDP (log)	overall	8.72	0.81	N = 508	Logarithm of GDP per capita in purchasing power parity (PPP) constant 2005 international dollars (WB WDI)
	between		0.77	n = 25	
	within		0.28	T-bar = 20.32	
Political violence (POL)	overall	3.49	6.36	N = 452	Polity IV democratisation index from the Centre for Systemic Peace (CSP), measured on a scale from -10 (least democratic) to 10 (most democratic)
	between		5.8	n = 25	
	within		2.84	T = 18.08	
Military conflict (WAR)	overall	0.28	0.45	N = 537	Dummy variable for the occurrence of military conflict/political violence inside of each country and/or internationally, culled from the total occurrence of conflict in the MEPV dataset of CSP
	between		0.21	n = 25	
	within		0.39	T-bar = 20.65	
Average length of stay (ALOS)	overall	12.57	3.01	N = 441	Average length of stay in hospitals measured in days patients stay in hospitals (proxy for the inpatient care)
	between		2.18	n = 25	
	within		2.11	T-bar = 17.64	
Outpatient contact (OUTPCONT)	overall	7.11	3.37	N = 431	Number of outpatient contacts per person per year (proxy for outpatient care)
	between		3.23	n = 25	
	within		1.05	T-bar = 17.24	

NOTE: 'Between' refers to the deviation and differences between countries/units, while 'within' – within countries.

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CHAPTER 5 APPENDIX

Detailed questions for the independent variables used

Demographic variables

- Age: calculated within ESS from the date of interview and birth of respondents.
- Gender: reported.
- Married: "Could I ask about your current legal marital status? Which of the descriptions on this card applies to you?", different coding across different countries and rounds. As marital status is only a control in our analysis, and is not the centre of attention, for simplicity we use only the official marital status and create a binary variable for being married or not.
- Education: "About how many years of education have you completed, whether full-time or part-time? Please report these in full-time equivalents and include compulsory years of schooling" (rounds 3-5). In rounds 1-2 the question was phrased as "How many years of full-time education have you completed?"

Economic indicators

- Income: "[Please] tell me which letter describes your household's total income, after tax and compulsory deductions, from all sources? If you don't know the exact figure, please give an estimate. Use the part of the card that you know best: weekly, monthly or annual income" (rounds 4-5), 12-point scale coding. "Using this card, if you add up the income from all sources, which letter describes your household's total net income? If you don't know the exact figure, please give an estimate. Use the part of the card that you know best: weekly, monthly or annual income" (rounds 1-3), 10-point scale coding.
- Satisfaction with the income: "Which of the descriptions on this card comes closest to how you feel about your household's income nowadays?" with 1 – "Living comfortably on present income"; 2 – "Coping on present income"; 3 – "Difficult on present income"; and 4 – "Very difficult on present income". The variable is dichotomised for the analysis.

Political indicators

- Voting: "Some people don't vote nowadays for one reason or another. Did you vote in the last [country] national election in [month/year]?" Scale: binary 0-1.
- Satisfaction with the political order: "And on the whole, how satisfied are you with the way democracy works in [country]?" with the range from 0 – "Extremely dissatisfied" to 10 – "Extremely satisfied".

Social indicators

- Social activity: "[How] often do you meet socially with friends, relatives or work colleagues?" with 7-point coding, where 1 is "Never"; 2 – "Less than once a month"; 3 – "Once a month"; 4 – "Several times a month"; 5 – "Once a week"; 6 – "Several times a week"; 7 – "Every day".
- Trust: "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people? Please tell me on a score of 0 to 10, where 0 means you can't be too careful and 10 means that most people can be trusted."

Health care

- Health care evaluation: "Please say what you think overall about the state of health services in [country] nowadays?" with the scale from 0 to 10, where 0 is "Extremely bad" and 10 – "Extremely good".

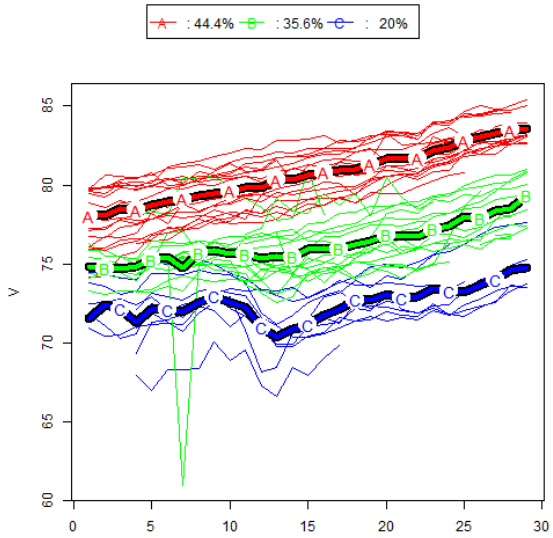
Life styles

- Activity of people: "I am going to read out a list of statements about how you may have been feeling recently. For each statement I would like you to say how often you have felt like this over the last two weeks: … I have felt active and vigorous" on a scale of 1 – "All of the time"; 2 – "Most of the time"; 3 – "More than half of the time"; 4 – "Less than half of the time"; 5 – "Some of the time"; 6 – "At no time".

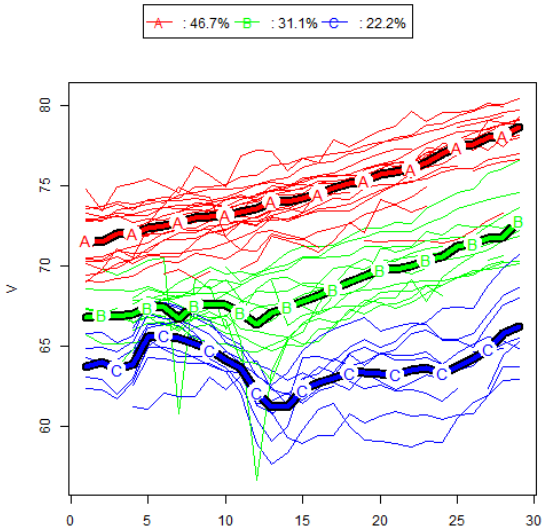
CHAPTER 6 APPENDIX

KmL analysis details for all indicators

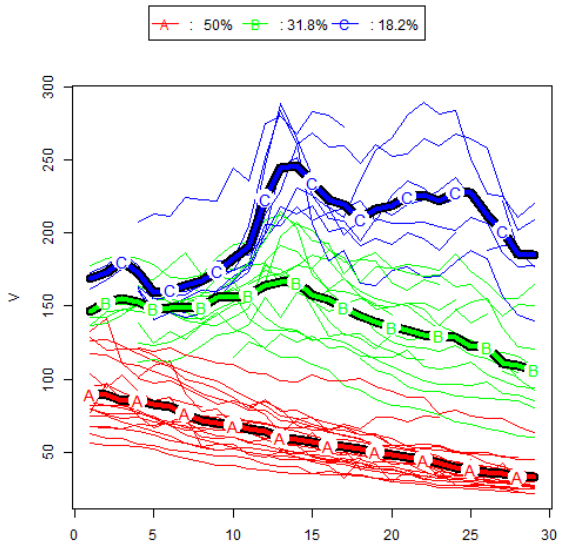
KmL: Life expectancy at birth, in years, female.



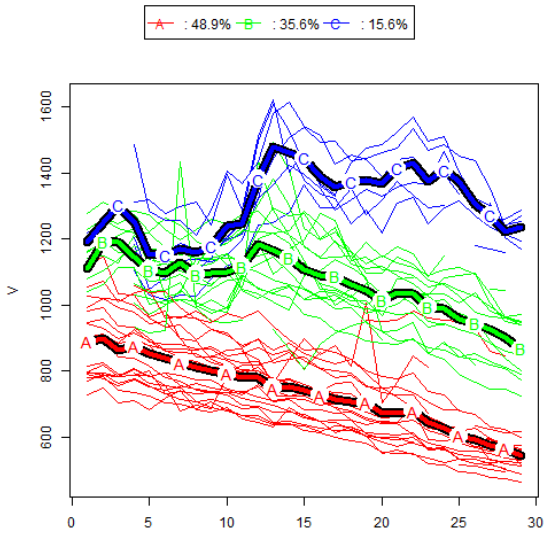
KmL: Life expectancy at birth, in years, male.



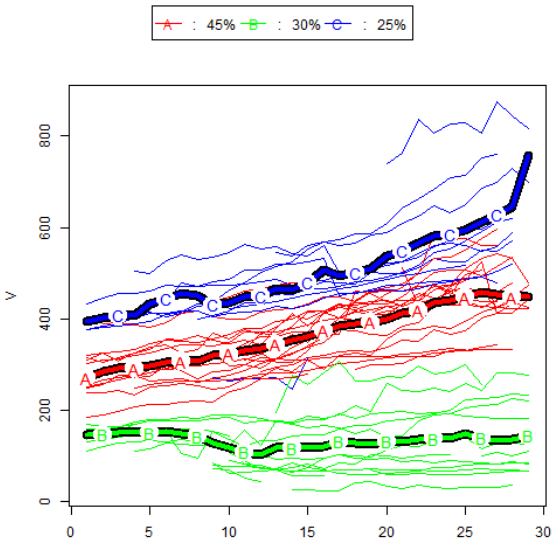
KmL: SDR, diseases of circulatory system, 0-64 per 100000.



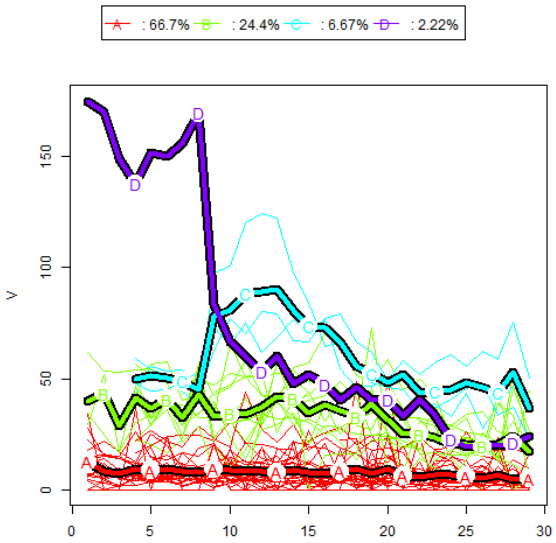
KmL: SDR all causes, all ages, per 100000.



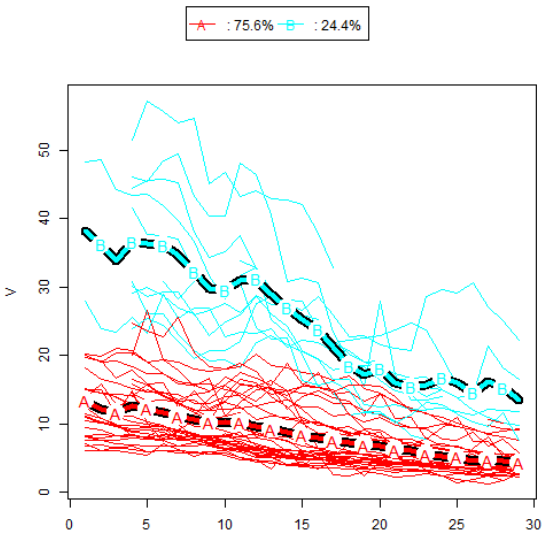
KmL: Cancer incidence per 100000 (second optimal number of clusters).

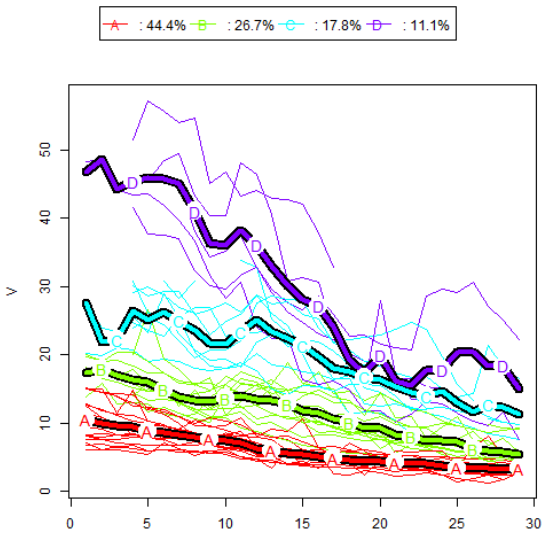


KmL: Maternal deaths per 100000 live births

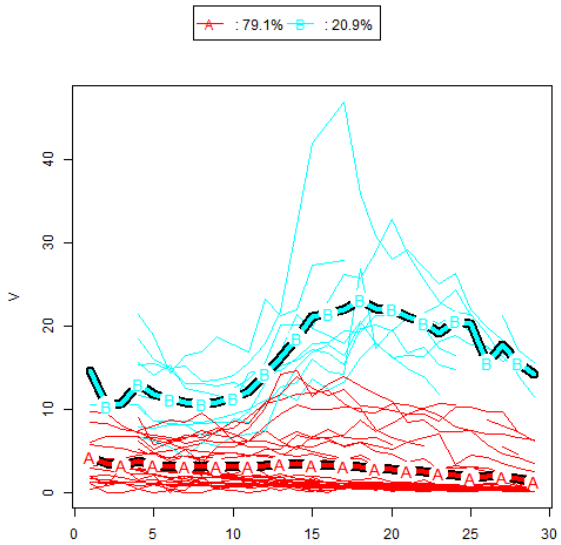


KmL: Infant deaths per 1000 live births

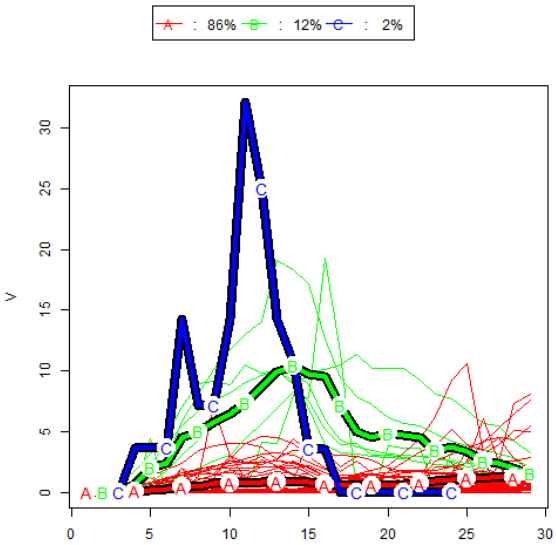




KmL: SDR, tuberculosis, all ages per 100000.



KmL: AIDS incidence per 100000 (second optimal number of clusters).



NOTES

Liubov V. Borisova has written this thesis while being a PhD student at the Bremen International Graduate School of Social Science (Jacobs University Bremen and Universität Bremen). Between 2009 and 2013 she had been a PhD fellow in the Thematic Field C "Changing Lives in Socio-Cultural Contexts", based at Jacobs University Bremen. She completed her thesis in July 2013 and defended it in September 2013.

This thesis was submitted by Liubov V. Borisova in partial fulfilment of the requirements of the degree of Doctor of Philosophy in Sociology at Bremen International Graduate School of Social Science (BIGSSS) in School of Humanities and Social Sciences (SHSS), Jacobs University Bremen (in cooperation with Universität Bremen). The work was defended on the 27th September 2013.

The thesis is aimed at better understanding health and its determinants in the context of a broader Europe. It tries to incorporate the different theoretical and empirical approaches to analysing the determinants of health, as well as utilises diverse methods and datasets. The work consists of six chapters: theoretical literature review, which serves as an umbrella for the five independent studies. The detailed literature review arrives at the main theoretical and empirical framework — the augmented health production function, which is utilised and tested in four out of five studies. Three first studies focus on the 28 Central and East European (CEE) countries, while the other two look at the broader European context. In the first four chapters, health is the centre of the story, modelled within the augmented production function. The final study addresses the changes in the European health divide at the macro level over the past twenty years.

The findings are diverse and manifold. They primarily add to the literature on the determinants of health by bridging the diverging approaches and creating a theoretical framework — augmented health production function — for analysing the determinants of health, which can be further tested in other regions of the world. The divide in Europe — still often referred to as the "East-West divide" — has changed, and could adjust our whole understanding of European health patterns.

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