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HWWA DISCUSSION PAPER

105

Hamburgisches Welt-Wirtschafts-Archiv (HWWA)
Hamburg Institute of International Economics
2000
ISSN 1616-4814

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- Arbeitsgemeinschaft deutscher wirtschaftswissenschaftlicher Forschungsinstitute (ARGE)
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The author has benefited from the comments of participants of the ZEI/CEPR Workshop in Vilnius, a seminar at UNICEF Innocenti Research Centre, Florence, and at the Centre for European Policy Studies, Brussels. Excellent assistance and comments by Sylke Viola Schnepf are gratefully acknowledged. The usual disclaimer applies.

This Discussion Paper is part of the HWWA's research programme „International Trade and Competition Regimes".

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Edited by the
PRESIDENTIAL DEPARTMENT

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Hamburg Institute of International Economics

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Contents

List of Tables and Figures

Abstract

Alerted by the dramatic mortality increase in Russia after the onset of transition, and inspired by Sen (1997) to interpret mortality as an indicator of economic performance, mortality data is used as the benchmark, by which to judge the success or failure of transition in Central and Eastern Europe. In particular, it is examined whether reforms from a centrally planned to a market system did have a detrimental effect on health during transition, as it has allegedly been the case in Russia.

Controlling for other determinants of health such as GDP growth and health provision, the hypothesis that reforms are bad for health cannot be supported. Instead, good reforms do have a beneficial effect, quite independently of GDP growth. In the 23 countries examined for the period 1989-96, health provision can only account for the development of infant, child and female mortality rates, but not for adult male mortality, which seems to be largely due to stress-related phenomena, that are generally considered to be quite unrelated to health care provision. Further, in contrast to the growth in transition-literature, there seems to be no trade-off between short-term costs and long-term benefits of reform. Good reform directly translates into better health. Several mechanisms are discussed to shed light on the link between good reform and good health.

A particularly worrying trend with potentially wide-ranging long-term implications for the CEECs' development paths derives from the observation of a substantial degree of divergence in health status across the region, given the important role of health in determining future growth prospects.

Zusammenfassung

Alarmiert durch den dramatischen Anstieg der Sterblichkeitsrate in Russland in den ersten Jahren der Transformation und basierend auf Sen's (1997) Idee, Sterblichkeit als Indikator ökonomischer Performance zu interpretieren, verwenden wir Sterblichkeitsraten als Maßstab zur Evaluierung von Erfolg oder Mißerfolg der Transformation in Mittel- und Osteuropa. Insbesondere wird untersucht, ob die strukturellen Reformen von der Plan- zur Marktwirtschaft eine negative Auswirkung auf den Gesundheitsstatus hatten, wie das Negativ-Beispiel Russland suggeriert.

Wenn für andere Determinanten der Gesundheitsentwicklung kontrolliert wird- wie z.B. die Wachstumsraten des Bruttosozialproduktes und die Bereitstellung von Gesundheitsdiensten, zeigt sich, dass diese Hypothese nicht aufrechterhalten werden kann. Im Gegenteil, eine “gute” Reformpolitik verrringert die Sterblichkeitsraten relativ unabhängig vom BSP-Wachstum. In den 23 untersuchten Ländern für den Zeitraum 1989-1996 kann die Bereitstellung an Gesundheitsdiensten nur die Entwicklung der Kinder- und Frauensterblichkeit erklären, nicht jedoch die der erwachsenen Männer. Letztere scheint in der Tat eher von stress-induzierten Phänomenen verursacht worden zu sein, die grundsätzlich als vergleichsweise unabhängig von Gesundheitsdiensten gilt. Darüber hinaus zeigt sich im Gegensatz zur Literatur über Wachstum in der Transformation, daß es keinen trade-off zwischen kurzfristigen Kosten und langfristigem Nutzen der Reform zu geben scheint: Gute Reformen führen unmittelbar zu einem verbesserten Gesundheitsstatus. Einige Mechanismen werden diskutiert, die für diesen Zusammenhang verantwortlich sein könnten.

Aufgrund der erheblichen Bedeutung der Gesundheit als Bestandteil des Humankapitals ergibt sich ein besonders besorgniserregender Trend mit potentiell weitreichenden Konsequenzen für die Entwicklungsperspektiven der MOEs aus der Beobachtung zunehmender Divergenz der Sterblichleitsraten innerhalb der Region.

1. INTRODUCTION

Following the onset of transition life expectancy in Russia virtually plummeted and is now only slowly bottoming out. Crude death rates in 1992 and 1993 rose sharply by about 9% p.a., which is unprecedented in modern times in the absence of war and famine (Shapiro 1994). Eastern Europe as a whole was said to be „going through a health crisis of epidemic proportions“ (TIME, 27 June 1994). To some observers the capitalist system itself or at least the transition to it was deemed to be the culprit explaining the fatal decline in health status. The main purpose of our study is to scrutinise this rather simplified view by addressing the question: Are reforms from a centrally planned to a decentralised market system bad for health?

This question is most relevant for several reasons:

1) Thus far the research on transition in CEE has been dominated by economic and political issues. The analysis of health in transition has played only a minor role despite its truly „vital“ significance.[1]

2) The optimal speed of reforms has been a matter of much debate in the „political economy of transition“-literature. Plenty of empirical and theoretical studies examined the issue without having agreed on a consensus.[2] This paper contributes to the discussion by using health performance as the indicator of success or failure of reforms instead of the commonly used *economic* variables GDP or inflation.

3) Although the health status per se is a non-economic phenomenon, it has both strong economic implications and determinants: The importance of health in determining long-run economic growth has been demonstrated in the empirical growth literature (see e.g. Barro/Sala-i-Martin 1995; Sala-i-Martin 1997). Variables like life expectancy at birth proved highly significant through almost all sorts of model specifications. In the background of this statistical relationship, several mechanisms lead from improved health to economic growth (World Bank 1993): A better health status of the population
   – reduces production losses caused by worker illness,

1 The publications of the International Child Development Centre of UNICEF in Florence are a notable exception. We will discuss the existing literature below.

2 Particular disagreement seems to exist between theory which generally favours gradual reform and empirics which tend to support speedy reforms.

– increases the enrolment of children in school and improves their ability to learn and
– frees for alternative uses resources that would otherwise have to be spent on treating illness.

If health has indeed been adversely and persistently[3] affected by the process of transition, this would dampen the *long-run* growth prospects of the respective economy.

From the reverse point of view, per capita GDP is the single most predictive explanatory variable of a nation's stock of health as measured by various mortality indicators. Also other economic and social variables like unemployment, income inequality, real wage changes, etc. are known to affect a nation's health status. If mortality is largely determined by economic factors, it may obviously serve as a test parameter of economic success or failure.[4] The inclusion of health data as a complement to GDP deserves particular attention, if both performance indicators tend to follow different paths. In this case, purely economic indicators will no longer be adequate measures of a nation's well-being.[5] Since mortality data can be *disaggregated* according to various categories, its analysis may draw our attention to policy issues not revealed in the *average* real income of a nation.

Health itself is an unobservable quality. Following standard practices we measure health[6] by the usual indicators life expectancy, infant mortality and mortality of children under 5 years of age, and various age-, gender-, and cause specific death rates. We are well aware of the fact that they certainly do not represent the entire picture of health, yet they are far more easily and objectively available than morbidity data.

Outcomes in terms of various indicators of health status have not followed a uniform pattern across CEECs. Even more intricate, different health indicators for a given coun-

3 The potential persistence of health effects arises from the fact that „the functional consequences of ill health are likely to be felt throughout the life cycle" (Strauss/Thomas, 1998, p. 767). Hence, if children's or young adults' health is adversely affected during the course of transition, this deterioration of their human capital is likely to stay with them for several decades.

4 Sen (1998, p.3) argued forcefully in favour of using mortality as an indicator of economic success: The 'connection [between economic phenomena and mortality] lies in the fact that the influences that increase or reduce mortality often have distinctly economic causes, and there is thus a prima facie reason for not dismissing mortality as a test of economic performance.'

5 Miringoff et al. (1996) find a strong divergence between economic growth and a so-called „social health index" for the US after 1970. While GDP continued its trend increase, the health index has declined steadily ever since.

6 See Murray et al. (1999) for a discussion and critical examination of other summary measures of population health. Though theoretically sensible most of them would not be suitable for the purpose of our analysis due to insufficient availability.

try do not always behave consistently (e.g. infant mortality in one country may have increased, but adult mortality decreased). As World Bank researchers concluded in a recent study, the CEECs are not an epidemiologically homogenous group (Adeyi et al., 1997). While we have to keep these complexities in mind, their detailed analysis would be beyond the scope of the paper. Rather, our interest is in discovering the common determining factors and trends of health development in transition.

The paper is structured as follows:

Section 2 briefly describes the health performance in CEECs during transition and embeds it into the development during the last four decades within the region and in the rest of the world. Section 3 presents the theoretical framework used and derives the hypotheses to be tested. Data, methodology and the results of the panel regressions for the period 1989-1996 in 23 transition countries will be summarised in section 4. Section 5 concludes.

2. HEALTH IN CENTRAL AND EASTERN EUROPE

2.1 Pre-transition

The world-wide improvement in health conditions has never been as substantial as within the past four decades. As it is shown for example by the World Bank (1993), life expectancy at birth has steadily increased in all regions of the world from 1950 to 1990. Among the regions compared (Sub-Saharan Africa, India, China, Other Asia and islands, Latin America and the Caribbean, Middle East, established market economies (EMEs), and formerly socialist countries) the CEECs assume a favourable second place just behind the EMEs. The steep increase in life expectancy in the CEECs up to the late 60s is particularly impressive. Due to the far greater destruction suffered by the CEECs during World War II compared to other regions, they obviously had more potential welfare gains - and hence also health gains - to achieve than other regions. They managed to realise these potential gains and significantly narrow the „health gap“ up into the mid-60s. Firmly relying on „extensive growth“ they had mobilised all productive resources - neglecting allocative efficiency principles[7] - and provided minimum income levels and basic services to the entire population (UNICEF, 1994). In particular com-

7 In the health sector this featured for example in over-staffed health personnel and an oversupply of hospital beds. Among the above mentioned regions the CEECs disposed of the highest hospital capacity in 1990 (World Bank 1993).

municable diseases, especially those of childhood, could be reduced at a faster rate than in the EMEs, so that the bulk of the health improvements was accounted for by declining infant mortality (esp. post-neonatal mortality)[8]. The widening health gap to Western Europe from the mid 1960s onwards was caused by the comparative deterioration of the health status of the middle aged adults, in particular an enormous amount of cardiovascular and ischeamic heart disease in middle-aged males (Preker/Feachem 1994). In general, this declining importance of communicable diseases was consistent with what is called the *epidemiological transition*: As health improves with increasing income per capita, the burden of disease shifts from a preponderance of communicable to non-communicable disease (World Bank 1993). But the overwhelming proportion of deaths caused by circulatory diseases in the CEECs was so significantly higher than in other regions that it called for an explanation. The standardised death rate due to cerebrovascular diseases, for example, was almost a triple of the EU average in 1988 with no clearly visible converging trend towards western levels. Also other non-communicable diseases were much more frequent in the CEECs (e.g. heart and circulatory diseases, malignant neoplasms).

The unique factor explaining this „distortion“ has not been found. It is rather a bundle of causes, whose separate effects are hard to disentangle (High environmental pollution; difficult socio-political conditions; lifestyles characterised by diets high in fat, alcohol, and heavy smoking; poor quality medical care. See Hertzmann 1995). Certainly the socialist health care system had been far less well prepared to cope with non-communicable diseases, since this would have required higher medical technology or at least a more efficient use of the existing technology. The strengths of the system with its encompassing public accessibility and preventive measures (immunisation) on a grand scale worked perfectly only for the reduction of infectious disease[9].[10] Although the standardised death rate (SDR) due to infectious diseases is still a multiple of the EU average, its absolute magnitude is almost negligible.

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8 Between the early 1950s and the mid-1960s, infant mortality fell by 56% in the USSR and 41% in Central and Eastern Europe as opposed to 41% in Western Europe, 34% in South-Western Europe, 30% in the advanced Latin American countries (Costa-Rica, Chile, Uruguay) and 11% in the United States (UNICEF 1994).

9 There are several parallel aspects between the causes of failure in the real sector of the socialist economy and in their health care system. Central planning led to a strong emphasis on quantitative accumulation without regard to quality and efficient use. Moreover, due to the separation from international knowledge and capital flow, the technology used was often outdated.

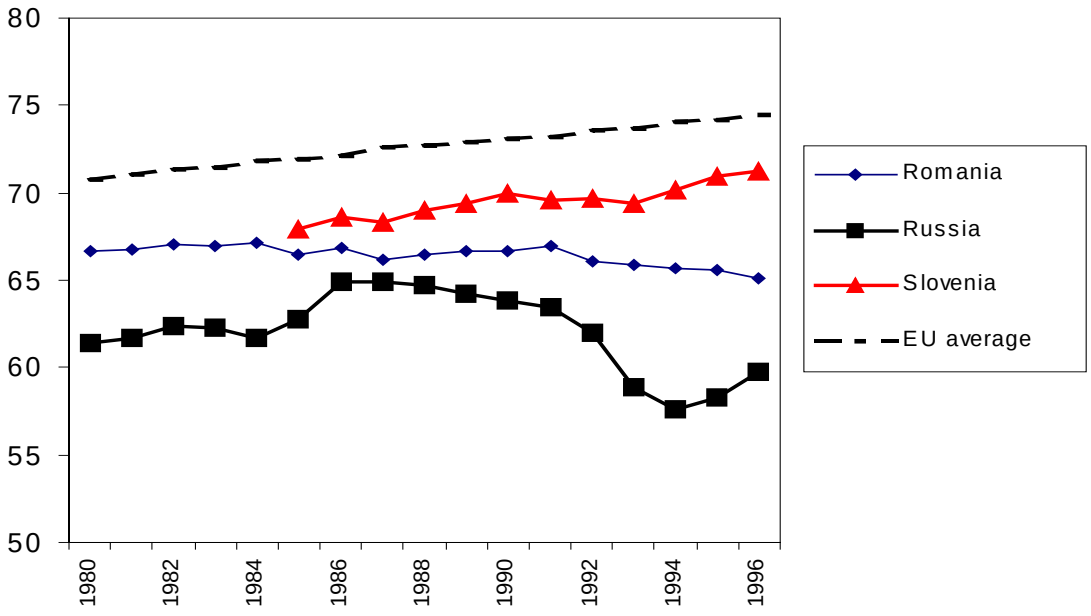
10 See Preker/Feachem (1994) for an analysis of positive bequests and legacies of the socialist health system.

In the 1980s the deterioration in mortality rates came to a halt and life expectancy started to rise again at only a slightly slower pace than in Western Europe - a development that was commonly attributed to the anti-alcohol campaign.[11]

2.2 Transition

The trend of improving life expectancy did not continue into the 1990s. While we did observe some converging trend in mortality performance pre-transition, the onset of reforms entailed a divergence of health indicators across the region (WHO 1996). One of the very few common responses was the rise in crude death rates in the first phase of reforms in almost all CEECs. Throughout the entire period 1989 to 1996, however, outcomes varied significantly, as figure 1 exemplifies for male life expectancy at birth also taking into account the pre-transition development.

Figure 1: Male life expectancy at birth in selected countries (1980-96)



Source: WHO (1999), UNICEF (1999).

The three selected transition economies sufficiently represent the diversity of outcomes: Slovenia, one of the advanced reforming countries, has almost steadily been converging towards the higher EU average, except for 3-4 years of stagnation in the early years of transition. Russia's life expectancy performance evidently stands in sharp contrast to

11 See e.g. Avdeev/Blum/Zakharov (1996). This argument remains heavily debated, however (Ellmann, 1997).

Slovenia's. As already indicated earlier, it has undergone a virtual mortality crisis. Romania is in between the two extremes with male life expectancy slowly but steadily declining throughout the transition period.

Figure 2: Standardised death rates due to circulatory disease (age 0-64 per 10000)

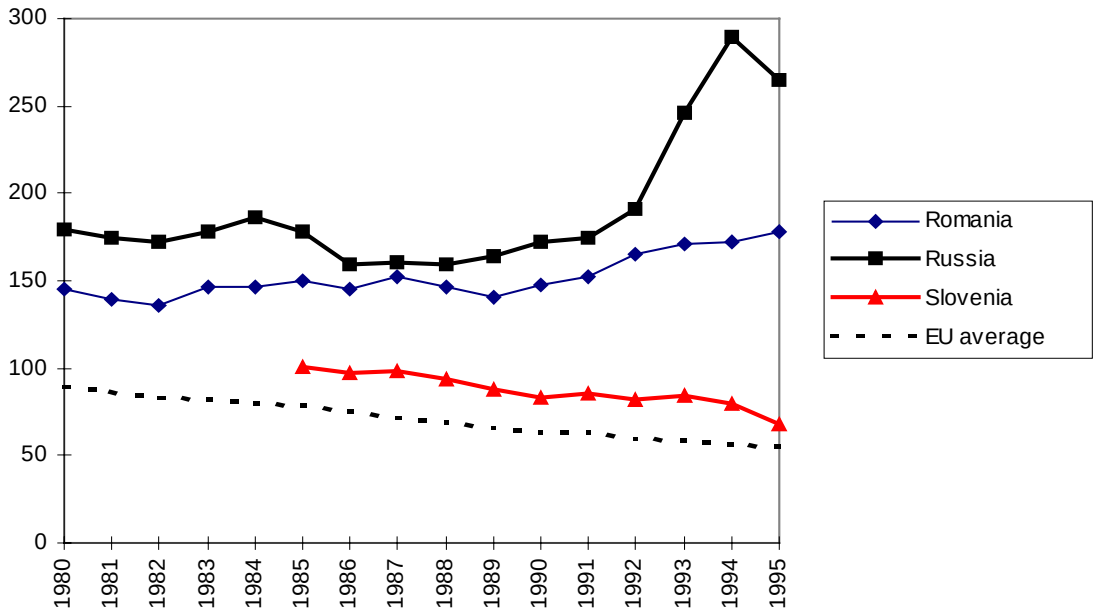
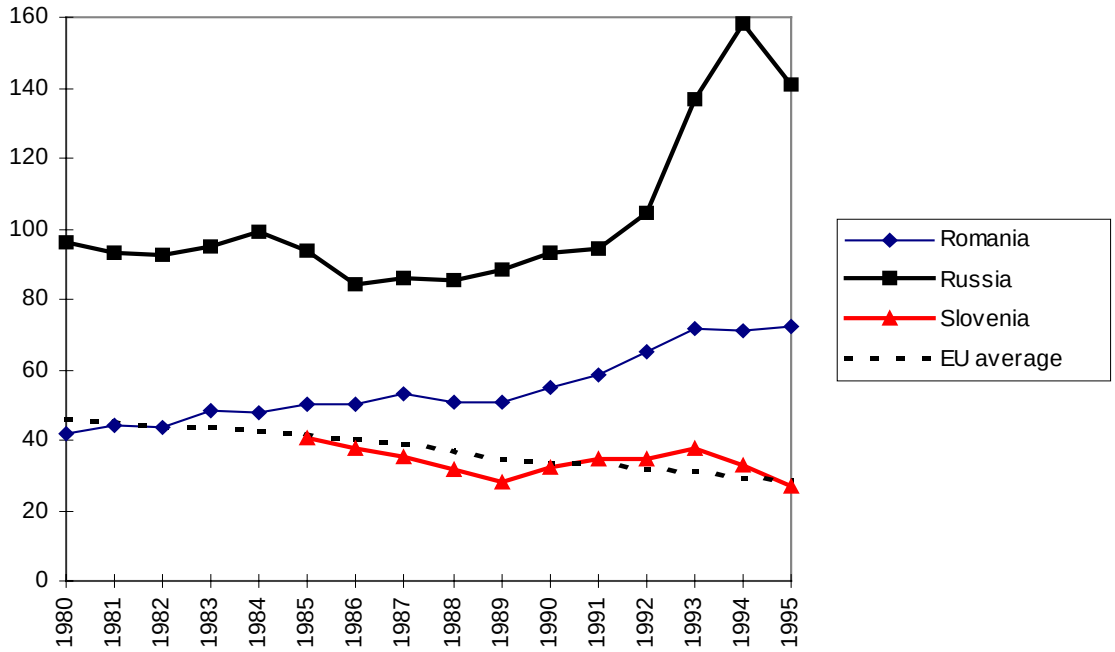


Figure 3: Standardised death rates due to ischeamic heart disease (age 0-64 per 10000)



Source: WHO (1998).

Beside age and gender-specific mortality data, the cause-specific standardised death rates (SDRs) reveal interesting insights, too: The described changes in mortality seem to be largely explained by changes in those causes of death that are known to be affected by social and psychological stress. Figures 2 and 3 illustrate the development of the SDRs due to circulatory diseases and due to ischaemic heart disease in the period 1980 to 1995. Again, the dotted line depicts the EU average and serves as a benchmark for the CEECs.

In either picture, Russia shows steep increases in SDRs after at least a decade of stability. While the negative effect of transition is less pronounced in countries like Romania, Slovenia smoothly continues its longer term trend of convergence to the EU countries.[12]

The purpose of the previous description has been to highlight the complexity of health outcomes in transition countries, in order to further validate the need for a deeper investigation into the determinants of the observed development. To approach this task the next paragraph sets up the theoretical framework used in the subsequent empirical study.

3. THEORETICAL CONSIDERATIONS AND HYPOTHESES

The theoretical model underlying our empirical study has been developed by Anand/Chen (1996)[13] and is based on the concept of the individual-specific health production function as in Grossman (1972). Accordingly the stock of health evolves in response to health and non-health inputs, conditional on individual behaviour and environmental conditions. Health inputs include for example the amount of nutrients intake, the quality and quantity of health resources available to and the services used by an individual. Non-health inputs comprise those elements of social infrastructure that are indirectly conducive to an individual's health status, like housing, water and sanitation services. In short, the health production function may look as follows:

(1) $H_{it} = f(X_{it}, Z_{it}, V_{it}, S_{it}, Q_{it}, H_{it-1})$

12 As for the pattern of SDRs, Slovenia may be representative for Albania, Slovakia, Croatia, Czech Republic and Poland. Romania compares to Armenia, Bulgaria and Tajikistan with Hungary as an intermediate case between Slovenia and Romania. Russia is similar to the rest of the former Soviet states plus Moldova.

13 For a full derivation of the model the reader is referred to the given source. We merely sketch out the main ideas.

with H_{it} as the stock of health for individual i at time t, X_{it} as a vector of nutrients or types of food consumed, Z_{it} as a vector of health services used, V_{it} as a vector of environmental conditions, S_{it} as a vector of i's social characteristics, Q_{it} as a vector of macroeconomic indicators and H_{it-1} as the individual's health stock in the previous period.

Equation (1) may be expressed in first differences as:

(2) $$dH_{it} = f(dX_{it}, dZ_{it}, dV_{it}, dS_{it}, dQ_{it}, dH_{it-1})$$

where d is the difference operator.

Structural reforms of the health sector or the entire economic and social system affect changes in the health stock via their influence on the RHS variables in (2). Price liberalisation for example may lead to an increase in prices of food or health services in general. Macroeconomic indicators like inflation or employment are obviously affected by economic reforms.[14] Hence reform policies can be used as proxies for (some of) the flow variables in (2).

All individual health stocks have to be aggregated to obtain the health stock of the population, so that S_{it} would have to drop and we would reinterpret i as the country subscript. In order to measure the per se unobservable variable health, we employ mortality rates, by gender age and cause of death. Some of the variables in (1) are far less apt for empirical measurement in the relatively short time period that we observe. While nutrition and environmental conditions do undoubtedly matter for health in the medium and long term, they are unlikely to be at work in the short term.[15] Internationally comparable data on nutrition, health care consumption and environmental conditions have not been available. Therefore the general specifications employed in the empirical analysis below will have to be more modest versions of (1) and (2).

As Pritchett/Summers (1997) argue, the estimation of the regression in levels would substantially bias the coefficient results, if health was also influenced by some country specific, time invariant variable, e.g. climate. To avoid this, the country specific effects

14 Given the rather short period we shall examine, changes in environmental conditions should not be expected to play a significant role.

15 Ellmann (1994), Watson (1995) and Cornia/Paniccia (1996) confirm this view with respect to the transition countries. Besides, data availability becomes a bottleneck, particularly concerning environmental conditions.

must be swept out, either by using country specific dummy variables (fixed effects) or first differences. We pursue the latter approach, so that our specification should be:

(2') $dH_t = f(dHR_t, dHC_t, dQ_t, Ref_t)$

with HR_t as available health resources (number of physicians, nurses, midwifes, hospital beds, etc.)[16], HC_t as measures of human capital (enrolment ratios, literacy rates) that represent a crucial part of the above mentioned social characteristics, Q_t will be quantified largely by GDP per capita, that serves as an encompassing proxy not only for the macroeconomic development, but also for the general state of infrastructure (e.g. availability of clean water), and Ref_t measures progress in structural economic reform.

Based on this framework, our hypotheses are as follows:

1) While in centrally planned times, the state provided encompassing health care for its population, transition necessarily involved a dismantling of the state's role in health provision. To the extent that no immediate private substitute has been available and given the pressures on government budgets, transition would be expected to lead to a decline in health resources in the short term, thereby negatively affecting the general health status.[17]

2) Macroeconomic development, in particular measured by per capita real GDP growth has declined quite sharply at the onset of transition throughout almost the entire region. Since income is a very powerful determinant of health, this socioeconomic decline should have contributed to the increase in mortality in the first years of the sample period, while promoting health recovery as income rebounded in the more advanced countries.

3) The influence of reform policy on health is more ambiguous during the rather short period 1989-96, that is analysed below. The fact that Mwabu (1996) has found a positive relationship for developing countries does not necessarily imply the same result would hold for the CEECs, which have undergone a systemic change, quite incomparable to the rather evolutionary and long term structural adjustment of the

16 Several studies have examined the importance of access to medical health care for health status. Their evidence is reliable in the aggregate, which we are concerned with here. When specific populations are tested, however, the relationship turns out to be more intricate. See e.g. Robst/Graham (1997).

17 Goldstein et al (1997) set up the same hypothesis, but do not test it econometrically.

developing countries. Besides, the time period over which reform efforts were measured in Mwabu (1996) was much longer (12 years). We do not doubt this long-term beneficial effect of reforms, mediated by economic growth and improvements in health and non-health infrastructure. But the long-term benefit might only be achieved at a short-term cost of temporary deteriorating health performance, especially if reforms are implemented at a high speed thereby suddenly exposing the population to unfamiliar economic and social situations, for which they have not yet acquired appropriate coping mechanisms[18].[19]

4. EMPIRICAL ANALYSIS

Before we actually examine the potential determinants of health changes in transition, we ought to analyse whether health development in transition did in fact make a difference to the previous longer-term evolution. If this is the case, it will underscore the need to explain the observed patterns of health development in transition. Appendix I conducts two versions of the Chow test to show that the mortality development during transition does indeed differ markedly from the pre-transition phase.

As several studies have shown, there exists a stable relationship between the level of GDP per capita and various health indicators *across countries*. When it comes to examining the determinants of health *across time*, the intuitive guess that changes in income per head would translate into changes in health status is less supported by empirical evidence[20]. While the idea of a positive connection is widely accepted, the exact time structure varies substantially across time and countries. Other studies have also shown that health-related expenditures and resources may influence health outcomes even independently of overall GDP growth, at least for a restricted period of time (see e.g. Drèze/Sen 1989).

The specific characteristics of the transition economies are even augmenting these general problems: The abrupt change of the political and economic system entailing both a huge output fall and rising economic and social uncertainty was such an unprecedented

18 This trade-off idea is similar to what part of the „political economy of reform“-literature argues about the cost of speedy reforms.

19 In specification (2') we drop dHC_t since our considered time period is too short to reveal any effect of a change in the human capital stock on health.

20 For a strong piece of evidence in favour of a causal relationship running from income to health see Pritchett/Summer (1997).

phenomenon, that comparative evidence is hard to come by. Although the mortality rise in some of the transition countries (especially in Russia) is comparable in magnitude to those experienced during famines or wars, analysing famines or wars does not add many insights, since mortality increases in transition have *not* been primarily caused by infectious diseases and undernutrition. Neither do the existing studies on the impact of the Great Depression (e.g. Brenner, 1973; Eyer/Sterling, 1977) help us much in understanding the phenomenon of the „mortality crisis“ in (some) post-socialist countries.

Some lessons and ideas can be drawn from Mwabu (1996), who attempts to assess health effects of structural adjustment programmes in developing countries using cross section data. He generally finds a positive relationship between better health, economic growth and a good rating in reform implementation. In contrast to transition economies, however, developing countries have not undergone such a dramatic switch of system. Cornia/Paniccia (1996) have used similar econometric techniques as we do to investigate health development in the CEECs during transition. Unlike us, however, they do not take structural reforms into account, they use a smaller sample and rely on health expenditures rather than health resources.[21] Besides, it remains unclear, why - given the importance of per capita income in determining health - this variable is left out of their analysis.

The empirical specification of our model builds on equation (2’). The variables employed in the regression are described in the following paragraphs:

- To quantify changes in health status we have used mortality rates, disaggregated by age (<1 year, 1-5 years, 5-19 years, 20-39 years, 40-59 years, 60+ years), gender and cause of death. In particular, we have selected standardised death rates due to circulatory diseases, external causes (accidents, murder, self-inflicted injury, etc.), ischeamic heart diseases and cerebrovascular diseases, since these have been the most prominent causes of death in transition (WHO 1996).

- To measure *health resources* (HR) the WHO (1998) and the TRANSMONEE 3.1 database[22] contain plenty of indicators of health resources (Physicians, nurses, midwives, pharmacists, dentists, hospitals, hospital beds, primary health care units, etc.).

21 Due to heavy price distortions in transition economies the use of exchange rate converted nominal expenditures leads to more biased indicators of actual health investment than physical variables like physicians, nurses, etc..

22 The TRANSMONEE 3.1 database is available from the International Child Development Centre of UNICEF at Florence.

Taking all of them as explanatory variables would pose serious collinearity problems.[23] We have used principal component analysis (see Dunteman, 1989) to circumvent this problem and to construct an index measuring the change in health resources in each year. In the reported regressions we only considered those three variables that were available for most of the countries. Those were physicians, midwives and hospital beds, each in per capita terms. Their first principal component accounts for 64% of the variation in the original three variables and we therefore neglect the other two principal components. The weights of the variables in that first PC are 0.73 for physicians, 0.57 for midwives and 0.72 for hospital beds.

– As explained above, changes in GDP are also expected to affect the health status of the population. Further *macroeconomic variables* are ignored in table 1, but we have experimented with the first principal component of per capita GDP growth and inflation as well as the first principal component of per capita GDP, inflation and employment changes, although data on the latter is only partially available. There were no qualitative differences to the simple formulation of including per capita GDP growth alone, so that we may justifiably use this simple specification.[24]

– Two measures have been developed that attempt to quantify the implementation of structural *reforms*: 1) The so-called liberalisation index from de Melo/Denizer/Gelb (1996) for each of the years 1990-94. It measures the level of liberalisation achieved in each year. 2) The EBRD reform index, which measures reform progress in the areas of privatisation, liberalisation, financial institutions and the legal system (from 1993 onwards). Both indicators are highly correlated. In order to work with a time series that covers the entire period, we have adjusted the scale of the EBRD index accordingly.

– Some of the countries have been seriously affected by *regional tensions* or *wars*, which we expect to have a negative effect on health. We therefore add a dummy variable taking the value 1 for war and 0 otherwise.[25]

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23 However, as the cross-correlation coefficients of the various health resource variables indicates, not all of the indicators move in the same direction. Even more so, the extent of the decline in health resources does not seem to comove substantially with the extent of structural economic reforms that have been implemented. This is good news in so far as it reduces the multicollinearity problem among the RHS variables.

24 Quite similarly, Cornia/Paniccia (1996) have constructed an „economic stress index“ as the first principal component of the real wage, the employment rate and the inflation rate.

25 The countries affected by war are Macedonia, Georgia, Tajikistan, Croatia, Armenia and Azerbaijan.

– We also include the *initial level* of the respective dependent variable. In doing so we draw on the conditional convergence hypothesis examined in the empirical growth literature. The logic behind a (conditional) convergence hypothesis in health status would also rest on the diminishing returns idea: Health improvements are easier to achieve from a lower base. At poor health levels, there are very cost-effective medical means available, e.g. immunisation, that yield substantial returns in terms of illness prevention. When the initial health status is already relatively high, it is more costly and more difficult to improve health much further. Thus, marginal returns to investment in health are decreasing. It will be interesting to see, whether this intuitively plausible mechanism can be confirmed for the transition economies[26], in particular, since we have found some - though not entirely convincing - evidence for conditional convergence in GDP growth rates.

In sum, we run the following panel regression (generalised least squares) for the period 1990-96:[27]

$$\Delta H_{i,t} = a_0 + b_0 Ref_{i,t} + b_1 \Delta GDPpc_{i,t} + b_2 \Delta HR_{i,t} + b_3 War_i + b_4 Initial_i + \varepsilon_{i,t}$$

where Δ indicates the percentage change in the respective variable. The time-invariant RHS variables WAR and INITIAL capture the country-specific differences.[28]
Our hypotheses concerning the signs of the coefficients can be summarised in formal terms as follows:

$$b_0 <> 0,\ b_1 > 0,\ b_2 > 0,\ b_3 < 0,\ b_4 < 0$$

Table 1 presents the results.

26 Including the initial level of the endogenous variable and the war-dummy augments the theoretical model outlined above.

27 The countries included in (most of) the regressions are: Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Georgia, Estonia, Hungary, Kazakhstan, Kyrgysztan, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovenia, Ukraine and Uzbekistan.

28 Their inclusion is justified – despite being time invariant – , if they affect the evolution of mortality in the subsequent periods to different degrees.

Table 1: Panel results based on GLS regression

		Reform	p.c. GDP growth	lagged p.c. GDP growth	Health resources	Regional tensions (dummy)	Initial level	Adj. R^2	Dur-bin-Watson	No. of observa-tions
1	DR20-39 male	-0.068 ** (-3.5)	-0.005** (-6.6)		-0.04 (-0.34)	-0.05* (-2.0)	0.033** (2.4)	0.43	2.4	99
2		-0.08** (-4.5)	-0.005** (-6.8)			-0.066** (-2.9)	0.041** (3.6)	0.47	2.1	126
3	DR20-39 fem.	-0.043* (-2.1)	-0.0027** (-5.0)			-0.051** (-3.7)	0.035 (1.3)	0.30	2.1	126
4		-0.06** (-2.5)	-0.0001** (-2.3)	-0.0025** (-3.5)	-0.16* (-2.1)	-0.069** (-4.6)	0.012 (0.4)	0.45	2.3	82
5	DR40-59 male	-0.087** (-4.0)	0.00006 (0.1)	-0.003** (-5.6)		-0.069** (-5.5)	0.023** (3.5)	0.48	1.7	112
6		-0.063** (-2.9)	-0.0002 (-0.4)	-0.002** (-3.6)	-0.125 (-0.3)	-0.078** (-5.7)	0.021** (3.4)	0.57	2.2	82
7	DR40-59 fem.	-0.071** (-3.8)	-0.0007 (-1.1)	-0.0018** (3.1)		-0.049** (-3.9)	0.027** (3.0)	0.48	1.7	112
8		-0.061** (-3.0)	-0.0003 (-0.4)	-0.002** (-3.6)	-0.125 (-1.5)	-0.058** (-4.1)	0.025** (2.9)	0.54	2.2	82
9	DR60+ male	-0.043** (-3.1)	-0.0008 (-1.8)	-0.001** (-2.3)		-0.023** (-2.9)	-0.0067** (-2.5)	0.39	2.2	106
10		-0.043** (-2.7)	-0.0007 (-1.4)	-0.0013** (-2.7)	-0.0058 (-0.1)	-0.026** (-2.8)	0.0056* (2.0)	0.38	2.4	77
11	DR60+ female	-0.01 (-0.7)	-0.001** (-3.2)		0.041 (0.8)	-0.05** (-3.7)	-0.13** (-2.7)	0.21	2.3	92
12		-0.036** (-2.8)	-0.001** (-3.2)			-0.028** (-2.7)	0.005** (2.4)	0.22	2.1	118
13	Infant mortality rate	-0.05** (-2.3)	-0.0022** (-3.0)		-0.274** (-2.8)	-0.047** (-2.4)	-0.048** (-3.9)	0.34	2.5	96
14	Under 5 mortality	-0.038** (-2.3)	-0.0027** (-4.0)		-0.22* (-2.2)	-0.066** (-3.7)	-0.005 (-1.4)	0.30	2.6	83
15	SDR cir-culat. disease	-0.086** (-5.7)	-0.002** (-3.1)		-0.17* (-2.1)	-0.04** (-3.0)	0.01** (6.4)	0.59	2.1	99
16	SDR heart dis-ease	-0.089** (-6.3)	-0.002** (-4.2)		-0.18* (-2.1)	-0.057** (-3.4)	-0.05** (-2.3)	0.77	2.2	99
17	SDR cerebro-vascular disaese	-0.077** (-6.2)	-0.002** (-6.5)		-0.15* (-2.1)	-0.04** (-4.0)	0.012** (5.5)	0.59	2.1	99
18	SDR ex-ternal causes	-0.073** (3.2)	0,004** (-4.4)		-0.12 (-0.9)	-0.067** (-2.3)	0.011** (3.4)	0.43	2.4	89

Source: WHO Health for All Database (1998), UNICEF (1997), (DR means „death rate“);t-statistics are in parentheses; ** (*) indicates 1% (5%) significance level.

Reform progress enters with a significantly negative sign in most cases, implying that successful structural reform policy is beneficial for the health status of the population. This is in some contrast to the results of several studies examining the determinants of *economic* performance - measured by GDP growth - in transition. Havrylyshyn et al. (1998) for example find, that if GDP and not health is used as the measure of performance, reforms have a negative impact on growth in the same period and a positive impact on growth in the following period. This pattern is commonly considered as a reflection of the trade-off between short-term costs and medium-term benefits of structural adjustment. When performance is measured in terms of the health status, however, the results do not confirm such a pattern.[29] Instead, reforms are *directly* positively associated with improvements in *health* status. Hence, transition itself is definitely not a „killer“, only bad reforms are.

Several possible mechanisms link good reforms to good health. They mainly work via their effect on the social and psychological stress of the individual as revealed in the predominant role of cause-specific death rates due to heart diseases and external causes. With the breakdown of the system of central planning economic and social uncertainty suddenly mounted precipitously. The faster and more clearly new and credible rules were established guaranteeing property rights and defining what the new system would look like - thereby adding to the credibility of reform efforts - the sooner this uncertainty and stress could be eliminated. This is not a solely „mental“ process, but is accompanied and fostered by concrete economic or social developments: Workers that suffered from displacement at the onset of transition benefit from higher probability of new employment opportunities, if reforms imply a rapid expansion in private sector activity, as it has usually been the case.

GDP growth seems to be in a statistically even stronger relationship with mortality rates than reform policy, at least for the age- and gender specific death rates as well as for under 5- and infant mortality. It is inversely associated with mortality changes, suggesting that economic growth has indeed affected health development in transition in the expected direction. In some cases, the GDP change of the previous period had a greater and more significant influence on mortality rates than that of the same period, which is plausible, since GDP changes may take time until their effects trickle down to the population’s health status.

29 We have not reported the results of the regressions that include the lagged reform indicator. Their fit is generally very poor and the coefficient signs are largely inconclusive.

Dreze/Sen (1989) distinguish the forces driving health development into a „*growth-mediated*“ and a „*support-led*“ process. Though interrelated, they need not always be at work simultaneously. The success of the former „depends on the growth process being wide-based and participatory (...) and also on the resources generated by economic growth being utilised to expand the relevant social services (...), particularly health care and education“ (Sen, 1997).[30] In contrast, the support-led process operates independently of economic growth by giving priority to providing social services to reduce mortality and increase the health status.[31] In our sample, these forces seem to have been less dominant. In the age- and gender-specific death rates, health resources are only significant (at the 5%-level) with the expected sign for the female age groups of 20-39 and 40-59 years, whereas changes in the provision of health resources seem to have left the male population unaffected. This supports the hypothesis, that in particular the changes in male mortality have been caused rather by stress-related factors characteristic for the transition process, which are largely independent of health care availability.

The provision of health resources did play a role in the development of infant and child-mortality and of female death rates. The size of their coefficients indicates an even higher sensitivity of mortality with respect to health infrastructure than to GDP growth, supporting the plausible idea that - in contrast to male adults' - infants', children's and women's health was more dependent on physical resources than on transition-related stress factors. Somewhat surprisingly, similar results hold for the cause-specific mortality rates.

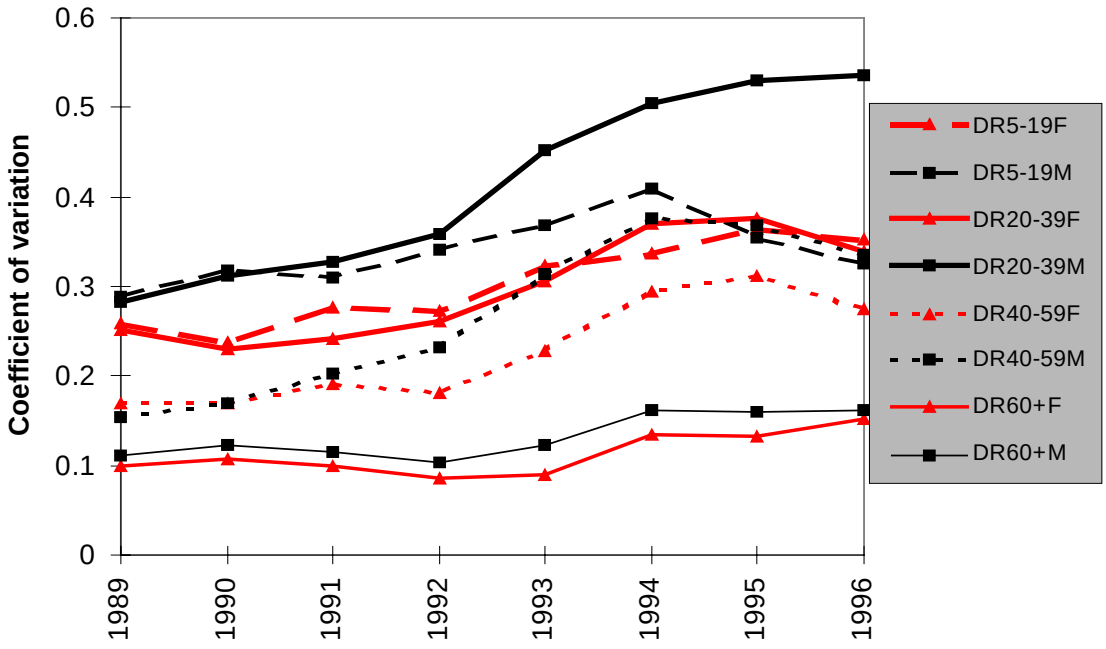
The most surprising result concerns the significantly negative coefficient of the war-dummy in all regression specifications. It implies, that those countries that suffered from regional tensions or wars, have performed better in terms of health than predicted by their generally unfavourable RHS variables.[32] A broadly comparable case is reported by Sen (1997): Life expectancy in England and Wales jumped upwards by nearly seven years per decade during the war decades 1911-21 and 1941-51. He attributes this success to „a more effective use of public distribution systems associated with war efforts and more equal sharing of food through rationing systems“ (Sen, 1997). A similar process might have been at work in the war-torn CEECs, contributing to the fact that mor-

30 Examples are the impressive mortality reductions achieved in South Korea and Hong Kong.
31 Examples are Sri Lanka, pre-reform China or Costa Rica.
32 From this result one should, however, not derive the normative conclusion that in order to improve the health status countries ought to make war. Health status does not improve in absolute terms.

tality in the war-torn countries increased by less than expected on the basis of the other determinants.

Very surprisingly, the coefficient of the (log of the) initial level of the respective mortality rates enters with a significantly positive sign in most specifications. Hence, in contrast to our expectations, mortality rates have been *diverging* among the CEECs: Those countries, that started out with initially higher mortality rates, i.e. a worse initial health status, have borne more marked mortality increases than those countries starting from a more favourable position.[33] Put differently, the more healthy a population was at the outset, the more resistant it has been to the social and psychological difficulties posed by transition. There is thus *divergence* in health performance among the CEECs, which is a very worrying trend, since health status itself is a determinant of future economic development. This aspect can be viewed more clearly from a different perspective, i.e. by looking at the variation of the crude death rate level among the CEECs within a given year. Figure 4 depicts the evolution of the coefficients of variation[34] for the gender- and age-specific death rates used in the regressions.

Figure 4: Divergence in crude death rates



Source: TRANSMONEE 3.1

33 This conclusion holds in a conditional sense, i.e. after controlling for the other determinants of health development.

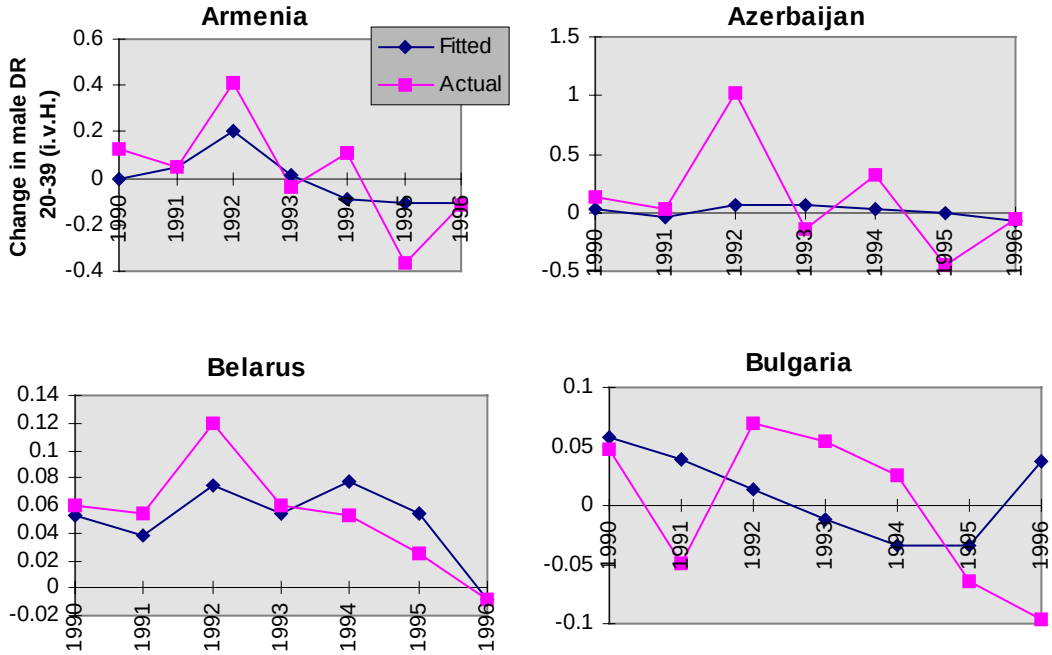
34 The coefficient of variation is the quotient of the standard deviation and the arithmetic mean of a given sample.

Obviously, the dispersion of crude death rate (CDR) levels has increased throughout the transition period for all age and gender categories[35]. Visual inspection of the graph tells us that within the same age group, the dispersion of CDRs has increased more for males than for females. The male age groups of 20-39 and 40-59 have been affected to the largest extent, whereas male and females over 60 appear only slightly influenced. These results are just another way of saying that males at their best age have been affected most by transition.

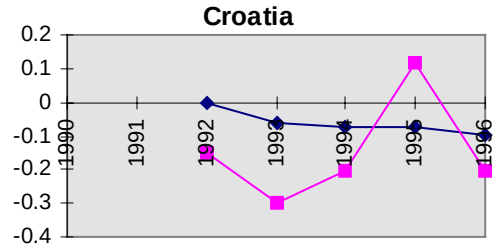
This divergence pattern among the CEECs has not been obvious from the inspection of GDP growth rates, as it has been found in similar studies, e.g. De Melo et al. (1997), which tend to find evidence in favour of conditional convergence. It lends support to the hypothesis that GDP is an incomplete measure of a nation's well-being, since it did not capture the divergence in one very direct measure of well-being, i.e. health or mortality.

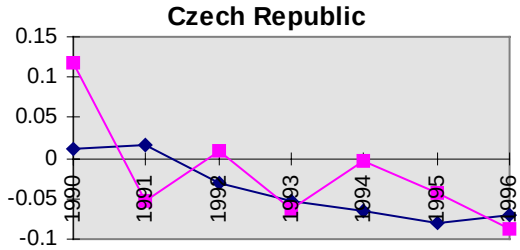
Naturally, the selected explanatory variables do not predict the health performance in each of the CEECs to the same extent. While we need not examine the fit of each specification for every single country, we have chosen specification 2 as the representative regression to examine the residuals of each country. Figure 5 depicts the actual and fitted growth rates in death rates of males between 20 and 39 years.

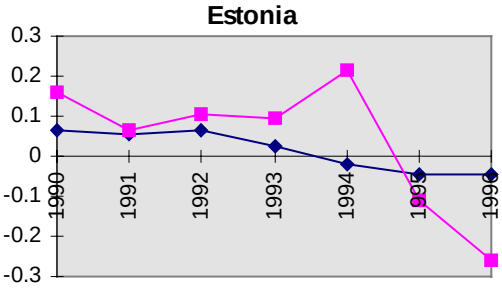
Figure 5: Actual vs. fitted mortality development (CDR20-39 male)

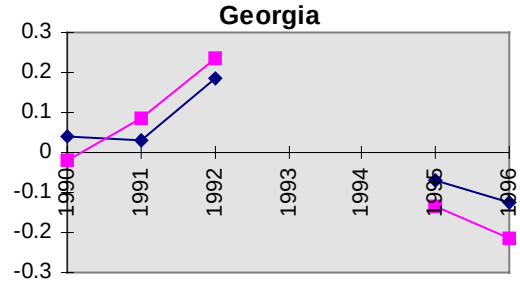


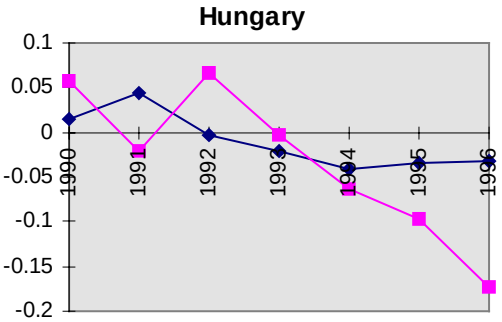
35 The same pattern holds, if we consider age- and gender-specific life expectancy.

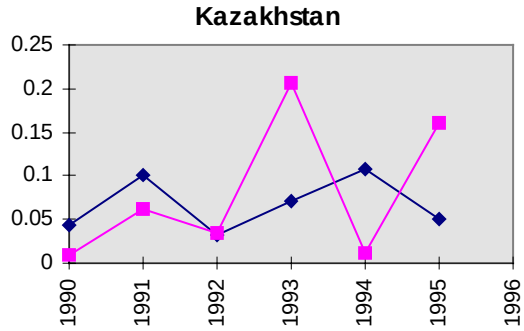

Croatia
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
1990
1991
1992
1993
1994
1995
1996

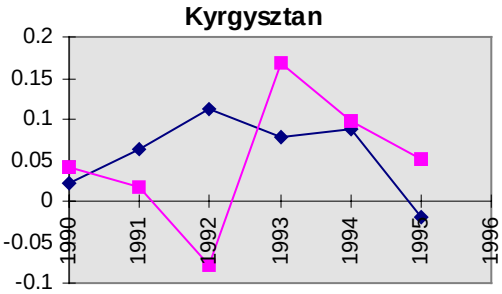

Czech Republic
0.15
0.1
0.05
0
-0.05
-0.1
1990
1991
1992
1993
1994
1995
1996

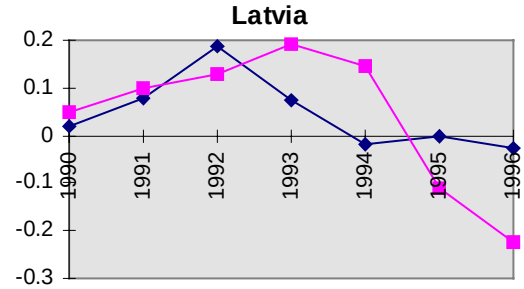

Estonia
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
1990
1991
1992
1993
1994
1995
1996

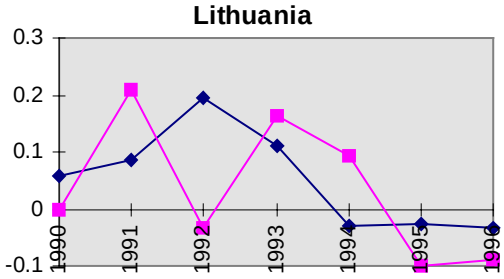

Georgia
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
1990
1991
1992
1993
1994
1995
1996

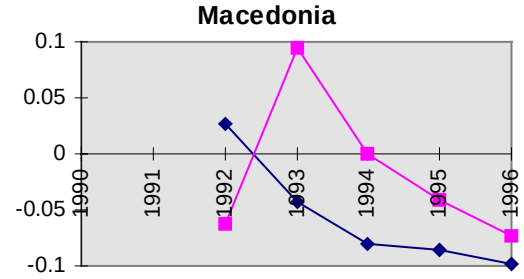

Hungary
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
1990
1991
1992
1993
1994
1995
1996

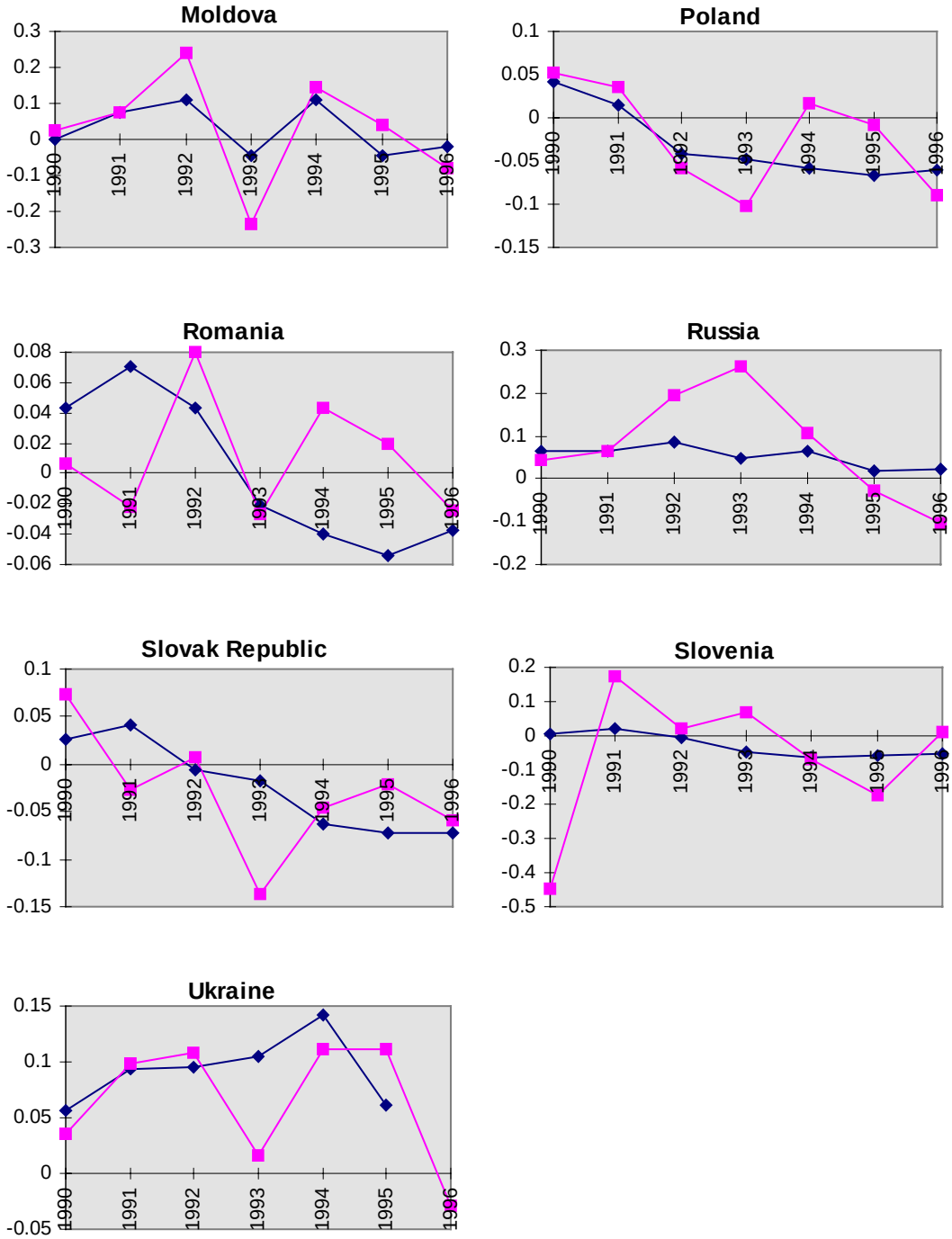

Kazakhstan
0.25
0.2
0.15
0.1
0.05
0
1990
1991
1992
1993
1994
1995
1996


Kyrgysztan
0.2
0.15
0.1
0.05
0
-0.05
-0.1
1990
1991
1992
1993
1994
1995
1996


Latvia
0.2
0.1
0
-0.1
-0.2
-0.3
1990
1991
1992
1993
1994
1995
1996


Lithuania
0.3
0.2
0.1
0
-0.1
1990
1991
1992
1993
1994
1995
1996


Macedonia
0.1
0.05
0
-0.05
-0.1
1990
1991
1992
1993
1994
1995
1996



Source: Own calculation based on specification 2 in table 1.

The *predicted* health performance shows a rather uniform pattern in most of the countries: Higher mortality increases in the early years of transition are followed by lower or even negative increases towards the end of the observation period. In the majority of the countries the *actual* pattern is close to the predicted one, thereby supporting the underlying model. However, notably Russia and the Baltic countries are different in that they substantially overshoot the predicted path at about mid-period and undershoot it in more

recent years. Bulgaria shows a somewhat similar pattern, whereas Croatia's mortality evolution was more favourable than predicted in all but one year, although it was affected by war. These deviations indicate that there have been some unknown country-specific factors at work.

Generally speaking, differences between actual and fitted values arise, because reform policy, GDP change and health resources do not exhaust the list of factors that may determine mortality changes in transition. In particular, it is not only the *quantity* of health services available, but also their *quality* and efficiency that matters. Neither has it been possible to control for environmental factors and nutrients intake which are both important factors in determining health. Moreover, many social stress factors that are not necessarily directly related to GDP growth play an important role in determining health, e.g. divorces, job insecurity, poverty, unemployment, migration, depression, etc.. They share the common feature that „individuals are called upon to react to new and unexpected situations for which they do not know the appropriate coping behaviours. This leads to physiological and psychological arousal, provoking sudden changes in heart rate and blood pressure and in the ability to maintain coherent behaviour" (Cornia/Paniccia 1996). To the extent that these factors are independent of GDP growth rates in one or the other country, our model can only partly explain mortality changes in the respective case.[36]

5. CONCLUSION

The central interest of this paper was to test the hypothesis, that reforms towards a market system in Central and Eastern Europe have been detrimental to health, as suggested by the dire experience in Russia. Based on our empirical procedure, in which we approximated the per se unobservable quantity health by different indicators of mortality, we could firmly reject this. On the contrary, the more successful a country was in the implementation of structural reforms, the more favourable was its health performance.

In addition to structural reforms, only few variables were needed to explain a large extent of the variation in mortality outcomes, suggesting that health development in the

36 It would require more in depth country studies to explain the strong deviations between actual and predicted values for example in the countries cited above. Concerning Russia and the Baltic countries, for example, a potential explanation could be that they have borne fairly sharp increases in income inequality which may have added more than usual to the psycho-social stress caused by GDP decline.

transition economies was driven by the same common factors. The growth rate of per capita income in the current or previous period was shown to be significantly associated with the various mortality indicators used. However, changes in the provision of health resources appeared to matter only for part of the indicators, notably the female age-specific death rates (except for the 60+ category) and the infant and child mortality rates. This evidence corroborates the notion that the male population suffered more from psycho-social stress factors, since those are not directly influenced by medical support.

Given that structural reforms and per capita incomes seem to be the most important factors, the immediate policy implication is obvious: Those countries whose health status was hit particularly hard by transition will recover only if they implement structural reforms and achieve sustained economic growth („growth-mediated health improvement“). For the transitional period these factors seem to have dominated both the „support-led“ forces - i.e. health resources - (certainly for the male population) and the traditional risk factors[37] (environmental degradation, smoking, diet, alcohol consumption).

The growth-mediated channel works only if the benefits of growth are shared widely among the population. While some rise in inequality during transition is unavoidable, too much of it provokes psycho-social stress and thereby negatively affects health. Such a sudden and sharp rise in inequality may have been behind the fact that Russia and the Baltic countries have undergone a mortality evolution far worse than predicted by the explanatory factors chosen.

Obviously, the derived policy conclusion is of limited help from the point of view of designing appropriate policies for reform of the health sector itself. The policy-makers find themselves in the difficult position to support policies that bolster the economy while simultaneously requesting the extra-funds required to design and implement health sector strategies aimed at increasing the efficiency of resource allocation and improving public health. It is beyond the scope of this paper and will be left to further research to address these issues concerning the optimal reform of the health sector.[38]

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37 Traditional risk factors could not be included in the regression. Cornia/Paniccia (1996) explain why they do not seem to matter for determining mortality changes in transition.

38 Thus far, reforms of the health sector have not proved all too successful, and have met with strong public opposition, as the recent reform attempts in Poland have manifested (see Nicholls, 1999).

As the economies complete their process of transition, the transition-related stress factors will diminish and the „support-led“ process, that works via the efficient provision of social and health services, will regain its importance also for the male population.

The urgent need for the more backward countries to ameliorate their health situation is strongly emphasised by the unexpected result of divergence in mortality rates. Transition can be perceived as a phase during which the initial conditions are set which in turn largely determine the countries' future development prospects. Health constitutes a crucial dimension of human capital, which in turn is one very important initial condition for the future development process[39]. Therefore, the divergence in health status is a most worrying sign for those countries left behind. Unless they offset the diverging trend, the transitional effects might perpetuate themselves and drive the economy into a downward spiral of human underdevelopment and economic decline. In that worst-case scenario the initial comparative advantage of a relatively healthy and (formally) highly-educated work-force would soon be lost and prospects for convergence towards western industrial countries would be grim.[40]

39 It is important, since it has empirically proved to have a strongly positive influence on growth.

40 Some critical remarks concerning our methodology are of course in order: We have not tested for causality although we often pretend to deal with causal relationships. Other studies have found causal relationships (in a statistical sense) of the sort described here in other contexts and countries (see e.g. Pritchett/Summers, 1996). Together with the theoretical model used we have *interpreted* the measured relationships as causal. Further, there is reason to believe that including reform indices, GDP growth rates and changes in health resources in the same regression may lead to serious multi-collinearity-problems. While this might be intuitively plausible, the regression-outputs do hardly support this view. We did neither find entirely implausible results, nor too high standard errors, nor too sensitive coefficients. In fact, simple correlations of the RHS variables reveal that there the variables are not very mucg correlated. Besides, when using the quantitative health resource indicators we could not capture the quality and efficiency of the services provided by these resources. The data necessary to examine such issues, has not been available to us. As Parkin (1989) finds, international comparisons of health sector efficiency is extremely difficult, even for OECD-countries.

Appendix
Was there any effect?

The Chow test represents one way of examining whether the time paths of various indicators of health status are different during transition compared to the pre-transition period.[41] This requires a sufficient number of observations in the two sub-periods considered - pre-transition (T1) and transition (T2). Only for life expectancy at birth (female, male and both) there is data back to 1970 for 12 countries, whereas no more than five countries have a sufficiently long time-series for the remaining age and gender-specific life expectancies and for the cause-specific standardised death rates.

There are two versions of the Chow test applicable for our purposes: The *forecast* and the *breakpoint test*. In the forecast version of the Chow test, the equation estimated with the T1 observations is used to predict the values of the dependent variable in the remaining T2 data points. There is then a vector of discrepancies between predicted and actual values. If the discrepancies are small, little doubt is cast on the estimated equation, but large differences would cast suspicion on the estimated equation. The forecast test contrasts the size of the prediction errors with the variance to be expected if the null hypothesis is true, namely that the predicted observations come from the same statistical model as the one underlying the estimated equation.

In the breakpoint Chow test, the data are partitioned into two subsets. Each subset must contain more observations than the number of coefficients in the equation being estimated. The purpose of the partitioning is to test whether the coefficients may be regarded as constant over the subsets. To carry out the test, the equation under review is fitted separately to each subsample. Summing the residual sum of squares for each subsample gives the unrestricted residual sum of squares. The equation is then fitted to the complete set of sample observations, which yields the restricted residual sum of squares. The F-statistic is based on these residual sums of squares in the usual way and the Likelihood Ratio (LR) statistic comes from the restricted and unrestricted maximum of the likelihood function. As in the forecast version the output from the test is an F and an LR statistic with associated probabilities.

41 For an introduction to the Chow test, see standard econometric textbocks, e.g. Greene (1990).

For the purpose of our study we split the sample into the pre-transition period, that we defined to end in 1988 and the transition period 1989 to 1995.[42] Our estimated equation has the following specification:

$$H_{t,i} = \alpha + \beta * Time_{t,i} + \varepsilon_t$$

with $H_{t,i}$ as the natural log of the respective health variable (age and gender-specific life expectancy, infant mortality, under 5 mortality and cause-specific death rates) in year *t* and country *i*. Since we are looking for a possible change in the time structure, „*Time*" is the only explanatory variable.

The rather scarce data available for the second subsample reduces the reliability of the results. Besides, the results of the Chow test do not indicate the direction of the change. If, for example, life expectancy has been decreasing in the first period (pre-transition), it would be crucial for us to know, whether transition has further deteriorated or reversed the long-term trend. Therefore we supplement the tests by a simple graphical analysis, in which we calculate a range of minus one to plus one standard error of the regression[43] around the log-linear trend of the dependent variable, whereby the trend is calculated on the basis of the observations up to 1988. If the actual values after 1988 are out of this range, this further substantiates the hypothesis of a structural break. Table A1 presents the results of this procedure.

The asterisk indicates that in either version of the Chow test the hypothesis of structural stability was rejected at the 5% level at least according to two out of the four statistics[44]. The signs used in the table have the following meaning:

+	increase in the respective variable,
-	decrease,
+-	inconsistent development,
=	constant.

42 Assuming the same year as the start of transition for all countries is over-simplifying to some extent, but does not alter the qualitative content of the results.

43 The standard error of the regression is a measure of the size of the prediction error, i.e. the residuals. About two-thirds of the residuals will lie in a range from minus one to plus one standard error.

44 As explained above, each version of the test has two test statistics (F-and LR-statistic).

Table A1: Show test results

	Countries	Arm	Bul	Cz	Hun	Kyr	Lat	Lit	Pol	Rom	Rus	Uk	Uz
Life exp.at birth	until 1988		+	+	+-	+-	+	+	+		+	=	-
	1989 -1995		- *	+ *	+-	- *	- *	- *	+ *		- *	- *	= *
Life exp.at birth fem.	until 1988	=	+	+	+	+-	+	+	+	+	+	+	-
	1989 -1995	=	+	+ *	+	+- *	- *	- *	+	+	- *	- *	= *
Life exp.at birth male	until 1988	=	-	+	-	+-	+	-	+-	-	+	-	-
	1989 -1995	=	- *	+ *	+	+-	- *	- *	+ *	- *	- *	- *	= *
Life exp.at 15 fem.	until 1988		+		+-				+	+	+		
	1989 -1995		+		+-				+	- *	- *		
Life exp.at 15 male	until 1988		-		-				-	-	+		
	1989 -1995		-		-				+ *	- *	- *		
Life exp.at 45 fem.	until 1988		+		+				+	+	+		
	1989 -1995		+		+-				+	+- *	- *		
Life exp.at 45 male	until 1988		-		-				-	-	+		
	1989 -1995		-		-				+ *	- *	- *		
Life exp.at 65 fem.	until 1988		+		+				+	+	-		
	1989 -1995		+ *		+				+	+ *	- *		
Life exp.at 65 male	until 1988		-		+-				+-	+-	+		
	1989 -1995		= *		+-				+	- *	- *		
Infant mor-tality	until 1988		-	-	-				-	-	-		
	1989 -1995		+ *	- *	-				-	= *	+-		
Under 5 mortality	until 1988		-		-				-	-	-		
	1989 -1995		+ *		-				-	-	+- *		

Source: WHO (1998), own calculations.

The largest number of countries is available for life expectancy at birth. As table A1 shows in the third column, except for Hungary all of these countries seem to have been affected by transition, five of them negatively and three positively. As for the gender differences, a few interesting observations emerge: In the period up to 1988, female life expectancy increased for all age groups and countries (except Russia for life expectancy

at 65), whereas male life expectancy deteriorated at age 15 and 45, but improved for age 65.[45] During transition the picture became more diverse: Bulgaria and Hungary were left largely unaffected and continued their long-term trend. Only for Poland's male population the long term negative trend could be reversed while leaving their females unaffected. The worst scenario occurred in Romania and Russia, who suffered from both male and female declines in life expectancy. Data on infant mortality and under 5 mortality suggests that children were not as negatively affected by transition as adults, the exception being Bulgaria and partly Russia.

In sum, the analysis shows that the CEECs have been affected to varying degrees by transition, which supports the need for a further inquiry into the causes of these diverging developments.

45 Russia is again the exception.

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