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Abstract

During the transition to capitalism, the postcommunist countries have experienced unprecedented mortality crises, although there has been considerable variation within — and between — countries and regions. Much of this variation remains unexplained, although alcohol and psychological stress have been found to be major causes of declining life expectancy. We move beyond this finding by showing that the implementation of neoliberal-inspired rapid large-scale privatization programs (mass privatization) was a major determinant of the decline in life expectancy. We find that mass privatization also increased alcohol-related deaths, heart disease, and suicide rates, strong evidence that mass privatization created psychosocial stress that directly resulted in higher mortality. We also find that mass privatization modestly contributed to a decline in the number of physicians, dentists, and hospital beds per capita; however, we find only very weak evidence that this reduction in health resources directly contributed to the mortality crisis itself. By using "control function" and instrumental variable approaches to account for the potential endogeneity of mass privatization, we also demonstrate that the choice of mass privatization as a property-reform strategy was not economically determined, but was rather caused by ethnic politics and the mimicking of policies adopted by powerful neighboring countries.

We have a fearful example in Russia today of the evils of insane and unnecessary haste. The sacrifices and losses of transition will be vastly greater if the pace is forced ….

- *John Maynard Keynes, "National Self-Sufficiency," Yale Review, 1933*

[W]henever serious readjustments take place in the social order, whether or not due to a sudden growth or to an unexpected catastrophe, men are more inclined to self destruction.

- *Émile Durkheim, "Suicide," 1970*

I am deeply convinced that the success of our policy in all spheres of life is closely linked to the solution of our most acute demographic problems. We cannot reconcile ourselves to the fact that the life expectancy of Russian women is nearly 10 years and of men nearly 16 years shorter than in Western Europe.

- *Vladimir Putin, State-of-the-Nation Address, April 25, 2005*

Introduction

The massive economic contraction that followed the disintegration of the Soviet system has attracted a great deal of attention. What has been relatively neglected, unfortunately, is the most troubling aspect of the transition to postcommunism, the explosive rise in "violent mortality," or epidemic levels of cardiovascular disease and "external" causes of death such as alcohol poisoning, homicide, and suicide (World Bank 2005, Brainerd and Cutler 2005, Gavrilova et al. 2000). Countries in the "mortality belt," spanning from Estonia in the north to Ukraine in the south, experienced life-expectancy declines of up to six years within the first half-decade of reform — a peacetime mortality crisis unparalleled in modern history.[2] The United Nations' TransMONEE project tabulates that the excess mortality during the 1990s, or deaths that would not have occurred if mortality had remained at 1989 levels, totaled over 3.2 million (UNICEF 2001). (See Figure 1 and Tables 1 and 2.)

While the generalized economic crisis that has been labeled the "postcommunist recession" could logically be expected to relate to this increased mortality, it can at best be considered only a partial explanation, since the mortality has not followed the typical patterns of development and health. During the initial stages of reform, from 1989 to 1994, there is a moderately strong correlation between the logarithmic change in gross domestic product per capita and the logarithmic change in life expectancy (r=-0.60).

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[2] Eliminating all common forms of cancer roughly corresponds to a life-expectancy increase of three years, a little less than half of the magnitude of Russia's decline (Swiss Re 2004).

Over the next six years, however, the unadjusted relationship weakens considerably (r=-0.13). Several countries, including Russia, exhibit the anomalous experience of declining mortality in the midst of economic recovery (World Bank 2005). Another enigmatic aspect of the excess deaths has been the disproportionate impact on working-age men, rather than vulnerable groups such as the very young and elderly, whose health has historically borne the brunt of rapid economic destabilization. Infant mortality levels in Russia, aside from an immediate and transient spike following the onset of radical market reforms in 1992, have steadily declined against a background of "epidemic" levels of chronic disease. (see Figure 2)

The social sciences (sociology, political science, economics) have been relatively silent about this human crisis, focusing instead on patterns of elite and social stratification, political outcomes, and economic development and change. A major exception to this neglect has been the group of "global ethnographers" studying the living conditions of the population (e.g., the contributors to Burawoy and Verdery 1999 and Burawoy et al. 2000). Although these ethnographers do not explicitly address the public-health crisis, they do link adverse social outcomes implicated in contributing to the erosion of population health, such as the emergence of poverty, to organizational failure, which is usually traced back to the destructive effects of the adoption of "neoliberal ideology" on state capacity (see Field, Kotz and Buhkman 2000 for a holistic account of the public-health crisis, which supports a "state desertion" account).

Western neoliberal economists were the most influential advisors to the postcommunist policy makers, while domestic neoliberal economists served as crucial political elites directly shaping postcommunist economic policy (see the seminal work by

Wedel 2001 and Kogut and Spicer 2005). And yet neoliberals have had very little to say about the mortality crisis, and indeed believe it to be the most puzzling outcome of the transition (e.g., Shleifer and Treisman 2004). They expected that the enactment of the correct (i.e., neoliberal) reforms would push countries forward on the linear path from "planned" to "advanced market economies"[3] and thus increase economic growth and prosperity. The lengthening of life expectancy should follow suit (Sachs 1996; Pritchett and Summers 1996) as countries undergo an "epidemiological transition," typical of modernizing societies, in which neonatal care, modern sanitation infrastructures, and vaccines generate a decline in disease and thus a lengthening of life expectancy (Omran 1971; WHO 2003).

Not surprisingly, the public-health field has most directly and extensively studied this crisis. Epidemiologic analyses clearly show that the increase in mortality is due to a rise in cardiovascular disease and "external causes" like alcohol poisoning, violent

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[3] This economic ontology is made explicit by the European Bank for Reconstruction and Development (a daughter bank of the World Bank [the International Bank for Reconstruction and Development] and the institution most responsible for oversight of the transition), which releases yearly reports and updates (Transition Reports) that serve as the major source of data for most social scientists studying the region. These reports code all economic policies on a 1-4-point scale, with 1 corresponding to a "planned" economy and 4 to a "market" economy. A score of 4* was given to policies that approximated what was found in the advanced market-economies; this has subsequently turned into a 4.3.

deaths, homicide, suicide, and accidents. Psychosocial stress levels and alcohol consumption have occupied central roles in these explanations. Yet even in the most comprehensive analyses a sizable residual remains unaccounted for.

We will advance a sociological theory of postcommunist mortality, building on the work of the global ethnographers but using quantitative methods. This analysis complements the public-health literature, but it poses a major challenge to neoliberal transition theory. Our findings demonstrate that those countries that implemented the neoliberals' preferred method of privatization (mass privatization) experienced substantial declines in life expectancy. This explains a large part of the postcommunist mortality crisis, although the magnitude of the effect and the variance explained is sensitive to the type of statistical test employed. Our most conservative estimate of the decrease in overall life expectancy as a result of implementing a mass-privatization program is 0.86 years; the highest estimate is 5.14 years. We control for endogeneity related to the selection of mass-privatization programs and heterogeneity of the program effect using several instrumental and control methods, and find that the results remain consistent. We find it difficult to escape the conclusion that rapid large-scale privatization as embodied in mass-privatization programs was a significant anterior cause of the postcommunist mortality crisis via the mechanism of psychosocial stress.

This paper has five sections. In the first, we review the findings from the public-health research. In the second we discuss the neoliberal analysis and develop a "new classical sociological" theory of postcommunist mortality that supplements the public-health account. We then generate our hypotheses. In the third we discuss our methods

and data. In the fourth we present our results, and in the conclusion we discuss the implications for public policy and future research.

Public Health Literature on the Postcommunist Mortality Crisis.

It is well established that the postcommunist mortality crisis was primarily driven by so-called "violent mortality": cardiovascular disease and external causes of death such as alcohol poisoning, accidents, homicide, and suicide, especially among working-age adult males (Cornia and Paniccia 2000). Public-health researchers have long understood that there is a strong relationship between low socioeconomic status and poor health (Kosa 1969, Marmot and Wilkinson 1999). Thus, a declining economy should lead to worse health as it lowers living conditions. And indeed, over the entire period from 1989 to 2000, across 22 transition countries, the log of life expectancy and the log of GDP growth have a -.55 correlation coefficient, although the relationship holds most strongly in the first five years (-.60) and is rather weak thereafter (-.13) (Brainerd and Cutler 2005). Clearly, the economic decline had some important effect, but the size of the effect, and the mechanisms that are operative, are not obvious.

Logically, a collapsed medical-care system, unable to provide preventive medicine or to adequately treat the ill, could account for this rise in mortality (Field, Kotz and Bukman 2000). Prior to the transition, the state (and state-owned enterprises, or SOEs) bore the brunt of the financial burden of health by universally providing free access to centrally planned care (Balabanova et al. 2004). Although the principle of universality persists, the advent of market reforms in the context of the health sector

levied higher costs on patients at the time when many were the least able to afford them (Balabanova et al. 2004; Brainerd and Cutler 2005, p. 48).

The marketization of health care, combined with a growing lack of purchasing power among the poor, could account for increased mortality. Reiss et al. (1996) report, for example, that many patients in St. Petersburg simply could no longer afford the cardiovascular medicines they needed, and, as a result, access to care was suddenly abridged for patients with histories of chronic conditions and for patients who were newly diagnosed with illness. Surveys from eight postcommunist countries found that over one in five persons who reported an illness did not visit a doctor even though they felt it was medically necessary (ranging from roughly 10% in Armenia to 50% in Georgia) (Balabanova et al. 2004).

However, as plausible as this account is, we are aware of no systematic research (at either the national level of Russia or cross-nationally) that supports this position as a primary determinant of the mortality crises, and it does not easily explain the precipitous rise in "violent" causes of death. Stegmayr et al. (2000) show that in Novosibirsk the increased mortality from strokes was not due to higher fatality rates (which would follow if the cause was poor health care) but simply from a higher number of strokes. Using maternity fatality rates as a measure of the quality of health care, Brainerd and Cutler (2005) fail to find a significant relationship between log changes in maternal mortality and log changes in working-age (ages 25 to 64) male mortality in 22 postcommunist

countries.[4] They also fail to demonstrate a significant relationship between public and private health-care spending levels and male working-age death rates (p. 12).

The Russian Longitudinal Monitoring Survey (RLMS) also shows that the traditional risk factors for cardiovascular disease (behavioral risks such as smoking, alcohol consumption, and having an unhealthy lifestyle/diet and clinical risks such as hypertension and high cholesterol), generally estimated to account for 40% to 60 % of all chronic-disease experience, surprisingly explain only a small fraction of the rise in mortality in Russia. Of these, only alcohol consumption changed enough to independently explain surging mortality levels. Furthermore, the RLMS did not show an increase in underweight people (with weight determined by the Body Mass Index), suggesting that an inability to get enough food is not to blame (Brainerd and Cutler 2004, pp. 13-15). This finding is consonant with Dore, Adair and Popkin (2003)'s study that shows that Russian households are able to maintain nutritional levels despite changing economic conditions. This resilience is likely a function of the recourse to informal agriculture as a coping strategy (Southworth forthcoming) and intra-family gift-giving (Burawoy et al. 2000).

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[4] As previously noted, infant mortality levels experienced a downward tendency, suggesting sufficient levels of pre- and neonatal care. Maternal fatalities may be a weak proxy for care related to the emerging conditions that more heavily relied upon pharmaceuticals, diagnoses, medical procedures, or other areas in which the health system was radically restructured.

It might be the case that, while caloric consumption is maintained, securing enough food requires more work, or displaces resources required for other basic needs, like utilities, shelter, and water. Using the RLMS data for Russia, Brainerd and Cutler (2005) include a number of controls for such circumstances (such as whether a family was in poverty or extreme poverty, received subsidies for fuel, had to sell goods to obtain food, and what the share was of all expenses devoted to food), but fail to find significant effects.

Still, while postcommunist households may have maintained sufficient caloric intake, dietary content may have undergone important changes (i.e., a "nutrition transition"; see Popkin 2002). Several studies suggest that the economic transition affected the composition of diet in ways that would influence health outcomes. In most Soviet-style systems meat and dairy products were heavily subsidized, while fruit and vegetables were hard to come by. Thus, the removal of subsidies could increase the price of meat and dairy, and the liberalization of trade increase the supply of affordable fruit and vegetables, leading to a predictable shift in food-consumption patterns, with corresponding mortality effects (insofar as fatty meat and dairy have adverse health effects relative to the consumption of fruits and vegetables). Bobak et al. (1997) show that average Czech butter consumption fell from 9.4 kg. to 5.4 kg. from 1989 to 1992, while Poledne and Skodova (2000) show that the average Czech increased consumption of fruits and vegetables from 68 to 86 kg. from 1989 to 1997. Sekula et al. (1997) showed a similar change in Poland between 1989 and 1994, where there was a decrease in the consumption of animal fat and an increase in the consumption of vegetable fat.

Changes in the availability and prices of different types of food (based on variation in exchange rates and inflation rates) might therefore account for changing mortality rates. In a cross-country regression using WHO mortality data on the availability of fruits and vegetables per person in kilograms, Brainerd and Cutler (2005, p. 49) show that an increase in such availability corresponds to decreased mortality, but the effect is not statistically significant, and explains a modest 3% of the changing mortality of working-age men. This matches their results obtained within Russia using RLMS data — decreasing fruit-and-vegetable consumption increases cardiovascular death, but this explains only 2% of the increase in such diseases (p. 22).

The most significant positive findings from the public-health literature focus on increased levels of psychosocial stress and the related increase in alcohol consumption and other risky "coping" behaviors. Stress (the anxiety/fear caused by a person's perception of a challenge and the perceived inability to meet those challenges [Sokolov 1963, Ursin 1988, Ursin and Levine 1991]) has long been recognized as being associated with cardiovascular disease (Labarthe 1998). The stress response is necessary for all life to respond to various stimuli in the environment, but damage to health comes when stress levels are maintained for long periods of time (Ursin and Levine 1991), because the body can not adequately recover normal levels of the hormone cortisol. Elevated cortisol levels have been linked to impaired cognitive performance, suppressed thyroid function, blood-sugar imbalances, decreased bone density and muscle tissue, higher blood pressure, suppressed immunity, and increased stomach fat (which in turn is linked to a variety of cardiovascular diseases). Thus, multiple mechanisms have been found by which psychological and social stressors "get under the skin" to affect a wide range of

pathologies (Kristenson et al. 2004).

Such stress, in addition to killing through other types of "violent mortality," may also reasonably be assumed to be a cause of some of the massive increase in the suicide rate in the postcommunist world. To examine the mortality impact of psychosocial stress levels, Brainerd and Cutler proxy male suicide for overall stress. In a cross-sectional regression, the male-suicide rate has a substantively large and statistically significant effect on the increase in male mortality from 1989 to 2000 across 22 transition countries (the coefficient is .274, and this variable explains 28.7% of the variance [Brainerd and Cutler 2004, p. 49]). If a significant portion of this stress results from an acute fear of a major decline in living standards, then the minimum-wage level might also serve as a decent proxy for this type of stress (amplifying this is the fact that minimum-wage levels are often used as a benchmark for setting the value of various social benefits). Brainerd and Cutler (2005, p. 116) show that the log change in the minimum wage as a percentage of hourly wage has a large negative effect (-9.8%) on mortality in 18 transition countries.

Stress can, of course, lead to poor health through an increase in "risky" behavior, such as using alcohol or drugs as a coping mechanism. Such behavior would also be influenced by the price and availability of such goods, which would in turn be influenced by liberalization policies (or the effect on imports of such goods from currency fluctuation and inflation). For example, the relative price of alcohol plunged in Russia from 1990 to 1994 by 58% (Brainerd and Cutler 2005, p. 17), a result of a flood of cheap imports and low-quality black-market vodka. Increasing alcohol consumption contributes to mortality by increasing levels of alcohol poisoning and by contributing to suicides, accidents, and violent deaths. Furthermore, binge drinking may contribute to

cardiovascular disease via increasing arrhythmias and heart attacks (McKee and Britton 1998). And there is ample evidence of an increase in alcohol in Russia. The RLMS data indicates that alcohol consumption increased by 27% from 1992 to 2000. Official statistics on per-capita alcohol consumption show large increases cross-nationally in the Baltics and the European Former Soviet Union (FSU), but only a slight change in many countries in central and southern Europe.

There is evidence that this increased consumption is indeed partially responsible for the mortality crisis. A detailed study of cardiovascular disease and drinking in men in Novosibirsk from 1985 to 1994 showed that heavy drinkers experienced increased health problems. But the authors find that the level of heavy drinking is too low to account for the increase in cardiovascular disease, and, even if it is underestimated by a factor of 5 on surveys, it could account for only 8% of such deaths (Malyutina et al. 2001; Malyutina et al. 2002). Cross-national regression in 22 transition countries reveals a large, statistically significant effect of increased alcohol consumption on mortality, suggesting that it explains about 25% of the increased mortality between 1989 and 2000. Regression analysis of the RLMS data from 2000 to 2002 (when it recorded cause of death) shows that the increase in alcohol consumption in Russia predicts an increase in male mortality from accidental deaths. Each 1% increase in consumption increases the likelihood of dying by 0.4%, which, if one controls for binge drinking (defined as someone who reports normal consumption in the last 30 days as 120 or more grams of hard alcohol), falls to 0.3%; binge drinking, however, makes one 362% more likely to die an accidental death.

Taken together, the major findings of the public-health literature are that an increase in stress and an increase in alcohol consumption have had a prominent effect on the postcommunist mortality crisis, but that these factors leave a large amount of variance between countries and variance within countries over time unexplained. The gigantic question this begs is what explains variation in stress and risky behavior both over time and between countries.

There is evidence that suggests that "transition" policies may have precipitated or contributed to the mortality crises (Ellman 1994). One study found that mortality increases within Russia were greatest in regions that experienced the fastest pace of transition in terms of job gains and losses in large and medium enterprises (Walberg et al. 1998). Unemployment levels, which did not exist under communist regimes, soared in the wake of social reform. In the Soviet-style economies, employers historically played an important role in ensuring well-being through dispensing various social and consumer goods in the workplace (literally, in enterprise-owned organizations that may or may not have been located at the factory) and quite often housing as well. The sudden loss of these benefits could be particularly traumatic for workers. Indeed, evidence finds that many workers continued to work even in the absence of fiscal remuneration to maintain access to these goods (Service 2003, Southworth 2004). Other studies point to the impact of asset stripping and reprofiling of health-delivery institutions, such as pharmacies, under privatization programs (Cornia and Paniccia 2000). We provide a first attempt to

operationalize these policies by investigating the effect of implementing large-scale

privatization programs on mortality.[5]

Neoliberal Economics and New Classical Sociological Theories of Postcommunist Health Outcomes

A small group of neoliberal economists with ties to Harvard provided the

intellectual guidance (policy advice) and legitimation (intellectual/political support) for

transition policy makers (Kogut and Spicer 2005). To our knowledge, they have mostly

ignored the mortality crisis, and focused instead on explaining variation in rates of annual

growth throughout the region.

These economists argued that radical liberalization, stabilization, and privatization

programs were necessary for both economic and political reasons. They have

subsequently produced a substantial amount of literature that indicates that the closer the

adherence to their initial policy advice is (usually measured by the de Melo et al. [1996]

composite indictor of "liberalization"), the better the economic performance as measured

by annual growth rates (see King and Hamm 2005 for a literature review). Neoliberals

expected that the transition from the planned to the market economy would catalyze the

"epidemiologic transition" found in Western societies, in which modernization leads to

declines in overall mortality and a decrease in its variability until it reaches a low and

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[5] Other studies attempt to quantify implementation of structural reform using 1) The de

Melo liberalization index, and 2) the EBRD reform index. See King and Hamm (2005)

for the pronounced limitations of these indexes.

stable level (Omran 1971). Sachs (1996) theorized that "liberalization" would lead to increases in life expectancy, while Prichett and Summers (1996) believed it would lead to lowered infant mortality rates and longer life expectancy.

Neoliberals have never suggested that actually implementing their prescribed policies might have contributed to the public-health crisis, and in fact offer no structural account of the mortality crisis at all. They ultimately resort to will-based, or voluntaristic, explanations of the mortality crisis: poor health is related to poor personal choices. Therefore, their policy advice is that individuals must decide to make better choices and take better care of themselves, perhaps aided by educational campaigns. A recent study conducted by the World Bank on the Russian mortality crisis concluded that "Russians must ease back on the bottle, cut down on smoking, watch their diet and lead healthier lives if they are to reverse population decline and maintain economic growth." Though the report referred to Russians' legendary fondness for vodka, it also cited excessive smoking, poor diet, and low personal fitness as contributory factors (Reuters, Moscow, Dec. 8, 2005).

We consider this a non-explanation. It begs the following question: *Why did people all over the postcommunist world start making worse personal choices, and why much more so in some countries rather than others*? Such decisions could in no sense be considered "rational" in the medium or long term, so why did people decide to start discounting the future so heavily? There must have been a change in people's environment to trigger this behavior. Individual preferences, willpower, or genetics cannot account for the changing mortality patterns over time. We seek an answer to these questions by providing a sociological analysis of the effects of the most contested of all

transition policies, mass or "shock" privatization (King 2003).

Sociology has made substantial contributions to understanding postcommunist poverty through extensive case studies and survey research, but for the most part sociologists have directly addressed declining life expectancy. Our new classical sociological account is not mutually exclusive with the public-health literature. We wish to add to the explanation by seeking to identify the anterior cause of psychosocial stress. We add in privatization policy as an additional explanation of the mortality crisis, opening up a whole new set of independent variables (macro- and microeconomic [i.e. structural adjustment] policies) for explaining public health and demographic change in the postcommunist world.

Neoliberal-neoclassical economics (building on the classics of Smith and Ricardo) fundamentally disagrees with what we term "new classical sociology" (building on the classics of Marx, Weber, and Durkheim) about the relationship between the state, the market, and civil society. The neoliberals famously see the state and the market in a zero-sum way, in which *the more state there is, the less market there is*. Civil society (defined as having social groups with shared values and symbols) is conflated with the market. The neoclassical sociological position sees the state, the market, and civil society as mutually constitutive (Block and Evans 2005, Chibber 2004, Linz and Stepan 1996, Zeitlin 1984, and Reno 1998). Here, civil society refers to groups with "social closure" (class and status groups) (Parkin 1979) as well as a community's shared understandings of the world.

The artificial creation of "private property" overnight, when a class of entrepreneurial capitalists has not emerged over time, will not produce the desired effects

because it neglects the role of "civil society" (a profit-oriented entrepreneurial class) and a strong bureaucratic state in the proper functioning of "Western" or "modern" capitalism (these can be considered the Marx and Weber effects). Moreover, to the extent that traditional social-prestige hierarchies are disrupted and many people's traditional understanding of themselves in relation to society is undermined by radical institutional change, we can expect an intensification of social problems (the Durkheim effect).

Our initial causal model identifies supply-and-demand shocks from mass-privatization programs that undermine economic organizations, producing a decline in the economy's activity and a rise in barter, which both lead to declining state revenues, producing a decline in state capacity. The state can no longer supply the elements necessary for medium- and hi-tech production (see Hall and Soskice 2001), including skilled labor, which creates a vicious circle of declining enterprises and a failing state (King and Hamm 2005, King 2002, King 2003, King and Szelenyi 2004). The generalized organizational failure resulting from these processes increases physical and emotional stress for all involved, and diminishes the organizational strength of care-giving institutions. These two social facts combine to increase mortality. (See Figure 3). We thus generate the main hypothesis we will test in this paper.

> H_{1SOC}: All things held equal, countries that implemented mass-privatization
> programs will have had greater declines in life expectancy than countries that
> didn't implement such programs.

Neoliberals would predict the opposite, even if there was a lag between the policy and the positive effect while resources were reallocating.

H_{1NL}: All things held equal, countries that implemented mass-privatization

programs, possibly after a brief lag of time, will have a greater increase in life

expectancy than countries that didn't implement such programs.

We will test the robustness of the basic finding with several additional dependent

variables. Because men were disproportionately employed in the heavy industrial sector

(Fodor 2003, Einhorn 1993) that makes up a disproportionate number of the large

enterprises that were included in mass-privatization programs, we would expect men to

suffer from more psychosocial stress than women. We look at the difference between

male and female changes in life expectancy as one test for robustness. Thus, contingent

on H_{1SOC} being supported, we test:

H_{2SOC}: All things held equal, mass-privatization programs will have a larger

negative effect on male life expectancy than female life expectancy.

To further test for the robustness of our psychosocial stress mechanism, we compare the

effect of mass privatization on the rate of two causes of death which we can reasonably

assume are to a significant extent the result of increased psychosocial stress: alcohol-

related deaths and suicides. As a final variable to test for the psychosocial stress

mechanism, we add ischemic heart disease (IHD) or coronary artery disease, which has

been shown to be related to anger and socio-emotional distress [e.g. Koskenvuo et al.

1988, Siegrist 1990, Chang et al. 2002].

H_{3ASOC}: All things held equal, countries that implemented mass-privatization

programs will have higher increases in the rates of alcohol-related deaths, suicide,

and ischemic heart disease than countries that didn't implement such programs,

and;

H_{3BSOC}: The increase in these rates will be greater for men than for women. Our initial "new classical sociological" explanation for the postcommunist collapse emphasizes that the economic crisis that contributes to the psychosocial stress will also undermine state capacity, and thus medical provision, further contributing to the mortality crisis. In the analysis we use a variety of measures of health provision (per-capita number of physicians, nurses, dentists, hospital beds, and inpatient admissions. Thus we generate additional hypotheses.

> H_{4ASOC}: All things held equal, countries that implemented mass-privatization programs will have declining health provision (hospital beds, physicians, nurses, dentists, inpatient admissions), and

> H_{4BSOC} This decrease in health provision will increase mortality.

Definitions and descriptive statistics for all variables are presented in Appendix 1.

Data and Methods

We construct a panel using the January 2005 mortality data from the WHO Mortality Database and the January 2006 European Health for All Mortality Database for 26 transition countries in Central and Eastern Europe, including the Baltics, Russia, and other members of the Former Soviet Union.[6] Economic and social variables are derived from the World Bank's World Development Indicators (2005), the European Bank for Reconstruction and Development (EBRD) Transition Report (2003), the TransMONEE

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[6] The panel is unbalanced because not all data for the regressors are available in the same years.

database (2003), and the World Bank/EBRD Business Environment and Enterprise

Performance Survey (1999). Econometric analyses are conducted using LimDep version

8.0 and Stata version 9.

The validity and reliability of health surveillance during transition could be a

possible limitation for analyses of the mortality crisis. More specifically, there are

concerns about shifts in mortality stemming from the development of new monitoring

and detection methods, as well as inaccurate or mis-classification of death resulting from

the transformation of health systems. Such unobserved relationships or measurement

errors may obscure the relationship between health outcomes and privatization programs.

Some countries, such as Georgia, implemented fees for death registration, which has led

to high levels of underreporting. Countries that adopted these types of market-driven

health-care-delivery reforms also tended to be the ones that more greatly embraced the

free-market model (Baburashvili et al. 2001), hence inclusion of these countries in our

analysis may conservatively bias the results of mass privatization on health outcomes.

While the proportion of deaths with undefined causes escalated, at the peak of the health

decline between 1991 and 1994, to approximately 3%, we assume that this categorization

is random across causes of deaths, and will not qualitatively skew results.

Overall, the consensus from scholars is that despite these limitations the data

during reform periods are sufficiently valid and reliable to permit empirical analyses for

comparative purposes (Brainerd and Cutler 2005, Baburashvili et al. 2001). [7] Indeed,

mortality data is far more reliable for comparative analysis than all macroeconomic data

(see Filer and Hanousek 2001).

Modeling Framework

Our analysis follows a 'quasi-natural experiment' approach, which has been

strongly advocated by statisticians as well as economists for evaluating the effects of

policy interventions (Angrist and Krueger 2002, Freedman 1999). The key advantage

claimed by this approach is that country participation can be treated as independent, such

that outcome differentials across these strata can be directly attributed to the policy.

Mass privatization seems to be a promising candidate for this framework, particularly

since the reform itself was intended to operate as an 'economic shock,' rapidly inducing

the formation of a capitalist class (Gerry and Li 2002).

The quasi-natural experimental design does have some notable limitations. The

independence assumption that underlies evaluation of the treatment effect of the policy

may not be unbiased if policy changes are driven by politicians' and stakeholders'

motives in ways that relate to health outcomes. Although recent comparative studies by

economists have assumed privatization and its different methods of implementation to be

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[7] In Russia from 1992 to 1995, for example, over 94% of deaths have been medically

certified, while background cancer mortality expressed temporal stability, an indicator of

internal consistency (Gavrilova 1997).

exogenous policy choices (e.g. Bennett et al. 2004), we will conclude our analysis by carefully assessing potential sources of endogeneity.

Fixed vs. Random Effects

To specify the appropriate modeling approach with panel data, we need to decide between the more efficient random-effects model and the more conservative fixed-effects model. The question is whether there are unmeasured unit (country) effects that are correlated with the explanatory variables and the outcome variables. We formally test this assumption using the Hausman-Test[8], which essentially compares the predicted parameters under random effects and fixed effects. We find that the unobserved heterogeneity cannot be assumed to be unrelated to the predictors of health outcomes (χ^2 = 44.27, p<0.001). Therefore, fixed effects is preferable, because it removes this heterogeneity altogether by explicitly allowing it to freely correlate with the explanatory variables (such that α can be any function of x). In essence, this is like putting in a set of country-dummy variables (Davidson and Mackinnon 1993). While the random-effects model explains variance caused by differences between countries over time and differences within countries over time, the fixed-effects model only explains within-country variation. As a result, differences in changes in life expectancy that arise from differences between countries are excluded from the analysis. This allows us to isolate the effect of our policy variable (mass privatization) without worrying about differences

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[8] Hausman $\sim \chi^2$(k) where k = # of predictors.

Hausman = $(\hat{\beta}_{FEM} - \hat{\beta}_{REM})' [\text{Var}(\hat{\beta}_{FEM}) - \text{Var}(\hat{\beta}_{REM})]^{-1} (\hat{\beta}_{FEM} - \hat{\beta}_{REM})$

between countries that might impact changes in public health. Fixed-effects estimation is also less efficient than random effects, as it loses degrees of freedom; since this makes it more difficult to have a strong and statistically significant result, we thus have a more conservative estimate.

Serial Correlation and Heteroskedasticity

Testing our data for nonconstant variance with the Breusch-Pagan method indicates the presence of heteroskedasticity. We also find evidence of first-order autocorrelation in our panel. To account for these distortions, we estimate an AR(1) model and use White's robust-covariance matrix to produce asymptotically consistent parameters and corrected standard errors. Jackknife standard errors are also used to test the model's robustness to potential outliers.

Endogenous Selection Bias and Heterogeneity of Treatment Effect

Initial conditions may influence the propensity of countries to select among various reform strategies to facilitate the transition to capitalism. We wish to rule out the possibility that the decision to implement a mass-privatization program may not be exogenous (i.e., there are factors that caused countries to implement mass-privatization programs that would have led to a decline in life expectancy regardless of the privatization policy adopted). Moreover, there are likely to be country- or region-specific factors that confound the relationship between mass privatization and health outcomes. Without explicit adjustment for the unobservable factors that confound the relationship

between mass privatization and health outcomes, the estimates of the treatment effect may be biased due to endogeneity.

There are several well-established statistical methods that can be employed to account for endogenous selection bias (e.g., matching, instrumentation, and statistical adjustments). Following the recent burst of popularity for selection models in the political science and development economics literatures, it seems straightforward to adapt a "Heckman-type" selection model (Heckman 1979) or "control function" (Heckman and Navarro 2004) to the problem of selection bias; by means of this a selection equation and an outcome equation are jointly estimated, assuming a bivariate normal error term in the two equations, to cope with bias resulting from selection on unobservables (Przeworski and Vreeland 2000, Navia and Zweifel 2003, Vreeland 2003). We acknowledge that this strategy has been critiqued for sensitivity to the model specification, problems with collinearity, and reliance on distributional assumptions in cases where independent variables for selection and the outcome equation are the same (Sartori 2003, Winship and Mare 1992). For these reasons, we agree with Winship and Mare that "Heckman's method is no panacea for selection problems and, when its assumptions are not met, may yield misleading results" (1992). Choosing to attack the selection problems statistically may account for them without shedding much light on them.

We construct a first-stage model to carefully study the factors that predispose countries to deploy mass privatization. These observed and unobserved influences are then injected into a selection parameter (λ), which is explicitly conditioned on a second stage to abrogate potential selection bias as well as some heterogeneity. On the basis of these findings, we also develop instruments which can independently predict mass

privatization without directly impacting life expectancy, allowing us to correct for selection effects using the Heckit method as well as two-stage least squares.

Health Production Function

Our main specification follows the standard health-production model, along the lines of Schultz (1993). The theory that underlies this model is based on the concept of the individual-specific health production function in Grossman (1972) and advanced on by Anand and Chen (1996):

(1) $H_{it} = f(Q_{it}, D_{it}, HC_{it}, N_{it}, Z_{it}, V_{it}, S_{it})$;

Where Q_{it} is a vector of macroeconomic variables; D is a vector of demographic characteristics; HC_{it} is non-health human capital; N_{it} is a vector of dietary and nutritional inputs; Z_{it} is a vector of medical resources; V_{it} is a vector of environmental conditions; and S_{it} is a vector of individual country characteristics.

We obtain a basic model that depends on policy variables and a set of social and economic determinants:

(2) $LE_{it} = \alpha + \beta_1\,MPRIV_{it} + \beta_2 LIB_{it} + \beta_3\,GDP_{it} + \beta_4 URBAN_{it} + \beta_5 EDUC_{it} + \beta_6 DEP_{it} +$

$$B_7 FERT_{it} + \theta\lambda_{it} + \varepsilon_{it}$$

Where *i* denotes country and *t* time; MPRIV is coded as a 0 for years preceding mass privatization and 1 for years following the implementation of mass privatization. (We define a mass-privatization program as a reform that transferred the ownership of at least 25% of large state-owned enterprises to the private sector by relying on citizen

vouchers and giveaways to firm insiders.[9]) This coding is taken from the text of the

historical narratives for each country in the EBRD's 1996 and 1999 *Transition Reports.*[10]

LIB is the EBRD's 1 to 4.3 scale of price liberalization; GDP is the log of per-capita

GDP in constant US$; URBAN is the percentage of the population living in urban

settings. Urbanization is included as a broad indicator of macro-development[11]; EDUC is

used to assess the educational components of human capital using tertiary enrollment

rates; DEP is the dependency ratio (the fraction of the population composed of elderly

persons and children); FERT is the fertility rate in expected births per woman; and λ is

the selectivity coefficient calculated by the Inverse Mills Ratio.[12] The selection

coefficient λ can also help to better understand the direction in which the bias occurs (if it

occurs), such that $\theta > 0$ would indicate that the countries which undertook mass

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[9] Data for the rates of privatization are not available from the World Bank or the EBRD.

[10] "Large" is defined for each country by the EBRD and generally refers to firms with

greater than 500 employees.

[11] Urban settings often correspond to greater access to health resources and nutritional

input, but have been associated with increased risk for chronic diseases, including

cardiovascular diseases, malignant neoplasms, and diabetes (Yach et al. 2004). Recent

studies have found that rural patients in postcommunist settings are less likely to receive

care, which is unsurprising given a larger health literature that shows differential access

to health resources and services in rural relative to urban settings (Balabanova 2004).

[12] Inverse Mills Ratio = $\begin{cases} \varphi/\Phi; & \text{if priv} = 1 \\ -\varphi/1 - \Phi; & \text{if priv} = 0 \end{cases}$

privatization had factors that also positively influenced their health experience, and as such would have been on a better health trajectory absent mass privatization.[13]

To assess the mechanism by which mass privatization affects mortality, in subsequent models we introduce controls for behavioral risks and nutrition (alcohol consumption per capita, protein and fruit-and-vegetable availability per capita) and measures of health- system resources (number of physicians, nurses, hospital beds, and dentists per capita and hospital-bed occupancy rates) as measures of health-system resources. We test the psychosocial-stress mechanism by stratifying the analysis by gender and regressing violent-mortality health indicators on the basic model in addition to life expectancy. We also estimate finite distributed lag models to analyze the effects of mass privatization over time. In appendix 3 we include a dynamic model using a lagged dependent variable to assess and to adjust for state dependence (that is, we include life expectancy in the previous year as a control variable).

Main Results

The result of the basic equation using fixed effects with adjustment for first-order autocorrelation is presented in Table 3. Mass privatization is estimated to lower overall

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[13] Applying the fixed-effects transformation to (1) yields the estimated basic model:

$$(2) \quad (LE_{it} - \overline{LE}_i) = \beta_1(MPRIV_{it} - \overline{MPRIV}_i) + \beta_2(LIB_{it} - \overline{LIB}_i) + \beta_3(GDP_{it} - \overline{GDP}_i) +$$

$$\beta_4(URBAN_{it} - \overline{URBAN}_i) + \beta_5(EDUC_{it} - \overline{EDUC}_i) + \beta_6(DEP_{it} - \overline{DEP}_i) +$$

$$\beta_7(FERT_{it} - \overline{FERT}_i) + \theta(\lambda_{it} - \overline{\lambda}_i) + (\alpha_i - \overline{\alpha}_i) + (\mu_{it} - \overline{\mu}_i);$$

life expectancy by 0.86 years. Time dummies for each year, not presented, did not significantly modify the direction or magnitude of the covariates, indicating that the results were not artifacts of the turbulent transition period. Other covariance matrices, calculated using either White's robust covariance matrix or Jackknife standard errors, do not modify the significance of these findings. And when dynamic effects are taken into account the results also remain consistent.[14]

The impact of GDP per capita on health is, similar to previous cross-country empirical findings, positive, by which an order of magnitude increase in GDP per capita corresponds to a 1.4-year increase in life expectancy. By this measure, the "break-even" point for the health benefits resulting from increased economic performance to offset adverse effects of mass privatization would require a 4.2-fold increase in GDP. Of course, no transition country has grown anywhere near this much. Moreover, simple cross-sectional regression analysis shows that mass-privatization programs exert a large negative effect on the overall rate of growth (about 46%), which would further contribute to declining population health levels (King and Hamm 2005). (See Table 3.)

In Table 4 we adjust for a broad set of additional control variables to determine whether

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[14] Finite distributed lag models find that the significant negative effect of mass privatization takes place in the first two years, and that the effect never turns positive, as might be expected from the neoliberal model. Appendix 3 presents a "dynamically complete" version of the basic equation, using lags of life expectancy and mass privatization.

changes in health-care resources, dietary elements, and other policy variables contributed to the mortality crisis and could alternatively explain (or have mediated) the relationship between mass privatization and mortality. We find that the number of physicians, nurses, hospital beds, and inpatient-care admissions scaled to population size neither have the expected statistically significant effect on life expectancy nor significantly change the coefficient on mass privatization. (See Table 4)

The only finding that may indicate that shrinking health-care capacity is contributing to life-expectancy trends is the positive effect of the greater number of dentists. During periods of economic flux, dentists, substituting for surgeons, may play a more prominent role in ensuring population health (for example, due to the diverse nature of dentists' abilities, many military establishments favor the enlistment of dentists over physicians). Another interpretation of this finding may relate to the migration experience of dentists relative to physicians. The period of transition was marked by high levels of cross-country migration, particularly for the specialist classes. The promise of better compensation under market-driven health-financing reforms may have lured dentists away from countries with bleaker economic outlooks, whereas physicians may have had less opportunity to benefit from emigration. The positive effect of dentists on life expectancy therefore may indicate that countries which retained dentists fared better socially and economically during transition than others, possibly accounting for the observed effect in a manner unrelated to health-care delivery. At any rate, one statistically significant effect out of five indicators is not very strong — and is moving dangerously close to being indistinguishable from a result of chance.

Table 4 also assesses the effect of dietary and nutritional health inputs on the cross-country mortality experiences, and shows that these controls do not affect the main finding. Only alcohol consumption had the expected direction, with an increase in alcohol consumption of one liter per capita decreasing life expectancy by 0.12 years. The results from the other variables, measuring availability rather than consumption directly, are counterintuitive, suggesting that increases in both the availability of fruits and vegetables and the percentage of total energy derived from protein decrease life expectancy. Overall caloric intake was not significant.

A major limitation to the nutritional factors is that during the transition period availability certainly increased following price and trade liberalization, while consumption may well have decreased for a substantial part of the population (i.e., the shelves were finally full but most of the people could no longer afford to buy the goods).[15] In addition, the data doesn't distinguish between an increase in potatoes and more nutritious fruits and vegetables. Thus the negative effect of fruits and vegetables could be due to the increased reliance on the produce of dacha garden plots, a non-market response to increased hardship (Southworth 2005, King 2003).

Lastly, Table 4 examines the impact of other transition policies on health outcomes. Adding the widely used de Melo liberalization index (which produces a single

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[15] A one point, higher categorization of price liberalization (on the 1-4.3 scale), using the main model specification, increased the availability of fruits and vegetables by roughly six kilograms, whereas privatization did not have a significant effect. Neither price liberalization nor mass privatization shaped the availability of protein.

summary value for all transition reforms, including privatization, with a 0 for "planned" economies and a 1 for "market" economies) indicates a strongly negative effect of 2.10 years. Since the de Melo index was only produced until 1997, the number of observations is reduced to 159, with 25 out of the 26 sample countries covered. The effect of mass privatization, which is slightly but not significantly attenuated, plus the de Melo index, is gigantic – roughly 2.8 years. Inclusion of the EBRD's foreign-exchange and trade-liberalization index $(1 - 4.3)$ is non-significant and does not change the results. Finally, the Heritage Foundation's Political Freedom index (positively coded from 1 to 7) demonstrates that increasing political freedom has a positive effect of 0.21 years on life expectancy in a manner that leaves the basic finding unaffected.

Thus, if we can rule out health resources and nutritional changes as mechanisms linking mass privatization and decreased life expectancy, we are left with psychosocial stress. We do a series of tests of the robustness of this explanation. First, since men were disproportionately employed in the big enterprises subjected to mass privatization, we would expect a bigger effect on men than women. As can be seen in Table 5, mass privatization knocks 1.99 years off of male life expectancy, far more than the 0.7 years for women (Models 1 and 2). Urbanization exerts a strongly negative effect on life expectancy (-0.5), but only for men. Fertility also exhibits a larger effect on men, roughly four-fold higher than the non-significant effect on women. Fertility declined in nearly all of the postcommunist countries, in some plummeting to dangerously low sub-replacement levels, with profound demographic implications. Using the main specification to regress fertility on mass privatization roughly suggests that mass privatization suppressed fertility by -0.20 births per woman (results not shown). This

follows a rich body of literature that finds fertility to be determined by a panoply of social and economic factors (Schultz 1969), primarily those that shape a household's desired number of children. Since the mortality effects of fertility are only prominent among men, we think that fertility is absorbing some of the effects of psychosocial stress, but the nature of these effects is not yet clear. There remains a need to assess the institutional determinants of fertility change (Easterlin 1985). (See Table 5.)

Models 3 and 4 demonstrate the increase in alcohol-related mortality causes of death (unintentional alcohol poisoning, liver cirrhosis, etc.) associated with the main covariates. As with life expectancy, there are marked differences across gender. Mass-privatization programs increased rates of alcohol-related mortality causes by 41 per 100,000 in males, but only 6.68 in females — approximately a six-fold difference. These results are similar in magnitude to the health-promoting effect of a 10-fold increase in GDP. We find the same patterns of findings for fertility and urbanization as in Models 1 and 2. Higher education levels significantly decrease alcohol mortality, but only among females.

For suicide and intentional causes of death (Models 5 and 6), mass privatization explains an increase of 5 suicides per 100,000 people for men, quite large given the rare nature of a suicide.[16] For a rough comparison, in the United States in 1996 suicide claimed the lives of 10.8 males per 100,000 population members (U.S. Public Health Service 1999). The effect for women is only 0.25, and it is not statistically significant. Models 7 and 8 compare ischaemic heart disease across gender. The results follow the

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[16] Brainerd and Cutler (2005a) use suicide as an indicator of psychosocial stress.

pattern observed in previous models: the effect on both genders is statistically significant and large, but is three times larger for men.

Of the covariates, it is noteworthy that the direction of the effect of fertility reverses, corresponding to decreases in male suicide. This may relate to the psychosocial benefits of family size in the face of economic stress, possibly indicating a role for fertility experience as a coping mechanism for men. Increased levels of education also appear to buffer against suicide risk and ischaemic heart disease — and this effect holds for women as well, although the effect is much smaller. This variable may capture the ability of people with higher education to find new, better jobs in the private sector. (See Table 6.)

Finally, we turn to the effects of mass privatization on the supply of health care, even though we have already seen that we have only very weak evidence of the decline in health services having a statistically significant impact on the rise in mortality. We can see from Table 6, in Models 9 to 13, which regress health-resource indicators on the basic equation, that there exist modest but statistically significant negative effects on the number of physicians per 1,000 people (-0.15), dentists per 100,000 people (-3.92), and hospital beds per 100,000 people (-0.72) — roughly 10% declines from the mean country values in the panel.

Returning to our hypotheses, we fail to reject H_{1SOC} ("All things held equal, countries that implemented mass-privatization programs will have had greater declines in life expectancy than countries that didn't implement such programs") and reject H_{1NL}, the neoliberal alternative ("All things held equal, countries that implemented mass-

privatization programs, possibly after a brief lag of time, will have a greater increase in life expectancy than countries that didn't implement such programs").

We also find strong evidence in favor of accepting H_{2SOC} ("All things held equal, mass-privatization programs will have a larger negative effect on male life expectancy than female life expectancy") and H_{3a} ("All things held equal, countries that implemented mass-privatization programs will have higher increases in the rates of alcohol-related deaths, suicide, and ischemic heart disease than countries that didn't implement such programs"), and H_{3b} ("The increase in these rates will be greater for men than for women").

We find slight evidence on H_{4a}, in which "All things held equal, countries that implemented mass-privatization programs will have declining health provision (hospital beds, physicians, nurses, dentists, public-health spending, inpatient admissions)." We have a modest negative effect on the availability of physicians, dentists, and hospital beds per capita.

Most surprisingly, we find only very weak evidence for $H_{4b,}$ in which "This decrease in health provision will increase mortality." Only 1 of 5 indicators (number of dentists) had a statistically significant effect, and this might be picking up differential opportunities for emigration.

We must use caution when interpreting this final negative result. It might be the case that informal networks are able to compensate for the reduction in health resources somehow (see Burawoy et al. 2000). It might be a problem in measuring health resources in the chaotic and highly informalized postcommunist economies that results in this weak finding. It also might well be that even if "civil society" has somehow been able to

mitigate the effects of declining official resources, this does not mean it will be able to do so in the future. Russia, for example, faces multiple looming epidemics in HIV and drug-resistant tuberculosis, that will necessitate substantially more resources to address once they reach fruition (Harvard Medical School and Open Society Institute 2001).[17]

Endogeneity

The major objection to our findings, and one immediately raised by most economists, is the problem of endogeneity. That is, there might be some set of conditions (such as a terrible political and economic crisis) that both causes the adoption of mass-privatization policies and would have caused the postcommunist mortality crisis anyway. Perhaps the countries that are the very worst off to begin with, facing the greatest economic challenges with the least going for them, adopt mass privatization as a measure of desperation. If this is the case, it is plausible that the statistical estimations of the effects of mass privatization on life expectancy are spurious, since life expectancy was going to fall in those countries no matter what policy was adopted. We can address this problem statistically.[18] Table 7 presents the results of a first-stage

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[17] The Russian government will have to spend some of its massive windfall in oil revenues (which it is currently [as of June 2006] stockpiling) to deal with this. It is hard to see where resource-poor transition countries will find similar resources.

[18] It could be addressed historically for each case with a detailed political analysis that carefully constructs plausible counterfactuals. We believe that in Russia such an analysis

probit model predicting mass privatization, along with a model with marginal effects estimated at mean levels of the explanatory variables, and a linear-probability model (with and without fixed effects) to facilitate interpretation. According to the linear-probability model, the biggest determinant of implementing a mass-privatization program is being a member of the Former Soviet Union (such countries were roughly 79% more likely to implement such a program). We think this demonstrates a large "policy diffusion" effect, or "mimetic isomorphism." That is, countries looked to the policies of powerful neighbors when formulating policies. There are other important determinants as well. (See Tables 7 and 8.)

The relative size of the second-biggest ethnic group is a highly significant predictor of privatization experience. The data is divided into three groups, so that each third (~20% difference) increases the chance of implementing a mass-privatization program by about 23% to 28%.[19] What we think is happening is that newly independent political elites of the FSU use mass privatization to remove the ethnically Russian population, which immigrated to the "near abroad" to fill positions in new industries. Thus, the elites of the new countries that emerged from the disintegration of the Soviet Union could have used mass-privatization policies as a vehicle to remove the Russian managers in charge of large industrial enterprises that were established by Soviet

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would clearly show that alternatives to mass privatization were quite possible, but this is well beyond the scope of this paper.

[19] Large disparities between the probit models (calculated at mean x-values) and the linear- probability model may suggest important non-linear effects.

industrialization.[20] Therefore, the bigger the ethnic minority, the greater the chance that mass privatization will be employed.

Countries that introduced price liberalization (measured on the EBRD's 1 - 4.3 point scale) were more likely to implement mass-privatization programs by 16% for each point. Presumably, this represents a general neoliberal ideology on the part of policymakers. Levels of external debt, long-standing debt, IMF credit, and IMF-credit-to-external-debt ratios did not enter significantly into the model of mass privatization. In the fixed-effects framework, a ten-fold increase in IMF credit was associated with an increased likelihood of privatization of 1% — a modest effect. The dummy for Central Europe and the Baltics is slightly positive but not significant; we think this may indicate a preference for FDI (King 2001, King and Szelenyi 2004).

Several demographic variables were also predictive. Higher levels of fertility corresponded to lower probabilities of mass privatization. To the extent that fertility proxies for each country's stage in the demographic transition, these findings suggest that less advanced countries (i.e., those with higher fertility) were also less likely to rapidly privatize SOEs as a reform strategy. This fits our theory, as our mechanism, ethnic political competition, only becomes salient where there was a large inflow of ethnic Russians, which was a by-product of Soviet-led industrialization. Tertiary education also decreased the likelihood of mass privatization, such that each percentage point of higher education reduces the likelihood of implementing a mass-privatization program by 1%.

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[20] Within Russia, we think, a similar process occurred, as mass privatization was used to oust managers loyal to the all-Soviet side (Kogut and Spicer 2005).

This could be capturing a large specialist/expert class, which might favor privatization, via management and employee buyouts or via FDI, over mass privatization (King 2001, King and Szelenyi 2004).[21]

Using each cross-sectional observation to predict the likelihood of a country having adopted a mass-privatization program correctly predicts 87% of the actual outcomes (Table 8).

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[21] To do the selection models, we had to include all of the covariates from the equations regressing mass privatization on life expectancy. This yields some statistically significant predictors that have no substantive interpretation. For example, a ten-fold increase in GDP would increase the odds of implementing a mass-privatization program by 8%. Urbanization and fertility rates have coefficients that indicate they decrease the chance of implementing such a program, but we don't think these results are necessarily interpretable.

A major caveat is that causality can not be fully ascertained because of the temporality limitations. However, it is reasonable to infer that relatively fixed historical factors, such as ethnic nationality, preceded rather than followed mass-privatization programs. Price liberalization and other covariates, alternatively, cannot be distinguished in our framework as to having preceded or having been preceded by mass privatization, which potentially gives rise to a spurious association. It is important to include these covariates, however, so that the second-stage model nests these terms to avoid mis-specification issues. (See Table 9.)

Tests of these variables for validity as instruments indicate that the size of the second-largest ethnicity, membership in the Former Soviet Union, and the log transformation of IMF credit levels fit the criteria for mass privatization (i.e., it is associated with mass privatization but not associated with life expectancy except through observables).[22] Using these instruments, we can get unbiased estimates by comparing outcomes across these dimensions, holding fixed unobservable influences on mass privatization.

Table 9 investigates potential exogeneity with a two-stage, least-squares approach to instrument for mass privatization with the variables used in the first-stage probit model to predict mass privatization. The mechanics of the two-stage model function to replace mass privatization with fitted values based on the first-stage estimation, in order to assess the treatment effect freed from potential unobserved endogeneity in the second stage. The results indicate a larger effect than predicted by the fixed-effect model (-1.17 years), although the difference is not significant, suggesting that the endogeneity may not be a prominent concern for mass privatization. GDP levels per capita, however, fall from significance in this model, which departs from the established positive relationship in the literature, strengthening the case for relying on the fixed-effects models.

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[22] Test for instruments, $Cov(z_{it}, d_{it}) \neq 0$; i.e., instrument z correlated with treatment d, and second, $Cov(z_{it}, \epsilon_{it}) = 0$ instrument z must be uncorrelated with heterogeneity in outcomes. If these conditions are satisfied then the IV is consistent.

We also use the Heckit method to account for endogeneity by constructing a new variable (λ), which combines the predictors of mass privatization rather than directly transferring predicted values of mass privatization into the main equation. Similar to the 2SLS model, the Heckit method allows us to hold constant the factors that may have both caused the "worst" countries to adopt mass privatization and would have contributed to their downward health trajectory in any case, potentially providing a more accurate interpretation of the program impact. This approach has the added benefit of permitting us to characterize the direction of the bias caused by the unobserved factors.

Table 9 presents the results of the selection models under three frameworks: treatment effects, which does not take the panel structure of the data into account and is thus essentially a pooled OLS model containing the added selection variable from the probit model; random effects; and fixed effects. In all of the models, as with the 2SLS estimator, the effect of mass privatization is magnified; in other words, any evidence of endogeneity indicates that the countries that were better off from a health-promoting perspective were more likely to have adopted mass privatization as a reform strategy. The selection coefficient θ is not significant for the fixed-effect model, suggesting that the factors that predisposed countries to differentially adopt mass-privatization programs were relatively time-invariant and that either fixed-effect or differencing models annihilate this bias.

Let us summarize the interpretation of the selection models. The method of privatization tends to be "politically" rather than "economically" determined. In fact, the biggest factor in explaining intra-FSU variation is ethno-national structure, which is historically determined. Mostly, the adoption of mass privatization was affected by the

timing and extent of industrialization. Those regions that were industrialized under the Soviet Union had a large ethnic Russian population that staffed many of the specialist occupations of the new enterprises. Thus, the countries that mass privatized were also likely to be the more industrialized ones. More industrialized countries should have had fewer very poor people, and thus we would expect that any given economic shock would have been less likely to push people below some (socially understood) basic level of consumption to maintain good health. They would also have a more highly educated labor force, and were thus more likely to have the professional expertise to implement improved public health measures (e.g., the presence of Russian-educated doctors in the universal Soviet- sponsored health-care system). Thus, our analysis suggests that to the extent by which countries that mass privatized differed from countries that did not mass privatize, this difference suppresses the effect of mass privatization on mortality.

Conclusion

Our primary findings are quite clear and robust, showing that the implementation of mass-privatization policies substantially decreases life expectancy via the mechanism of psychosocial stress, and that these policies account for the unique patterns of violent mortality and explain part of the distribution of mortality experiences across gender. This analysis goes beyond the existing understanding of both the public-health literature and the economics literature — that the postcommunist mortality crisis can be explained by unhealthy and risky lifestyles (especially drinking) as well as psychological stress (Brainerd and Cutler 2005) — by identifying one of the policies that induced this stress.

The peculiarity of the transition, that working-age men, rather than the weakest and poorest (the aged and small children), were disproportionately hit by the rise in violent mortality, is explained by our model. We find it likely that the dangerous behavior identified in the public-health literature is related to a psychological state (be it alienation, anomie, disenchantment, or some combination of these) that is related to the destruction of people's understanding of their place in the world. The psychological trauma confronted by a middle-aged skilled worker, previously part of the relatively privileged backbone of the socialist economy and now the useless relic of a defeated system, was enormous. Our findings indicate that for many it was literally a killer.

Mass privatization goes a long way toward explaining the mortality differences between Central Eastern Europe and the "mortality belt" in the FSU. Only the Czech Republic implemented a large enough mass-privatization program to count by our operationalization, but even this program was far smaller in scale and scope than the Russian version. Importantly, the best quantitative (Hanousek et al. 2004; Kocenda and Svejnar 2002) and qualitative (McDermott 2002) evidence shows that mass-privatized firms had worse performance than other enterprises. It is likely that the Czech Republic's extremely low unemployment rate and the provision of social-democratic welfare benefits (see Rutland 1992/3) mitigated the increase in stress associated with mass privatization.[23]

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[23] Poland had a much smaller program (covering about 10% of industry) that only included small and medium enterprises. Its implementation was delayed for several years by worker resistance, and it was enacted only in 1995. Here, too, it is important that

An alternative explanation for our findings would be that mass privatization proxies for the implementation of radical policy reforms more generally, and that it is not mass privatization *per se* that directly impacts life expectancy. Future work needs to operationalize the other transition policies and assess their individual and combined effects on life expectancy, as well as whether the sequence of these reforms is important. We wish to stress that these are just a set of first findings relating economic policies to demographic outcomes. Much more work needs to be done. This includes expanding the list of policies to include price, trade, and foreign-exchange liberalization, as well as stabilization programs.[24] We believe this will explain even more of the variation in mortality patterns in the postcommunist world, such as the spike in Russian mortality following the 1998 default and devaluation.[25] If the mechanism is economically induced psychosocial stress, these other policies should have effects similar to those of mass privatization. We also need better data on spending on public health care. As noted

enterprises privatized in this way seemed to have very poor performance as well (see the case study and statistical evidence summarized in King and Sznajder 2006).

[24] Current EBRD indexes used in this analysis are imperfect, as they build in bureaucratic and economic success and also do not reliably indicate the same programs in different countries (see King and Hamm 2005).

[25] This was a result of the IMF condition of funding government spending with special super-high-yield government-backed bonds rather than resorting to deficit spending, which created a huge financial pyramid on top of a crumbling real economy, combined with current account convertability.

above, we are not comfortable dismissing the hypothesis that declining support for health care is related to the mortality crisis (as Brainerd and Cutler [2005] find).

Finally, since there is always a potential for ecologic fallacy in macro-level analysis, we also believe much more definitive results could be obtained by getting more fine-grained data — ideally, data at the individual level. Only then will we be able to see what is occurring at the level of mechanisms.

Still, we feel our findings are sufficient to pose a gigantic problem for the neoliberal political economy of privatization, which claims that more and faster privatization (as long as it's not to workers with a legal device to centralize their shares!) is always better. Even if Bennett et al. (2004) are correct[26], and it could be shown that mass-privatization policies are economically beneficial, the human catastrophe would not be worth the price (at least according to most traditional and modern value systems). Of

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[26] We believe their analysis is incorrect because of the way they code mass privatization. They separate countries into full-privatizers (i.e., via auction), mass-privatizers, and mixed systems. This is problematic because all countries that implemented mass privatization were in fact mixed. It is also extremely vague. We have a much more simple way to interpret coding that measures the extent of mass-privatization programs. While a variable that measures the rate of mass privatization would be ideal, that data is not available from the World Bank or the EBRD, and cannot be constructed from the EBRD's 1 - 4.3 scale of large-scale privatization (see King and Hamm 2005). We are currently exploring ways to construct such a rate variable. We analyze the growth effects of mass privatization in another analysis (King and Hamm 2005).

course, none of the countries that adopted mass privatization have, to date, achieved anything close to sufficient GDP gains to offset the negative effects on public health.[27] Moreover, studies have found that poor public health decreases the value of human capital, and thus future economic growth. The World Bank and the World Health Organization estimate that the cumulative losses from increased mortality in Russia from 2005 to 2015 will amount to U.S. $303.2 billion, or 5% of GDP (World Bank 2005). There is an urgent moral and economic need to understand in greater detail the causal effects of macroeconomic and microeconomic reforms on public health.

The most obvious policy implication is that reforms must not aim to shatter the existing organizational base of the economy, but should instead build on existing institutions. This does not necessarily mean slower reforms, for simple management and employee buyouts in which the non-managerial employees have a legal device (an Employee Share Ownership Program, or ESOP) to centralize their shares can be *even faster* than mass-privatization programs (Ellerman 2003). Such reforms, by giving the de facto ownership rights of employees de jure status, have the massive economic benefit of eliminating the principle-agent problems that devastated so many postcommunist firms (see Ellerman 2003).

Class formation cannot be infinitely "telescoped." Policymakers should allow for rapid transfer to firm insiders (with protection from predatory outsiders) to improve incentives, but this will be practical mainly in small and medium firms. For industrial

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[27] Only three out of the 26 postcommunist countries proper have any experienced net growth from the time of the transition up to 2005.

giants too large to be controlled in this way, and on which many additional firms and indeed industries will be dependent, a superior method would be to restructure during prolonged state ownership, prior to privatization by strategic investors (when this benefits the firm), with due consideration of state revenues (this is the predominant Polish way to privatize large enterprises [King and Sznajder 2006]). In some cases, this may mean maintaining state ownership indefinitely, and in some cases forging joint ventures between SOEs and multi-national corporations (as seen in China).

The neoliberals' political prediction — that delays in large-scale privatization will result in lack of "transition progress" or even a reversal of reforms — has been shown to be false. Both Poland and Slovenia greatly delayed large-scale privatization, but have not suffered economically or ended up any less "Western." In fact, they have the highest overall growth rates in the postcommunist world (excluding East Asia). Furthermore, the expected "anti-reform" coalition of managers and workers did not emerge. Ironically, by increasing stress to catastrophic levels, mass privatization is likely to do substantially more harm than good for the long-term prospects of capitalism in the region. Mass privatization is not the second- or third-best way to privatize, as key members of the World Bank thought [Kogut and Spicer 2005]); it is very likely the second-worst way, the worst being to directly transfer the nation's most valuable enterprises to cronies in a flagrantly corrupt manner in exchange for political support (as in Russia's infamous "Loans for Shares" program).

When disruptive economic reforms are deemed necessary, they must be accompanied by social policies that shield the population's health from associated shocks, as in, for example, Finland and Cuba. The Finnish economy was hugely reliant

on trade with the Soviet Union, and the collapse of the Soviet economy was therefore experienced as a massive exogenous economic shock. However, an inclusive social policy was able to detach developments in mortality entirely from the health of the economy (Jantti et al. 2000). Similarly, Cuba suffered enormous external supply-and-demand shocks from the collapse of the Soviet Union (and the intensification of the U.S. economic-sanction regime), and yet its health-care system was able to handle this and avoided a mortality crisis. Cardiovascular disease showed no spike during this period, and actually improved (see Cooper et al. 2006).

Some might question where the revenue for these programs would come from. But arguing that these policies are too expensive merely delays the expense. The economic consequences of the public-health crisis will be paid eventually; delaying the implementation of inclusive social policies means that they'll be paid for in lives in addition to money. If the predicted epidemic of drug-resistant strains of TB and other diseases comes to fruition, and if it is globalized, the cost to the world will be exponentially higher still.

Therefore, it would be appropriate for the Bretton Woods global institutions (the IMF and WB), whose role in the global economy is now eliciting furious calls for a fundamental reconstruction from both the left and right (Woods 2006), to consider making non-conditional grants for such social programs in countries in need of economic reform.

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Table 1. Age-adjusted death rates for selected causes of violent mortality in Russia before and after mass privatization (per 100,000).

Cause of Death	1991		1994		Δ	
	Male	Female	Male	Female	Male	Female
Suicide	47.7	11.2	76.9	13.6	29.2	2.4
Accidental poisoning by alcohol	19.4	4.2	61.2	15.8	41.8	11.6
Injury (undetermined whether accidentally or purposely inflicted)	22.8	5.7	60.3	14.3	37.5	8.6
Homicide	25.1	6.9	52.8	13.6	27.7	6.7
Accidental drowning and submersion	16.3	2.5	21.9	3.4	5.6	0.9
Accidents caused by mechanical suffocation	4.6	1.2	11.4	2.4	6.8	1.2
Accidental falls	7.8	3.6	11.1	3.9	3.3	0.3
Accidents caused by fire and flames	5.3	2.4	9.8	3.9	4.5	1.5
All other accidental causes	24.6	6.0	45.0	11.6	20.4	5.6

Source: Adapted from Gavrilova, et al 2000.

Table 2. Mass Privatization and Life Expectancy by Country and Region

Region	Country	Mass Privatization	Year	Life Expectancy Change (1989-2002)$^{\omega}$
Balkans	Georgia	Yes	1995	1.04 / 1.43%
	Armenia	Yes	1994	2.81 / 3.89%
	Azerbaijan	No	-	-5.11 / -7.35%
Baltics	Lithuania	Yes	1993	1.29 / 1.83%
	Estonia	No	-	1.71 / 2.46%
	Latvia	Yes	1994	1.53 / 2.21%
Central Asia	Kyrgyz Republic	Yes	1994	-3.52 / -5.14%
	Uzbekistan	No	-	-2.50 / -3.61%
	Kazakhstan	Yes	1994	-6.66 / -9.79%
	Turkmenistan	No	-	-1.25 / -1.90%
	Tajikistan	No	-	-3.99 / -5.68%
Central Eastern Europe	Czech Republic	Yes	1994	3.50 / 4.88%
	Slovenia	No	-	0.94 / 3.73%
	Slovakia	No	-	2.73 / 1.30%
	Poland	No	-	3.55 / 5.00%
	Hungary	No	-	3.09 / 4.44%
Former Soviet Union	Russia	Yes	1992	-3.57 / -5.16%
	Ukraine	Yes	1995	-0.59 / -0.86%
	Belarus	No	-	-2.20 / -3.13%
SEE	Romania	Yes	1995	0.56 / 0.80%
	Bulgaria	No	-	0.31 / 0.44%
	Bosnia	No	-	0.96 / 1.31%
	Macedonia	No	-	1.60 / 2.22%
	Croatia	No	-	1.80 / 2.50%
	Albania	No	-	1.85 / 2.56%
	Moldova	Yes	1994	-0.55 / -0.81%
Total Δ	Avg. Δ Privatization			-0.38 / -0.61%
	Avg. Δ Non-Privatization			+0.23 / 0.36%
Difference of Avg. LE	Δ Privatization – ΔNonPrivatization			-0.61 / -0.97%
Average LE Difference[1]	Avg LE Privatization – Avg LE NonPrivatization			-0.90

Sources: World Development Indicators 2005 and EBRD 1992 and 1996 *Transition Reports.* $^{\omega}$ – when available, otherwise longest difference available; [1] – includes data from all periods, equivalent to the unadjusted estimate of life expectancy (LE) on mass privatization; Correlation coefficients: R_{LE}=-0.29, R_{LEmale}=-0.33, $R_{LEfemale}$=-0.20.

Table 3. Effect of Mass Privatization on Life Expectancy in Transition Countries

Covariates	Fixed Effects
Mass Privatization	-0.86 (0.22)**
GDP	1.38 (0.24)**
Urbanization	-0.00 (0.07)
Dependency	0.15 (0.04)**
Fertility	-0.77 (0.32)*
Price Liberalization	-0.02 (0.11)
Education	0.07 (0.01)**
Number of Observations	313
Number of Countries	26
R^2	0.93

Note: Hausman Test χ^2 = 44.27, p<0.001, favors FEM; Constant not reported; One-way fixed effects with country-specific effects presented, period effects do not alter results; Prais-Winsten transformation used to calculate AR(1) error structure; Mass Privatization significant at p<0.05 using either White robust covariance matrix or Jackknife estimated standard errors(deleting one group with iterations for each of 26 countries to obtain averaged estimates of the pseudo-variances). Other robustness checks (not presented) remove potential outliers, such as Russia and Kazakhstan, from the analysis and generate consistent results; * = p<0.05; ** = p<0.01 (two-tailed tests)

Table 4. Control Variables

Control Variables	Coefficient of Control	Coefficient of Mass Privatization
Health Resources		
Physicians (per 1,000)	0.10 (0.23)	-0.87 (0.24)**
Nurses (per 100,000)	0.00 (0.00)	-0.89 (0.23)**
Dentists (per 100,000)	0.04 (0.01)**	-0.67 (0.22)**
Hospital Beds	-0.10 (0.08)	-0.96 (0.24)**
Bed Occupancy Rate	-0.02 (0.01)*	-0.93 (0.30)**
Inpatient Care	0.01 (0.04)	-0.88 (0.23)**
Dietary & Nutritional Inputs		
Fruits & Vegetables	-0.01 (0.00)**	-0.69 (0.25)**
Protein	-0.16 (0.10)	-0.98 (0.23)**
Energy Availability (kcal)	0.00 (0.00)	-0.85 (0.22)**
Alcohol Consumption	-0.12 (0.05)*	-0.80 (0.24)**
Policy Variables		
De Melo Liberalization Index	-2.10 (0.75)**	-0.71 (0.22)**
EBRD Foreign Exchange & Trade Liberalization	-0.17 (0.10)	-0.69 (0.26)**
Political Freedom	0.21 (0.08)**	-0.98 (0.22)**

Note: Fixed effects model adjusted for log(GDP), EBRD price liberalization index, percentage of population urban, age-dependency ratio, fertility rate, and percentage population with tertiary education; Prais-Winsten transformation to accommodate AR(1) error structure; * = $p < 0.05$; ** = $p < 0.01$ (two-tailed tests)

Table 5. Effect of Mass Privatization on Violent Mortality in Transition Countries, By Gender and Disease[†]

Covariates	Models 1 & 2 Life Expectancy		Models 3 & 4 Alcohol-Related		Models 5 & 6 Suicide		Models 7 & 8 Heart Disease	
	Male	Female	Male	Female	Male	Female	Male	Female
Mass Privatization	*-1.99***	*-0.70***	*41.19***	*6.68***	*5.29***	*0.25*	*20.49***	*7.24***
	(0.33)	*(0.25)*	*(11.78)*	*(2.56)*	*(1.08)*	*(0.25)*	*(4.33)*	*(1.54)*
GDP	1.98**	1.16**	-42.16**	-10.74**	-3.97**	-0.30	-37.54**	-10.54**
	(0.36)	(0.28)	(13.26)	(2.88)	(1.16)	(0.27)	(4.63)	(1.65)
Urbanization	-0.51**	-0.04	13.22**	0.02	1.43**	0.08	11.67**	3.67**
	(0.11)	(0.08)	(3.63)	(0.79)	(0.34)	(0.08)	(1.35)	(0.48)
Dependency	-0.01	0.08	-2.46	-0.41	0.29	0.02	-1.29	-0.24
	(0.06)	(0.05)	(2.08)	(0.45)	(0.19)	(0.04)	(0.75)	(0.27)
Fertility	-1.65**	-0.44	42.42*	7.66*	-4.61*	0.07	10.77*	3.94
	(0.59)	(0.45)	(17.68)	(3.84)	(1.66)	(0.38)	(6.62)	(2.35)
Price Liberalization	0.18	0.02	-14.42*	-2.26	1.45	0.04	-1.55*	-0.57
	(0.17)	(0.13)	(5.99)	(1.30)	(0.56)	(0.13)	(2.23)	(0.79)
Education	0.04**	0.06**	-0.94	-0.38**	-0.26**	-0.07**	-1.01**	-0.25**
	(0.02)	(0.01)	(0.49)	(0.11)	(0.05)	(0.01)	(0.18)	(0.07)
Number of countries (N)	25		24		25		25	
Number of observations (NxT)	235		275		297		297	
R^2	0.93	0.91	0.86	0.92	0.97	0.95	0.93	0.93

Note: Models 6-11 report Mortality Rates per 100,000 population; Constant not reported; Fixed Effects with country effects presented, period effects do not alter results; Prais-Winsten transformation used to accommodate AR(1) error structure; * = $p<0.05$; ** = $p<0.01$ (two-tailed tests)

Table 6. Effect of Mass Privatization on Health Resources

Covariates	Model 9: Physicians	Model 10: Nurses	Model 11: Dentists	Model 12: Hospital Beds	Model 13: Inpatient Admissions
Mass Privatization	*-0.15**	*-30.31*	*-3.92***	*-0.72***	*0.08*
	(0.07)	*(16.32)*	*(1.37)*	*(0.20)*	*(0.36)*
GDP	0.10	-44.31*	4.00**	0.22	2.05**
	(0.07)	(18.61)	(1.47)	(0.22)	(0.41)
Urbanization	0.07**	18.21**	0.41	0.32**	0.74**
	(0.02)	(5.23)	(0.42)	(0.06)	(0.11)
Dependency	-0.01	6.21*	0.70**	0.16**	0.11
	(0.01)	(2.66)	(0.22)	(0.04)	(0.06)
Fertility	0.11	37.99	-1.89	1.53**	2.98**
	(0.11)	(23.81)	(2.01)	(0.33)	(0.58)
Price Liberalization	-0.06	-18.40	1.24	-0.31**	-0.34
	(0.03)	(8.69)	(0.70)	(0.10)	(0.19)
Education	0.00	0.81	0.16**	-0.01**	0.11**
	(0.00)	(0.72)	(0.06)	(0.00)	(0.02)
Number of Observations (NxT)	286	296	299	278	303
Number of Countries (N)	26	25	25	26	26
R^2	0.93	0.94	0.96	0.94	0.96

Note: Models 9 scaled per 1,000, Models 10-12 per 100,000, Model 13 per 100;
Constant not reported; Fixed Effects with country effects presented, period effects do
not alter results; Prais-Winsten transformation used to accommodate AR(1) error
structure; $*$ = $p<0.05$; $**$ = $p<0.01$ (two-tailed tests)

Table 7. Endogenous Determinants of Mass Privatization

Covariate	Probit[†]	Probit ME[†]	LPM	LPM (FEM)[γ]
log(GDP)	0.43 (0.28)	0.08 (0.06)	0.02 (0.02)	-0.08 (0.07)
log(FDI)	-0.35 (0.35)	-0.65 (0.61)	-0.16 (0.63)	0.02 (0.45)
log(IMF)	0.03 (0.02)	0.01 (0.00)	0.00 (0.00)	0.01 (0.00)**
Urbanization	-0.04 (0.05)	-0.01 (0.01)	-0.00 (0.00)*	-0.04 (0.02)*
Dependency	0.09 (0.06)	0.02 (0.01)	0.01 (0.01)	0.03 (0.01)**
Fertility	-3.46 (0.99)**	-0.65 (0.25)**	-0.23 (0.10)*	-0.28 (0.08)**
Education	-0.11 (0.03)**	-0.02 (0.01)**	-0.01 (0.00)**	-0.01 (0.00)**
Political Freedom	-0.35 (0.20)	-0.07 (0.04)	-0.04 (0.02)	-0.08 (0.02)*
Price Liberalization	1.44 (0.25)**	0.27 (0.10)**	0.16 (0.03)**	0.07 (0.03)*
Years Central Planning	0.04 (0.04)	0.01 (0.01)	0.00 (0.00)	-
Ethnic Minority	1.48 (0.46)**	0.28 (0.13)**	0.23 (0.04)**	-
FSU	4.81 (1.10)**	0.79 (0.14)**	0.79 (0.11)**	-
CEEB	0.77 (0.86)*	0.17 (0.22)	0.09 (0.08)	-
Number of Observations	313	313	313	313
Number of Countries	26	26	26	26
χ^2	196.83**	196.83**	184.85**	511.47**
Pseudo-R^2	0.56	0.56	0.45	0.83

Note: [†] - clustered standard errors for intra-group correlation; [γ] – Prais-Winsten transformation to accommodate first-order autocorrelation; Discrete marginal effects given by $\Delta F/\Delta x = F_{(x1}*\beta) - F_{(x0}*\beta)$;
Continuous marginal effects evaluated at $\bar{x}$; * = p<0.05; ** = p <0.01 (two-tailed t-test).

FDI is the logarithm of foreign direct investment per capita; IMF is the logarithm of International Monetary Fund loans as a percent of total external loans; Ethnic Minority is the fraction of the population that is the largest ethno-national minority stratified into three levels; Years Central Planning is the number years the country was under central planning; Political Freedom is the Heritage Foundation political freedom index; FSU and CEEB are dummies for whether the country is a member of the Former-Soviet Union or Central and Eastern European Baltics.

Table 8. Frequencies of Actual and Predicted Mass Privatization Experience, Probit Model

Observations	Predicted		
Actual	0	1	Total
0	198	14	212
1	24	77	101
Total	222	91	n = 313

Table 9. Robustness Tests and Selection Models

| Model Type	Coefficient on Mass Privatization	Coefficient on log (GDP)	Coefficient on λ	R^2
POLS	-1.79 (0.32)**	-0.33 (0.11)**	-	0.37
2SLS[†]	-1.17 (0.43)**	0.08 (0.16)	-	0.36
Treatment Effects[ζ]	-3.34 (0.40)**	-0.35 (0.11)**	1.55 (0.24)**	0.46
Random Effects[†, ζ]	-5.14 (0.53)**	0.37 (0.14)**	3.24 (0.33)**	0.62
Fixed Effects[†,ζ]	-0.91 (0.35)**	1.38 (0.24)**	0.04 (0.20)	0.94

Note: Models adjusted for EBRD price liberalization index, age-dependency ratio, percentage of population urban, fertility rate, and percentage population with tertiary education; [†] - Prais-Winsten transformation to accommodate AR(1) error structure; [ζ] - standard errors adjusted for selection; * = $p<0.05$; ** = $p<0.01$ (two-tailed tests)

Figure 1. Trends in Male Life Expectancy at Birth, 1960-2003.
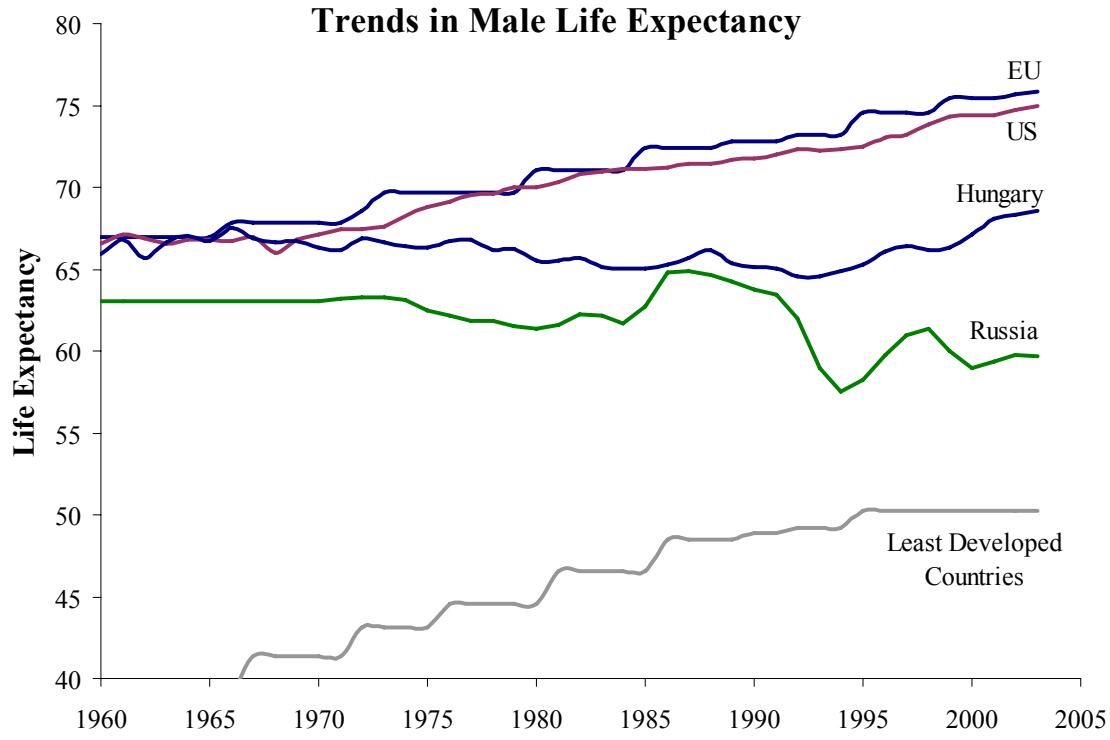
Source: World Bank World Development Indicators 2005 edition.

Figure 2. Infant Mortality Patterns in Russia, 1980-2002

Russian Infant Mortality Rates Pre- and Post-Transition
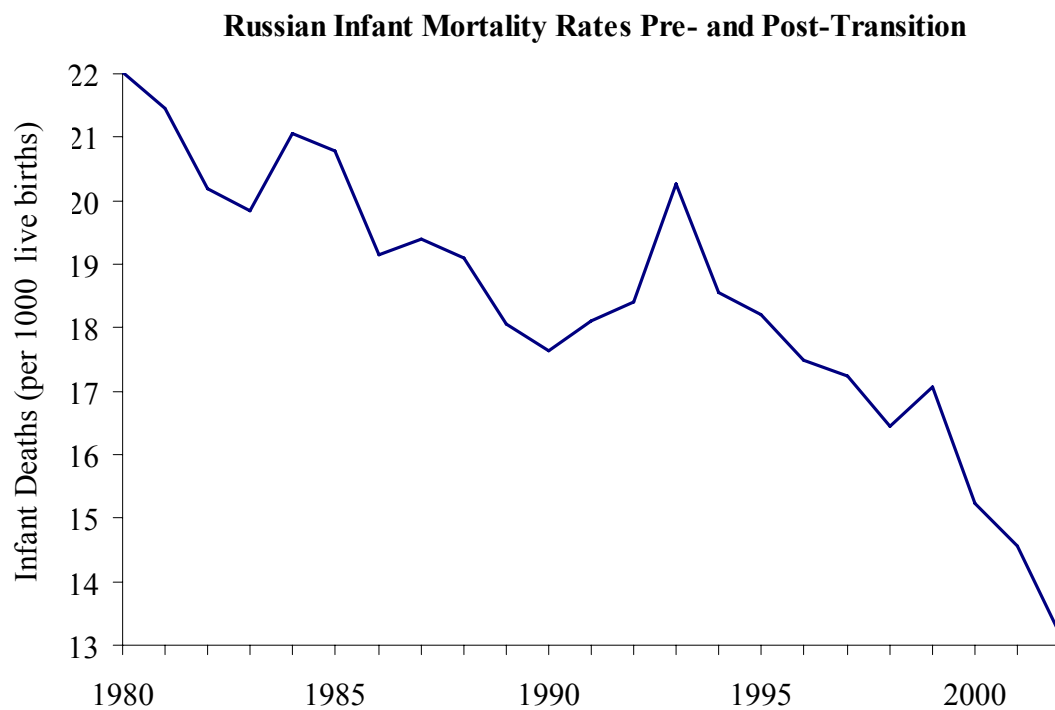
Source: WHO European Health for All Database 2005; adapted from World Bank (2005).

Figure 3. Neoliberal Economic and New Classical Sociological Theories of Postcommunist Health Experience
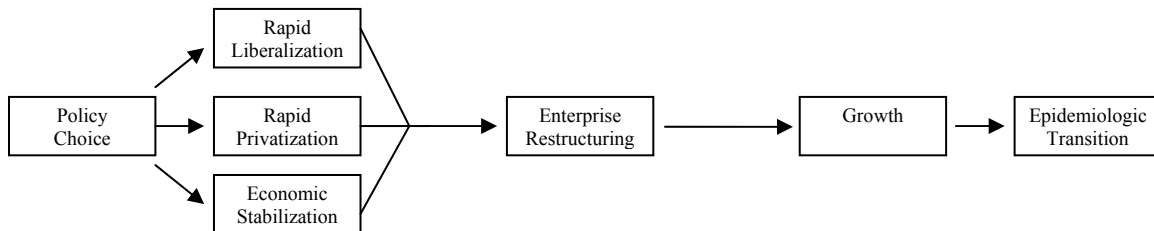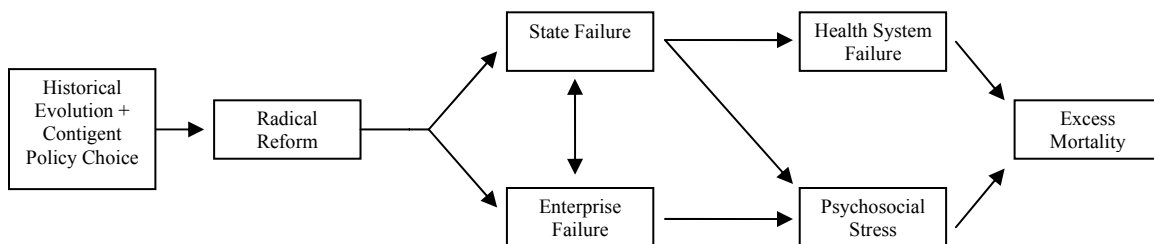
Figure 3a. Neoliberal Economic Theory

Figure 3b. New Classical Sociological Theory

Appendix 1. Definitions of Variables and Descriptive Statistics

Variable	Definition	Mean	SD	Min	Max
Health Outcome					
Life Expectancy	Life expectancy at birth	69.96	2.86	61.67	75.91
Male IHD	Deaths per 100,000 among working age population (15-64) due to heart attacks and coronary heart disease	131.63	55.05	30.26	285.37
Female IHD	Deaths per 100,000 among working age population (15-64)	40.27	19.61	5.19	100.21
Male suicide	Deaths per 100,000 due to suicide and other intentional causes of death	30.48	21.70	1.03	87.43
Female suicide	Deaths per 100,000 due to suicide and other intentional causes of death	6.07	3.56	0.17	16.16
Male alcohol-related mortality	Deaths per 100,000 from combined, selected causes of death known to relate to alcohol. Includes alcohol-dependence syndrome, liver cirrhosis, and chronic liver disease	221.16	94.92	65.81	546.40
Female alcohol-related mortality	Previous for females	66.46	28.68	18.75	152.73
Policy Variables					
Mass privatization	0 prior to implementation, 1 thereafter	0.32	0.47	0.00	1.00
Log GDP	Gross Domestic Product per capita, current US $2000	23.11	1.47	20.38	26.97
Political freedom	Heritage Foundation Political Freedom Index, from 1-7	3.55	1.99	1.00	7.00
Price liberalization	EBRD Liberalization Index, scale of 1-4.3	3.15	0.93	1.00	4.30
Foreign Exchange & trade liberalization	EBRD Foreign Exchange Liberalization Index, scale of 1- 4.3	3.15	1.24	1.00	4.30
Years of central planning	Number of years under planned economic regime	56.72	13.08	41.00	74.00
Foreign direct investment	Log FDI as a percentage of GDP	0.28	0.37	-0.50	0.28
IMF credit/external debt	Percentage of IMF credit to external debt level	8.80	10.67	0.00	53.56
Sociodemographic					
Urbanization	Percentage of population living in urban areas	56.70	12.44	25.13	75.20
Fertility	Fertility rate (births per woman)	1.85	0.75	1.07	5.04
Dependency	Percentage of population youth + elderly	53.85	10.60	39.49	88.33
Education	Percentage tertiary enrollment	23.38	12.04	2.60	69.30
Ethnic Minority	Percentage of population in second-largest nationality; Country levels ordered by thirds: 0, 1 and 2	0.80	0.88	0.00	2.00

Appendix 1. *Continued*

Variable	Description	Mean	SD	Min	Max
Health Resources					
Physicians	Number per 1,000 people	3.05	0.85	1.28	5.19
Nurses	Number per 100,000 people	680.54	229.58	143.40	1244.20
Dentists	Number per 100,000 people	33.66	22.45	1.20	83.00
Hospital Beds	Number per 100,000 people	8.49	2.68	3.02	13.71
Bed Occupancy Rate	Hospital bed occupancy rate (%) in acute care facilities	73.17	14.98	25.60	97.00
Inpatient Care	Inpatient care admissions per 100	16.67	5.82	4.57	30.02
Dietary and Nutritional Inputs					
Alcohol Consumption	Pure alcohol consumption (liters per capita)	6.08	3.83	0.17	14.33
Fruit and Vegetable	Availability of fruits and vegetables (10 kgs)	151.31	42.53	56.40	304.60
Caloric Intake	Average number of calories available per person per day	2831.23	393.64	1675.10	3767.90
Protein	Percentage of total energy available from protein	11.92	1.18	9.37	17.00

Appendix 2a. Countries included in the full sample with number of observations

Country	Number of Years Observed
Albania	13
Armenia	12
Azerbaijan	11
Belarus	12
Bosnia	5
Bulgaria	14
Croatia	12
Czech Rep	13
Estonia	12
Georgia	12
Hungary	14
Kazakhstan	12
Kyrgyz Rep	12
Latvia	12
Lithuania	12
Macedonia, FYR	11
Moldova	12
Poland	14
Romania	14
Russia	14
Slovakia	10
Slovenia	12
Tajikistan	12
Turkmenistan	12
Ukraine	12
Uzbekistan	12
Total	313

Appendix 2b. Estimates of country-specific fixed effects

Country-Specific Effects (α_i)	
Albania	6.92
Armenia	0.66
Azerbaijan	-4.46
Belarus	-2.69
Bosnia	8.55
Bulgaria	0.91
Croatia	4.35
Czech	-0.55
Estonia	-5.09
Hungary	-5.60
Kazakhstan	-8.62
Kyrgyzstan	0.96
Latvia	-0.22
Lithuania	0.64
Macedonia	3.46
Moldova	-0.64
Poland	-1.21
Romania	-1.93
Russia	-7.27
Slovakia	4.06
Slovenia	5.59
Tajikistan	2.14
Turkmenistan	3.59
Ukraine	-3.89
Uzbekistan	0.53

Appendix 3. Lagged Dependent Variable Models

It has been shown that fixed effects estimators for lagged dependent variables (LDV) are inconsistent as a result of correlation between the error term and the LDV (Nickel 1981). We use the GMM system of Arellano and Bond (1991) which employs LDVs of 2nd and higher orders to instrument for the endogenous lagged dependent variable, assuming sequential exogeneity. Similar to the fixed effects approach, first-differences of the dependent variable wipe out the random effect and are uncorrelated with the contemporaneous error term.

Covariates	GMM one-step$^{\gamma}$	GMM two-step$^{\psi}$
Mass Privatization	-0.62 (0.16)**	-0.94 (0.34)**
Mass Privatization (t-1)	-0.51 (0.16)**	-0.50 (0.74)**
Mass Privatization (t-2)	-0.08 (0.16)	-0.14 (0.46)**
GDP	0.60 (0.20)**	0.34 (0.22)**
Urbanization	-0.03 (0.05)	-0.01 (0.12)
Dependency	0.17 (0.03)**	-0.15 (0.06)**
Fertility	-0.34 (0.27)	-0.02 (0.01)*
Price Liberalization	-0.03 (0.09)	-0.05 (0.07)
Education	0.01 (0.01)	0.01 (0.01)
Life Expectancy (t-1)	0.69 (0.06)**	0.53 (0.21)*
Number of Observations (N x T)	261	261
Number of Countries (N)	26	26
AR(1)$^{\tau}$	0.00**	0.21
AR(2)$^{\tau}$	0.05**	0.18
Sargon Test (χ^2)	127.23**	17.33

Note: Constant not reported; Fixed Effects with country effects presented, period effects do not alter results; $^{\gamma}$ – White robust covariance matrix; $^{\psi}$ – Arellano covariance matrix (1987); $^{\tau}$ – p-value for presence of AR disturbance; * = p<0.05; ** = p<0.01 (two-tailed tests)

The first model finds evidence of directly positive state dependence that attenuates the coefficients on the group of mass-privatization policy variables. Diagnostic tests find evidence of overidentification and autocorrelation. The second model, which applies a two-step method to better model the autocorrelation (ρ, not shown), produces a more conservative estimate of the lagged dependent variable, but still significant at α=0.05. The mass-privatization variables are jointly significant at the α=0.01 level. Under this approach the model does not suffer from overidentification by instruments as indicated by the Sargon test.