Effect of Armed Conflict on Adult Mortality: A Time Series Cross-National Analysis*

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Abstract

This research investigates systematically the effect of armed conflict on adult health in a longitudinal analysis. Using the mortality rate of the working-age population (people aged 15 to 64) at the nation level as an objective health indicator, we explore various effects of military conflict on human mortality, including the short term direct and indirect effect, the long term indirect effect, the effects of the interstate and intrastate conflicts, and the effect of conflict severity. Our theoretical argument leads to a set of hypotheses that are tested in a sample of 76 countries from 1961 to 1999. We find broad support for our argument. Armed conflict not only directly kills human lives but also indirectly raises mortality by influencing health-promoting resources and health-compromising hazards. Civil conflict has a large short term direct effect on both male and female mortality rates, but it does not have strong or robust long term indirect effect for both gender groups. Interstate conflict appears to have a largely robust positive effect on both male and female mortality rates, both in the short term and over the long run. In addition, in the short run, the effect of the civil conflict is stronger than that of the interstate conflict particularly for male, whereas in the long run the effect of civil conflict is much weaker than that of interstate conflict for both male and female. Between the two genders, the results suggest that the female adult population typically suffers more than male from both interstate conflict in the short term and intra-state conflict in the long run. The effect of severe conflict (war) on both male and female mortality rates is positive and stronger than that of minor conflict, both in the short run and over the long run.

Effect of Armed Conflict on Adult Mortality: A Time Series Cross-National Analysis

Mortality is one of the most objective measures of population health. While military violence is known to cause killings, often leaving tragic memories of thousands of lost lives, there has not been any systematic longitudinal analysis of the effect of military conflict on population mortality. Most scholars of public health and demography have focused on the impact of economic variables in the cross-national analysis. For example, both GDP per capita and income inequality are found to be associated with life expectancy (e.g., Wilkinson, 1992; Wilkinson, 1997). Some scholars (e.g., Omran, 1971) further argue that countries that reach a certain threshold level of income (around $5,000 per capita in 1990) pass through the so-called "epidemiological transition" into a new phase, where non-communicable diseases rather than infectious diseases become the predominant causes of deaths. Scholars of public health and demography have typically ignored the impact of armed conflict on key demographic outcomes such as life expectancy and mortality rate.

In contrast, conflict scholars who examine the consequences of military violence have limited their attention to a few issue areas such as trade, economic growth, and democracy (see, e.g., Li and Sacko, 2002 for the effect of war on trade; Tilly, 1992; Mitchell et al, 1999; Thompson, 1996 for the effect on democracy; and Organski and Kugler, 1980 for the effect on national economy). They also have largely ignored the impact of military conflict on human mortality.

Little attention has been devoted to the question of exactly how military conflict affects human mortality across time and over countries. The analysis by Ghobarah, Huth and Russett (2003) is an exception. They analyze the effect of civil wars during the period of 1991-1997 on death and disability in 1999. They find that the lingering effect of civil wars is strong. But they do not examine the effect of interstate conflict. Moreover, their analysis is cross sectional and thus can not address how conflict affects public health over time. In this paper, we analyze how

various attributes of military violence influence human mortality not only across countries but also over time.

We believe understanding the effect of military conflict on mortality has important policy and theoretical implications. If prolonging human life expectancy and reducing the mortality rate is desirable, we need to better understand the causal determinants of mortality in order to engineer favorable conditions and public policies. While military violence is known to kill, a narrow focus on the direct killings of war is likely to cause underestimation of its deleterious consequences for human well-being. A logically coherent theory of the effect of armed conflict on mortality will help illuminate the real costs of war and offer additional rationale for promoting peace. In addition, demographic analyses of mortality that narrowly focus on economic variables are likely to suffer from omitted variable bias and incorrectly estimate their effects, if national economic conditions correlate with military conflict. Furthermore, such analyses typically fail to explain the wide variations among countries at similar levels of development. For example, deaths due to communicable diseases, maternal and prenatal causes, and nutritional deficiencies account for 51% and 65% of deaths in India and in sub-Saharan African respectively, whereas in China they only account for 16% of total deaths (Murray and Lopez 1996b). Disparities in premature mortality parallel this pattern. The projected probabilities of death for men between ages 15 and 60 for 2020 in India and in sub-Saharan African are 28% and 33% respectively, as opposed to around 17% in China (Murray and Lopez 1996a). To explain such variation, the effect of political variables such as military conflict must be considered. Finally, a thorough analysis of the consequences of military conflict for human mortality allows conflict scholars to appreciate the costs of war on human life that burden state leaders. This may shed light on the decision-making calculus of leaders in waging wars. Hence, a theoretical dialogue between public health and conflict scholars is mutually beneficial.

The purpose of this paper is to examine the effect of military conflict on human mortality across countries and over time. First, we develop a theoretical argument for the effect of

military conflict on human mortality, laying out the specific causal mechanisms and deriving testable hypotheses. Next, we discuss our research design. Finally, we test hypotheses from the theoretical model for a sample of 76 countries from 1961 to 1999. We conclude the paper with a summary of our findings and a discussion.

Theoretical Argument

How does military violence affect human mortality across countries over time? As noted, while this is an important question, most previous research has been limited to analyzing individual countries or focusing on other effects of armed conflict. In this section, we first lay out the direct and indirect causal mechanisms by which we argue military violence affects human mortality and then we discuss in detail how different attributes of military conflict can affect human mortality through these mechanisms.

Direct and Indirect Effects of Military Violence

Military conflict causes casualties to soldiers and civilians and kills human lives. It is known that military conflict directly reduces human life expectancy and increases mortality. The exposure to armed conflict *per se* is expected to have a strong and immediate positive effect on the mortality rate in a population. The exact size of the effect depends on the attributes of each conflict, an issue we will discuss in detail below.

While the direct effect of military violence is important and immediate, often attracting wide media and scholarly attention (as in the case of the current war in Iraq), catastrophic wars such as WWI and WWII are typically rare. Many military conflicts do not involve direct heavy casualties. In contrast, the indirect effects of military conflict often have a long run impact on mortality. But unfortunately, such effects tend to go unnoticed. We argue that the indirect effects of conflict are equally, if not more, important. Military conflict can affect human mortality through the following five indirect mechanisms.

The first indirect effect results from the impact of military conflict on national economy. War and conflict are costly and destructive. They soak up huge amount of resources and in the meantime, destroy public and private properties on a large scale. Wars frequently result in a staggering number of homeless people, forced migration, and serious economic recessions. Economic crises have often been blamed for aggravating the suicidal tendency (Durkheim 1951). A weakened economy is also usually concomitant with increased unemployment. Even in peace time, unemployment is a stressful life event. Research shows that unemployment causes deterioration in both psychological and physical health (Montgomery, Cook, Bartley, and Wadsworth 1999; Morris, Cook, and Shaper 1994). Unemployment is often associated with lower standards of living, especially immediately following a war, during which the social security system may have been disrupted. In addition to financial hardship, unemployment also has other detrimental consequences, such as the loss in physical and mental activity, use of skills, decision latitude, interpersonal contact, social status, and 'traction'—a reason to go on through the day and from one day to the next (Warr 1984). Unemployment has also been linked to self-destructive behaviors such as alcoholism and suicide. As many studies (see, e.g., Moser, Fox, and Jones 1984; Preti and Miotto 1999; Pritchard 1990) have shown, the risk of committing suicide is very high among the unemployed at the individual level and the unemployment rate is often positively correlated with the suicide rate at the society level. Poverty, recession, unemployment and massive migration may also cause the re-emergence of some infectious diseases that are closely related to premature death. Such an effect of war on mortality by way of affecting economic conditions tends to be long lasting because conflict-related economic dislocations tend to correct slowly.

A second indirect effect of military conflict is associated with the damage of health related facilities and infrastructures. Civil and interstate conflicts often involve heavy bombings that destroy hospitals and kill doctors and nurses. Roads and highways also are often damaged, with transportation of the wounded, the sick, medicine and medical equipment

delayed. Water is often polluted and common people have difficulty accessing sanitary water. Diseases that are easily treated during peace time often turn out to be lethal during war time. Human life expectancy is shortened and mortality increases as a result.

A third indirect effect of military violence concerns the crowding out of health related government spending during war time. Wars are expensive, requiring a lot of resources and increased government spending on military equipment and personnel. Government tax revenues are limited. Waging expensive wars often means that other desirable policy objectives are crowded out. As a consequence, government spending on health services are often reduced or cut. Poor people who rely on government health services now have to scramble for means to deal with their illnesses. The result is increased mortality.

In the meantime, the tightened budget may also lead to loosened governmental control over public health hazards. For example, reducing the number of government inspectors and deregulating the meat-processing industry may generate public heath problems due to increased contamination of meat, poultry, and eggs with E. coli and salmonella bacteria (Link and Phelan 1995). It is conceivable that the ensuing bacterial infection can cause an increase in deaths from infectious diseases.

A fourth indirect effect of military conflict may occur through its effect on social cohesion. Sociologists have long recognized that the suicide rate—a special type of mortality—is a product of social dynamics. As early as Durkheim (1951), the variations in suicide rates across countries and regions have been explained by the degree of social integration in a society. Over the past decades, numerous studies have examined the effect of social integration and social cohesion on other health aspects and found that Durkheim's theory also applies to other health related outcomes such as violence, crime, homicide, and cardiovascular disease (see, e.g., Berkman, Glass, Brissette, and Seeman 2000). While social relationships can have both positive and negative effects on health, the majority of the research community agrees that

social integration is beneficial for health (Berkman, Glass, Brissette, and Seeman 2000; Seeman 2000).

Military conflict, however, can have multiple effects on social cohesion. On the one hand, severe and civil (intra-state) conflicts usually lead to massive migration and destruction of material infrastructure and social organization. Civil war particularly reflects within-society political polarization associated with class, ethnic, religious, and ideological cleavages. While partisan spirit may be stimulated within each combating group, cohesion in the society as a whole will most likely erode. Conceivably, social cohesion during such war time weakens as in a setting of societal disruption. For example, one study that explores the impact of collective trauma on social fabric finds that destructive events such as the catastrophic flood on February 26, 1972 in West Virginia caused damage to the bonds binding people together, impairing "the prevailing sense of communality…it is a form of shock, a gradual realization that the community no longer exists as an effective source of support" (Erikson 1976:154).

On the other hand, interstate or less severe conflicts may encourage social cohesion under certain conditions. Based on historical data on the suicide rate, Durkheim argued that "great social disturbances and great popular wars rouse collective sentiments, stimulate partisan spirit and patriotism, political and national faith, alike, and concentrating activity toward a single end, at least temporarily cause a stronger integration of society" (1951:208). Consistent with Durkheim's thesis, statistics have shown that the most rapid improvements in life expectancy in Britain during last century occurred during the two world wars (Winter 1988). Such rapid improvement has been largely attributed to greater egalitarianism in Britain during these times and the related higher level of social cohesion (Wilkinson 1996).

While the actual effect of conflict on social cohesion may depend on the nature of the conflict in terms of its severity and the identities of the participants, the positive effect of conflict on cohesion appears more sensitive to contexts and less robust. For example, the current war between the USA and Iraq, while it is motivated by the war on terrorism and helps to remove a

brutal dictator, has intensified a partisan divided within the American society. Its effect on social cohesion in Iraq also has failed to be as clear cut as it seemed in May 2003. It is plausible that military conflict may reduce social cohesion more than it promotes cohesion.

A fifth indirect effect has to do with the traumatic experience and psychological distress related to military violence. While studies on extreme situations like natural disasters such as earthquakes, tornados, and hurricanes find little evidence of incapacitating and long-lasting psychological reactions in catastrophes, these events tend to be short in duration and limited in scale (Cockerham 2003). Presumably the effects of unnatural disasters such as war, especially if on a large scale, may be long lasting. War-related distress is a specific form of post-traumatic stress that involves such responses as fear, hopelessness, or horror, causing distress or impairment in daily functioning (American Psychiatric Association 1994). A recent study conducted immediately after the civil war in Croatia between 1991 and 1995 has found that 33% of the subjects reported that they had recurrent and bothersome thoughts or memories about a traumatic war-related event, 37% of the subjects reported a persistent sense of a foreshortened future, and one person in ten reported significant impairment in social, occupational, or other important areas of functioning (Kunovich and Hodson 1999). Mental distress and physical illness often go hand in hand because they contribute to each other and are affected by the same circumstances (Mirowsky, Ross, and Reynolds 2000). Mental illness such as psychological distress and depression can make people too hopeless, listless, or worried to follow a healthy lifestyle. Psychological stress can also directly damage health via biological pathways. Specifically, psychological stress triggers neuroendocrine and immune response, disturbs the body's internal *status quo*, rouses patho-physiological changes that are eventually manifested in organ impairment, leading to morbidity and mortality (Brunner and Marmot 1999).

Attributes of Military Conflict and Effect on Human Mortality

The above theoretical discussion has two implications for assessing the effect of military violence on human mortality. First, any conflict can generate direct and indirect effects. The direct effect of military violence on mortality is immediate. It operates in the short run or as long as the conflict is ongoing. Such effect dissipates quickly as the conflict concludes. The indirect effect of the conflict, however, is more likely to be long lasting, outliving the course of a conflict. While the government may quickly shift resources to resolving conflict-induced, health-related problems, damages to the economy and health-related infrastructures take time to recuperate and recover to the pre-conflict level. More important, eroded social cohesion and dramatic psychological experiences, which result from human involvement in military violence, take an even longer time to rebuild and heal. Social cohesion and psychological health may never return to their pre-war levels. Hence, we argue that the direct effect is short term and immediate while the indirect effect tends to be long term. Our argument suggests several testable hypotheses.

Hypothesis 1a: Military conflict has an immediate, short term positive effect on the mortality rate.
Hypothesis 1b: Military conflict has an indirect, long term positive effect on the mortality rate.

While these hypotheses are plausible, they have never been assessed in a cross-national setting over time. One purpose of this analysis is to assess the validity of these claims in a longitudinal dataset.

A second implication from the above theoretical discussions is that these short term and long term effects may interact with other attributes of military conflict. Military conflicts come in all shapes and sizes. We believe that to understand how conflict affects human mortality, we need to examine how different attributes of military conflict affect human mortality in the short

term and over the long run. Doing so helps us identify more nuanced patterns in the effect of conflict on mortality. In this paper we focus on two particular attributes of military conflict.

The first attribute we analyze is the distinction between interstate and intra-state military conflicts. Military conflicts often involve participants of different identities. Some conflicts are fought between armies of different sovereign states or between alliances of sovereign states. Many of them involve territorial claims or last many years between belligerent states. Some interstate conflicts are mere border skirmishes, resulting in a low death roll and ending with a compromise on the negotiation table, while others often escalate and involve a large number of states, ending up as world wars. Limited interstate conflicts may have little effect on the mortality rate in a society, but expansive, enduring interstate conflicts can result in a rise in the mortality rate.

In contrast, many conflicts are fought between parties from the same country. Such intra-state conflicts are often between the government and its opponents. These conflicts can be bloody, involving repression, massive killing and genocide. But civil conflicts may also be short-lived and mild where the opposition is too weak to put up an effective fight against the government.

Hence, the differences in the effects of interstate and intra-state conflicts may be more empirical than theoretical. Regardless being interstate or intra-state, military conflict kills people and generates negative externalities for the society as a whole. These characteristics of the interstate and intra-state conflicts suggest the following testable hypotheses.

Hypothesis 2a: Interstate military conflict raises human mortality in the short run.
Hypothesis 2b: Intra-state military conflict raises human mortality in the short run.
Hypothesis 2c: Interstate military conflict raises human mortality in the long run.
Hypothesis 2d: Intra-state military conflict raises human mortality in the long run.

The second attribute of military conflict we investigate is the severity level. Between minor and severe conflicts, the differential effects are clear. If all conflicts kill, both minor and severe conflicts increase human mortality in the short term. But the level of manpower input may differ greatly between minor and severe conflicts. Severe conflicts often involve more salient issues than minor conflicts. Where the stakes are high, leaders invest more manpower and financial resources in a severe conflict and are less likely to give in or negotiate a settlement, ending up killing more people than in a minor conflict in the short run.

Over the long run, both minor and severe conflicts can expect to cause a rise in human mortality. Both types of conflicts can cause economic recession and damaged infrastructures. They also can affect social cohesion negatively and increase post dramatic psychological problems in a society. Severe conflicts, however, are likely to cause more economic, physical, and psychosocial damages than minor conflicts. More severe conflicts involve more participants and more use of lethal weapons, leaving more wounded people and depleting the financial resources of a country more quickly and more deeply. While both minor and severe conflicts increase human mortality in the long run, severe conflicts tend to have a larger effect. Our argument leads to the following hypotheses.

Hypothesis 3a: Minor military conflict raises human mortality in the short run.
Hypothesis 3b: Severe military conflict raises human mortality in the short run.
Hypothesis 3c: Minor military conflict raises human mortality in the long run.
Hypothesis 3d: Severe military conflict raises human mortality in the long run.
Hypothesis 3e: Severe conflict causes higher mortality than minor conflict in the short run.
Hypothesis 3f: Severe conflict causes higher human mortality than minor conflict in the long run.

Research Design

The empirical analysis intends to assess the effect of armed conflict on human mortality over time and across countries. We employ a pooled time-series cross-sectional research design to test our hypotheses. The sample includes 76 countries over the period 1961-1999, as shown in Appendix 1. In this analysis, we focus on the mortality rate of the working age population from 15 to 64. The choice is based on several reasons. First, evidence suggests that adults have a high risk of premature death and suffer from frequent morbidity and high rates of chronic impairment in developing countries. Adult health arguably raises some serious legitimate concern for developing countries, and yet it receives relatively scant attention in public health forums (Phillips et al., 1993; Luo and Wen 2002). Second, the working-age adult mortality tends to have more deleterious effects on families, communities, and societies because working-age adults constitute the most productive group in a society, regardless of the national wealth level. Third, because we are interested in evaluating the effect of armed conflict on human mortality over time and across countries, we need to have data covering enough years and countries to reach interesting and valid findings and make generalizations. The mortality rate data are most comprehensive for the adult population. Finally, because we are interested in various attributes of armed conflict, focusing on one age group helps to sharpen our analysis and make it manageable and tractable. Future research on other age groups is warranted.

We separate the empirical analysis for male and female. This is a rather standard practice in the public health literature. Men and women have different physiological dynamics, gender role orientations, and labor market arrangements. As a result, they also have very different life expectancies and mortality rates in many societies (Cockerham 2003). In addition, while more men are involved in actual fighting, women tend to bear the burden of military violence, working to support their families and the war efforts. Therefore, it is important to separate the analysis for male and female.

Dependent Variable

The dependent variable is the age-sex-specific death rate for age group 15 to 64 years old. To construct this variable, we use official national statistics on age-sex-cause-specific deaths and age-sex-specific total population counts from the data provided in the WHO Mortality Database. The WHO Mortality Database comprises deaths registered in national vital registration systems, with the underlying cause of death coded by the relevant national authority. We aggregate total deaths across the underlying causes and generate the age-sex-specific death rate for age group 15 to 64 years old as the dependent variable. The variable is log transformed to correct for the positive skewness of its distribution.

Independent Variables

To test our hypotheses, we design several groups of conflict related variables. Data on all conflict variables are directly from or computed based on the Armed Conflict Database from 1946 to 2000 by Gleditsch, et al (2002). In the database, an armed conflict is defined as "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths." For Hypothesis 1a, we create a dummy variable Armed Conflict which is coded one if a country is engaged in any type of armed conflict in a year and zero otherwise. To test Hypothesis 1b, we create an Armed Conflict variable which measures the percent of time since 1946 a country has been involved in any armed conflict. The variable captures the long term effect of conflict history on human mortality in a society.

To assess Hypotheses 2a to 2e, we construct four conflict variables. To test the short term effect, we create two dummy variables, Interstate Conflict and Civil Conflict. Interstate Conflict (or Civil Conflict) is coded one if a country is involved in an interstate conflict (or an intra-state conflict) in a year and zero otherwise. We then compute the percent of time since

1946 the country has been involved in any interstate (or intra-state) conflict to capture the long term effect of the interstate (or intra-state) conflict history on human mortality.

To assess Hypotheses 3a to 3f, we construct four conflict variables. To test the short term effect, we create two dummy variables, Minor Conflict and War. Minor Conflict is coded one if a country is involved in any conflict with fewer than 1000 battle deaths and zero otherwise. War is coded one if a country is involved in any conflict with more than 1,000 battle deaths and zero otherwise. We then compute the corresponding long term variables, again using the percent of time since 1946 the country has been involved in any minor conflict or war.

Because the short term and long term conflict variables are highly correlated with each other (societies that were frequently involved in armed conflict in history are likely to be involved in a conflict today as well), we enter the short term and long term conflict variables separately into the models.

Control Variables

Income inequality within a country may affect its adult mortality rate. Since the early 1990s, ecological work has emerged to suggest that the extent of income inequality in a society is negatively associated with its average population health (Wilkinson, 1992, 1996). Higher income inequality is associated with a greater proportion of the population in very low income category and below the poverty line. The marginalized group of the population is less able to afford needed medical care when they have to struggle for food and rent. In contrast, societies that are characterized by more equitable distribution of income and wealth tend to have fewer people too impoverished to afford medical services. Income inequality may also impact population health independent of the overall poverty level of the society. Two plausible mechanisms operating at the contextual or societal level have been proposed: 1) income inequality is linked to underinvestment in health-promoting resources such as education, medical services, transportation and environmental controls (i.e., the neo-material

interpretation); and 2) income inequality leads to the erosion of social capital and stressful social comparisons, which diminish health via painful individual psychosocial processes and ensuing detrimental physiological mechanisms (i.e., the psychosocial interpretation) (Kaplan, Pamuk, Lynch et al., 1996; Kawachi & Kennedy, 1997; Kawachi, Kennedy, & Glass, 1999; Lynch, Smith, Kaplan et al., 2000). We measure income inequality using the widely used Gini coefficient. A Gini coefficient, bounded between 1 and 0, indicates perfect income inequality at 1 and perfect equality at zero. We use the income inequality data collected by Deininger and Squire (1996), supplemented by the inequality data for the 1990s used in Ghobarah, Huth and Russett (2003). While an excellent measure of income inequality, the Gini coefficient is based on income survey data. As a result, the Gini data have a lot of missing values. As in Easterly (1999) and Higgins and Williamson (1999), we use the decade average value of the Gini coefficient.

The level of democracy in a country may affect the mortality rate of its population. More democratic countries are found to be associated with less income inequality (Reuveny and Li, 2003). Per capita income is also found to rise more rapidly in democratic countries (Przeworski et al, 2000). Low income groups that are typically ignored in autocratic countries can influence public policymaking in democratic countries by forming political parties, running for offices, and casting their votes. They are able to acquire better health care services for themselves in democratic countries than under autocratic regimes. We measure the level of democracy using the POLITY IV database (Marshall and Jaggers 2000). The POLITY data record the democratic and autocratic attributes of many countries on an annual basis from 1800 to 1999. The widely used measure for the level of democracy from POLITY IV is the difference between the variable DEMOC and the variable AUTOC, ranging from –10 (strongly autocratic) to +10 (strongly democratic). The level of democracy is expected to reduce the adult mortality rate.

Urbanization is another variable that often affects the mortality rate. But its effect may be ambiguous. On the one hand, urbanization is often associated with the influx of poor people from the rural area, increasing the pressures for the city health care system and enlarging the

low income population in the city (Ghobarah et al, 2003). The mortality rate may increase. On the other hand, urbanization is often associated with economic expansion, leading to more service industries and creating more job opportunities. Urbanization is also associated with the widespread use of modern amenities, improving the hygiene conditions of new residents from the rural area. Modern medical facilities in the city can save lives which may have been lost in the rural area. Urbanization may reduce the mortality rate. We measure urbanization using the annual growth rate of the urban population in a country.

Another control variable is the growth of per capita income in the population of a country. Income changes affect the mortality rate within a population. As the per capita income increases, more people are able to afford health care services. Their health conditions are better monitored and maintained. In contrast, the decline in per capita income is often associated difficult economic and financial conditions in a country, such as high unemployment rates and economic downturns. People are less able to afford the costs of health services. Previous research has found that there are few aspects of our health not intimately affected by the state of the economy (Cockerham 2003). For example, several studies (Brenner and Mooney 1983; Brenner 1973, 1987a, 1987b) link the increased incidence of heart disease, stroke, kidney failure, mental illness, and even infant mortality in the United States and several Western European countries to economic downturns. Presumably, economic recession increases the amount of social, financial, and psychological stress on an individual, which can directly lead to physiological stress reaction and in turn lead to morbidity and mortality, especially among weaker groups of a society. Hence, we expect the changes in per capita income to be associated with adult mortality negatively. We use the annual percentage growth rate of GDP per capita to measure per capita income changes. Data are from the World Bank's World Development Indicators (2002).

On average, medical technologies have been improving over time across countries. Technological progress produces drugs which cure diseases that used to be lethal. Scientific evidence on behavioral and environmental determinants of health has also been rapidly accumulated in recent decades, which has largely contributed to the normative trend toward healthy lifestyles and health prevention especially across western societies. Thus, it is likely that there is a declining trend in adult mortality rate over time. We use a calendar year variable to control for this possibility.

The dynamics of public health may be different between developed and developing countries. Specifically, developed countries tend to be wealthier, democratic, and have better public health systems and public health care. In contrast, developing countries have less modern medical facilities and less generous social welfare programs. To control for this possibility, we include a dummy variable, which is coded 1 if a country is a member of the Organization for Economic Cooperation and Development (OECD) and 0 otherwise.

The population age structure of a country can influence its adult mortality rate. People younger than 15 and older than 64 are typically considered dependents in a society. In a country where there are more dependents than the working-age population (those of ages from 15 to 64), the burden on the working age population is very high. The overburdened adult population may experience a higher mortality rate. We capture the effect of the population age structure using the age dependency ratio of dependents over the working-age population. Data are from the World Bank's World Development Indicators (2002).

Another control variable we include is the mortality rate in the previous year. There are two reasons for including the lagged dependent variable in the model. First, human mortality rate exhibits inertia and path dependence. If not modeled, such path dependence can cause serial correlation in the error term. Second, there may be other causal factors that affect the adult mortality rate, but are not included in the model due to data limitation. For example, ethnic

heterogeneity of a country and public health spending are two such variables. Because these variables change slowly, their effect can be captured by the lagged dependent variable. Meanwhile, we attempt to keep our model conceptually focused. Rather than searching for an exhaustive list of societal determinants of population health, we aim to test the effects of conflict on adult premature mortality, holding constant the most important and available political and economic predictors of mortality in a cross-national and time series analysis. In fact, many studies in the social sciences adopt this modeling strategy (e.g., Bollen, 1979; Muller and Seligson, 1994; Muller, 1995). As Burkhart and Lewis-Beck (1994: 905) put it, "With such a pervasive control in place, it is more difficult for spurious effects to be reported." The disadvantage of including the lagged dependent variable, however, is almost equally obvious. As Achen (2000) shows, the lagged dependent variable steals variance from other variables in the model, making the other theoretically meaningful variables statistically non-significant. Because both the costs and benefits of this variable are strong, we assess two model specifications, one without the lagged dependent variable and the other including it.

Statistical Methods

Statistical models for pooled time series cross-sectional data may exhibit heteroskedasticity and serial correlation. While these problems do not bias the estimated coefficients, they often lead to biased standard errors for the coefficients, producing invalid statistical inferences. To deal with these potential problems, we estimate the models using the OLS regression with Huber-White robust standard errors clustered over countries. These estimated standard errors are robust to both heteroskedasticity and to a general type of serial correlation within the cross sectional unit (Rogers 1993; Williams 2000). The lagged dependent variable further controls for any possible temporal dependence in the data. Finally, because human mortality may affect many of the independent variables reversely, we lag all the right hand side variables in the model one year behind the dependent variable to control for the possible simultaneity bias, a

practice commonly adopted in the literature. Future research may re-examine the analysis using a simultaneous equations model.

Empirical Findings

We present the statistical results in Tables 1 to 3, with the in-sample summary statistics listed in Appendix 2. Table 1 includes the OLS estimates and the robust standard errors for the effect of aggregate conflict on adult mortality rate, testing Hypotheses 1a and 1b. Table 2 includes the statistical results for the effect of interstate and intra-state conflicts, assessing Hypotheses 2a to 2e. Table 3 presents the results for the effect of conflict severity on mortality, assessing Hypotheses 3a to 3f. As noted, each table presents eight models, estimating the short term and long term effects, for male and female, with and without the lagged dependent variable. All twenty four models have controlled for measures of economic growth (GDPPC growth rate), democracy, population age structure (age dependency ratio), wealth level (OECD country), and time trend (year). As is typically done, the statistical significance levels of the estimated coefficients are investigated with a one-tailed t-test because the hypotheses are directional. Estimation is conducted using Stata 7.0.

[Table 1 about here]

[Table 2 about here]

[Table 3 about here]

We start with a discussion of the results of the control variables in the three tables. Several control variables show significant effects in expected directions. Economic growth, urban growth, and national wealth (OECD) consistently show protective effects against the adult mortality rate. There is also a significant time trend, robust to different model specifications, with the adult mortality rate decreasing over time. On the other hand, income inequality, democracy, and age dependency ratio do not appear to have significant effects on adult mortality. It is possible that development-related factors such as national economy and

urbanization exert more fundamental or direct influences on population health than political system and/or age and income distribution. Another interpretation is that the effect of democracy on human mortality largely works through its influences over income inequality and economic development, as noted earlier. Because of the inclusion of GDP per capita growth, urbanization and income inequality in the model, the effect of democracy drops out. Similar logic applies to the lack of significance of income inequality. Overall, the patterns for the significant variables are consistent with previous research findings in the public health literature, which supports our analysis here.

Next we turn to discuss the effects of the conflict variables. Table 1 shows the results of eight models (Model 1.1 to 1.8) testing the short-term and long-term effects of the exposure to armed conflict on the adult mortality rate. The short-term effect of conflict involvement is quite significant for both men and women. Armed conflict involvement is associated with about 10% increase in the adult mortality rate for male as well as female, based on the coefficients in Models 1.1 and 1.5. Controlling for the lagged dependent variable in Models 1.2 and 1.6 does not change the significance level of the results, though reducing the size of the effect to about 7% for both male and female.

The long-term effect of conflict involvement is also significant and positive. Based on the coefficients in Models 1.3 and 1.7, a one standard deviation increase in the amount of time since 1946 a country has been involved in armed conflict is associated with about 6% increase in the adult mortality rate of male or female. Including the lagged dependent variable does not change the results substantially. These aggregate results provide strong support for Hypotheses 1a and 1b. In addition, there is little gender difference in terms of the magnitude and direction of the effect of armed conflict in general on adult mortality.

Table 2 shows the results of eight models (Model 2.1 to 2.8) testing the short-term and long-term effects of interstate conflict and civil conflict on the adult mortality rate. For male, without controlling for the lagged dependent variable, interstate conflict exerts both short-term

and long-term effects on adult mortality. Interstate conflict involvement is associated with about 6% increase in the male mortality rate, based on Model 2.1. Similarly, a one standard deviation increase in the amount of time since 1946 a country has been involved in interstate conflict is associated with about 5.5% increase in the male mortality rate, based on Model 2.3. Adding the lagged dependent variable renders the short-term effect of interstate conflict insignificant whereas the long-term effect remains significant.

The effect of civil conflict on the male adult mortality appears to be significant only in the short run but not in the long run. Based on Model 2.1, civil war involvement is associated with about 11% increase in the male mortality rate in the short run. In other words, the data suggest that for male, interstate conflict has stronger long-term effect on adult mortality than civil conflict. In the short run, however, civil conflict has greater detrimental effect on adult male health than interstate conflict.

For the female adult population, interstate and civil conflicts have consistent and positive effects on their mortality rate, both in the short run and in the long run. Interstate and civil conflict each lead to about 9% increase in the female adult mortality rate in the short run, based on Model 2.5. In the long run (Model 2.7), a one standard deviation increase in the amount of time since 1946 a country has been involved in interstate or civil conflict is associated with about 4.6% or 2.5% increase in the female mortality rate. The inclusion of the lagged dependent variable does not affect the long term pattern for female in terms of the interstate conflict, but weakens the effect in terms of the intra-state conflict.

Between the two genders, the results suggest that the female adult population typically suffers more than male from both interstate conflict in the short term and intra-state conflict in the long run. In addition, in the short run, the effect of the civil conflict is stronger than that of the interstate conflict particularly for male, whereas in the long run the effect of civil conflict is much weaker than that of interstate conflict for both male and female. One interpretation is that factions that fight in civil wars fight for keeps and the power to govern. They may try not to inflict

long term damages if the goal is to govern the country and make it produce wealth. In contrast, interstate wars involve territorial disputes and other conflicts of interests such as ideological disagreements between belligerent states. Part of the goal is to make the other party unable to fight in the long run, possibly generating more long term damages than civil wars.

Table 3 presents the effects of conflicts of different severity (Model 3.1 to 3.8). In the short run, the effect of war involvement is positive and significant while that of minor conflict is statistically not different from zero, for male. War leads to about 15% increase in the male mortality rate, based on Model 3.1. The inclusion of the lagged dependent variable does not change the statistical inferences, though it weakens the size of the effect. In the long run, the same pattern still holds for the male. Based on Model 3.3, a one standard deviation increase in the amount of time since 1946 a country has been involved in war is associated with about 7% increase in the male mortality rate. The size of the effect decreases with the inclusion of the lagged dependent variable while the effect remains statistically significant.

The impact of minor conflict appears stronger for the female adult population. In the short run, both the effects of war and minor conflict are positive and significant. War and minor conflict lead to about 8% and 11% increase, respectively, in the female mortality rate, based on Model 3.5. The inclusion of the lagged dependent variable in Model 3.6 does not change the statistical inferences for both minor conflict and war, though it weakens the size of the effect. In the long run, the effect of minor conflict washes away while the effect of war remains positive and significant. Based on Model 3.7, a one standard deviation increase in the amount of time since 1946 a country has been involved in war is associated with about 6.3% increase in the female adult mortality. The inclusion of the lagged dependent variable does not change the statistical inferences.

Conclusion

This research investigates systematically the effect of armed conflict on adult health in a longitudinal analysis. Using the mortality rate of the working-age population (people aged 15 to 64) at the nation level as an objective health indicator, we explore various effects of military conflict on human mortality, including the short term direct effect, the long term indirect effect, the effects of the interstate and intrastate conflicts, and the effect of conflict severity. Our theoretical argument leads to a set of hypotheses that are tested in a sample of 76 countries from 1961 to 1999. We find broad support for our argument.

We believe our analysis is the first time series cross national analysis of the effect of armed conflict on human mortality. As a result, this work has several noteworthy limitations. First, this research focuses on people aged 15 to 64. While the age group is an important marker of societal productivity and economic development, we are constrained by data quality for other age groups for many countries over time. Future research should examine our hypotheses for other age groups. Second, other population health indicators, such as life expectancy and cause-specific mortality, are also worth exploring. It would be particularly interesting if specific patterns are detected for specific causes of deaths. It is possible that death rates from infectious diseases are more sensitive to the short-term effect of conflict whereas mortality from non-communicable diseases may be more sensitive to the long-term effect. The development of diseases such as the heart disease and cancer are more likely affected by behavioral factors and social stressors that would impair the body system and kill over extended time periods. Further analysis is warranted to test these disease-specific hypotheses. Third, in our theoretical discussion, we theorized several mechanisms underlying the effect of conflict on health, but we did not empirically test each of these mechanisms explicitly. Moreover, the inter-relationship among these hypothesized pathways linking military violence to population health is unknown. These issues need to be further examined in the future once data are available.

That being said, our analysis produces several interesting empirical findings. First, this study confirms the importance of indirect and lingering effect of conflict on health in addition to its immediate and direct killing effect. Adult population health suffers from getting involved with any armed conflict. The deleterious effect of conflict on adult health is strong in the short run, yet the long-term effect of armed conflict is not negligible. Indeed, experiencing military conflict is health-detrimental to the working age population, both in the short-term and in the long-term. The impact exists even when we control for the nation's economic growth, political system, wealth level, age structure, temporal trend in mortality, and the lagged dependent variable.

Second, civil conflict has a very large short term effect on both male and female mortality rates but it does not have strong or robust long term indirect effect for both gender groups. In contrast, interstate conflict appears to have a largely robust positive effect on both male and female mortality rates, both in the short term and over the long run. In other words, in the short term, the effect of civil conflict seems to be stronger whereas in the long term interstate conflict exerts more killing effect on the adult population.

Third, conflict severity exhibits a very clear pattern in terms of the effect on adult mortality. Overall, the effect of war on both male and female mortality rates is positive, both in the short run and over the long run. On the other hand, military conflict less severe than war largely has statistically insignificant effects on adult mortality for both the short term and the long run, except in the case of the female in the short run.

Fourth, between the two gender groups, the female appears to be more vulnerable in general to the dangers from armed conflict than the male. Where armed conflict is found to affect the male, it always affects the female; where armed conflict does not affect the male, it still affects the female. The only exception for this pattern is the short-term effect of war which is clearly stronger for male than for female.

These findings suggest several important implications for society at large. Military violence involves a quantifiable, huge human cost. That military conflict can still kill, even when

actual fighting stops, highlights the imperative for negotiated peace. Armed conflict not only directly kills military personnel and civilians but also indirectly raises human mortality by influencing health-promoting resources and health-compromising hazards. Peace, however short lived and feeble, saves human lives. Ideally, it is the prolonged peace that is truly beneficial for improving human conditions. But in the absence of a feasible, final solution to human conflicts of interest, simply preventing a conflict from escalating into a war already can produce noticeable public health differences. Human mortality is much lower in minor conflicts than in wars. Hence, international efforts such as UN peace keeping, by minimizing conflict escalation and creating even just an ephemeral ceasefire, have probably already saved many lives and improved human welfare much more than people have generally recognized.

Our analysis also suggests that special attention should be devoted to changing the vulnerable position of women in military violence. The argument that women may be more peace loving is consistent with our empirical finding that they suffer more from military violence than men do at least among civilian population. Women have more at stake over the long run than men in opposing military violence. Empowering women politically may potentially cause national leaders to be more cautious and give the human cost more weight in making their political decisions over the use of force.

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Appendix 1 List of Countries Included in Estimation Sample

Country Name	*Frequency*	*Country Name*	*Frequency*
Albania	9	Latvia	9
Argentina	15	Lithuania	9
Armenia	9	Luxembourg	20
Australia	38	Macedonia, FYR	9
Austria	30	Mauritius	19
Azerbaijan	9	Mexico	32
Belarus	9	Moldova	9
Belgium	35	Netherlands	38
Brazil	8	New Zealand	37
Bulgaria	19	Norway	38
Canada	32	Panama	26
Chile	28	Peru	14
Colombia	21	Philippines	19
Costa Rica	34	Poland	7
Croatia	8	Portugal	30
Cuba	1	Romania	20
Czech Republic	2	Russian Federation	8
Denmark	37	Singapore	35
Dominican Republic	15	Slovak Republic	7
Ecuador	19	Slovenia	8
Egypt, Arab Rep.	18	Spain	37
El Salvador	15	Sri Lanka	15
Estonia	9	Sweden	38
Fiji	1	Switzerland	29
Finland	39	Tajikistan	5
France	38	Thailand	27
Georgia	8	Trinidad and Tobago	32
Germany	1	Turkmenistan	7
Greece	38	Ukraine	9
Guatemala	10	United Kingdom	38
Honduras	5	United States	38
Hungary	39	Uruguay	8
Iceland	7	Uzbekistan	7
Ireland	29	Venezuela, RB	31
Israel	8		
Italy	29		
Jamaica	4		
Japan	38		
Kazakhstan	8		
Korea, Rep.	16		
Kuwait	7		
Kyrgyz Republic	8		

Appendix 2 In-sample summary statistics

Variable	*N*	*Mean*	*Standard Deviation*
Male mortality rate (aged 15-64)	1468	0.01	0.006
Male mortality rate (log transformed)	1468	-4.726	0.476
Female mortality rate (aged 15-64)	1468	0.01	0.005
Female mortality rate (log transformed)	1468	-4.743	0.45
Armed conflict involvement dummy	1468	0.151	0.358
Armed conflict (% time since 1946)	1468	18.15	25.968
Interstate conflict dummy	1468	0.059	0.236
Intra-state conflict dummy	1468	0.104	0.306
Interstate conflict (% time since 1946)	1468	8.276	14.046
Intra-state conflict (% time since 1946)	1468	7.755	16.676
Minor conflict dummy	1468	0.069	0.253
War dummy	1468	0.082	0.274
Minor conflict (% time since 1946)	1468	5.57	13.193
War (% time since 1946)	1468	12.58	20.374
Gini index	1468	0.368	0.094
Urbanization	1468	1.749	1.59
GDP per capita growth	1468	1.839	5.494
Democracy	1468	5.585	6.279
Age dependency ratio	1468	0.617	0.158
OECD dummy	1468	0.433	0.496
Year	1468	1981	11.087

Table 1 Effect of aggregate conflict on adult mortality rate, 1961-1999

	(1) short term, male	(2) short term, male	(3) long term, male	(4) long term, male	(5) short term, female	(6) short term, female	(7) long term, female	(8) long term, female
Armed Conflict	0.1023**	0.0672**			0.0959**	0.0712**		
	(0.0501)	(0.0328)			(0.0415)	(0.0323)		
Armed Conflict			0.0023***	0.0016***			0.0024***	0.0017***
			(0.0008)	(0.0005)			(0.0007)	(0.0005)
Gini	-0.2147	-0.2036	-0.2972	-0.2655	-0.3626	-0.1864	-0.4487	-0.2556
	(0.3980)	(0.2280)	(0.3779)	(0.2211)	(0.3733)	(0.2577)	(0.3630)	(0.2577)
Urbanization	-0.1249***	-0.0818***	-0.1279***	-0.0845***	-0.0864***	-0.0553***	-0.0896***	-0.0583***
	(0.0280)	(0.0204)	(0.0272)	(0.0196)	(0.0258)	(0.0200)	(0.0251)	(0.0196)
GDPPC Growth	-0.0165***	-0.0101***	-0.0162***	-0.0100***	-0.0142***	-0.0087***	-0.0137***	-0.0086***
	(0.0033)	(0.0021)	(0.0033)	(0.0021)	(0.0030)	(0.0029)	(0.0030)	(0.0030)
Democracy	-0.0015	-0.0014	-0.0005	-0.0007	-0.0034	-0.0016	-0.0023	-0.0008
	(0.0055)	(0.0045)	(0.0054)	(0.0045)	(0.0049)	(0.0039)	(0.0048)	(0.0039)
Age Dependency	0.1279	0.1461	0.1858	0.1839	-0.0102	-0.0052	0.0432	0.0349
	(0.2396)	(0.1590)	(0.2282)	(0.1571)	(0.2134)	(0.1548)	(0.1993)	(0.1487)
OECD dummy	-0.3014***	-0.1795***	-0.3380***	-0.2080***	-0.2632***	-0.1620***	-0.3033***	-0.1931***
	(0.0700)	(0.0516)	(0.0709)	(0.0533)	(0.0700)	(0.0512)	(0.0713)	(0.0544)
Year	-0.0087***	-0.0078***	-0.0089***	-0.0079***	-0.0069***	-0.0059***	-0.0071***	-0.0060***
	(0.0025)	(0.0020)	(0.0025)	(0.0020)	(0.0023)	(0.0018)	(0.0024)	(0.0019)
$Mortality_{t-1}$		31.4745***		30.9903***		32.6642***		31.8505***
		(3.1529)		(3.0842)		(3.9577)		(3.9151)
Constant	12.9401**	10.5938***	13.2713***	10.8560***	9.3258**	6.8021*	9.6814**	7.1018*
	(4.9394)	(3.9556)	(4.9403)	(3.9824)	(4.6226)	(3.5666)	(4.7368)	(3.6957)
Observations	1468	1421	1468	1421	1468	1421	1468	1421
R-squared	0.21	0.33	0.21	0.33	0.16	0.26	0.17	0.27

Robust standard errors clustered over country in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2 Effect of interstate and civil conflicts on adult mortality rate, 1961-1999

	(1) short term, male	(2) short term, male	(3) long term, male	(4) long term, male	(5) short term, female	(6) short term, female	(7) long term, female	(8) long term, female
Interstate Conflict	0.0627*	0.0418			0.0868**	0.0626**		
	(0.0470)	(0.0373)			(0.0400)	(0.0337)		
Civil Conflict	0.1063**	0.0701**			0.0917**	0.0678**		
	(0.0567)	(0.0345)			(0.0474)	(0.0382)		
Interstate Conflict			0.0038***	0.0028***			0.0032***	0.0021**
			(0.0014)	(0.0010)			(0.0012)	(0.0010)
Civil Conflict			0.0011	0.0007			0.0015*	0.0012
			(0.0013)	(0.0009)			(0.0012)	(0.0009)
Gini	-0.2062	-0.1979	-0.2896	-0.2627	-0.3520	-0.1796	-0.4314	-0.2414
	(0.3979)	(0.2279)	(0.3782)	(0.2179)	(0.3737)	(0.2584)	(0.3658)	(0.2582)
Urbanization	-0.1253***	-0.0822***	-0.1291***	-0.0855***	-0.0871***	-0.0559***	-0.0898***	-0.0581***
	(0.0278)	(0.0202)	(0.0281)	(0.0203)	(0.0256)	(0.0198)	(0.0260)	(0.0203)
GDPPC Growth	-0.0165***	-0.0101***	-0.0168***	-0.0104***	-0.0142***	-0.0087***	-0.0143***	-0.0089***
	(0.0033)	(0.0021)	(0.0034)	(0.0021)	(0.0030)	(0.0029)	(0.0031)	(0.0030)
Democracy	-0.0015	-0.0014	-0.0004	-0.0006	-0.0035	-0.0016	-0.0023	-0.0008
	(0.0054)	(0.0044)	(0.0055)	(0.0045)	(0.0048)	(0.0038)	(0.0050)	(0.0040)
Age Dependency	0.1194	0.1403	0.1736	0.1751	-0.0194	-0.0116	0.0202	0.0146
	(0.2452)	(0.1622)	(0.2433)	(0.1658)	(0.2174)	(0.1574)	(0.2112)	(0.1546)
OECD dummy	-0.3010***	-0.1794***	-0.3475***	-0.2161***	-0.2644***	-0.1629***	-0.3049***	-0.1927***
	(0.0708)	(0.0525)	(0.0703)	(0.0525)	(0.0704)	(0.0515)	(0.0729)	(0.0555)
Year	-0.0088***	-0.0079***	-0.0089***	-0.0079***	-0.0069***	-0.0059***	-0.0072***	-0.0061***
	(0.0025)	(0.0020)	(0.0026)	(0.0021)	(0.0023)	(0.0018)	(0.0025)	(0.0019)
$Mortality_{t-1}$		31.4334***		30.8765***		32.6060***		31.9585***
		(3.1475)		(3.1312)		(3.9599)		(3.9416)
Constant	13.1636**	10.7496***	13.2177**	10.7927**	9.3778**	6.8673*	9.9437**	7.3734*
	(5.0145)	(4.0024)	(5.2395)	(4.2363)	(4.6740)	(3.5905)	(4.9242)	(3.8143)
Observations	1468	1421	1468	1421	1468	1421	1468	1421
R-squared	0.21	0.33	0.22	0.33	0.16	0.26	0.17	0.27

Robust standard errors clustered over country in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3 Effect of conflict severity on adult mortality rate, 1961-1999

	(1) short term, male	(2) short term, male	(3) long term, male	(4) long term, male	(5) short term, female	(6) short term, female	(7) long term, female	(8) long term, female
Minor Conflict	0.0511	0.0371			0.1096**	0.0990**		
	(0.0582)	(0.0464)			(0.0533)	(0.0484)		
War	0.1471***	0.0916***			0.0840**	0.0487*		
	(0.0578)	(0.0364)			(0.0496)	(0.0354)		
Minor Conflict			-4.82e-06	0.0003			0.0010	0.0010
			(0.0012)	(0.0009)			(0.0010)	(0.0008)
War			0.0035***	0.0023***			0.0031***	0.0021***
			(0.0010)	(0.0007)			(0.0008)	(0.0006)
Gini	-0.2128	-0.2025	-0.3424	-0.2944	-0.3631	-0.1872	-0.4761	-0.2727
	(0.3957)	(0.2282)	(0.3666)	(0.2182)	(0.3746)	(0.2593)	(0.3612)	(0.2592)
Urbanization	-0.1253***	-0.0822***	-0.1285***	-0.0852***	-0.0863***	-0.0550***	-0.0899***	-0.0587***
	(0.0279)	(0.0203)	(0.0279)	(0.0201)	(0.0259)	(0.0201)	(0.0254)	(0.0199)
GDPPC Growth	-0.0163***	-0.0100***	-0.0159***	-0.0099***	-0.0142***	-0.0088***	-0.0136***	-0.0086***
	(0.0033)	(0.0021)	(0.0033)	(0.0021)	(0.0030)	(0.0029)	(0.0031)	(0.0030)
Democracy	-0.0013	-0.0013	0.0001	-0.0004	-0.0035	-0.0017	-0.0020	-0.0007
	(0.0055)	(0.0045)	(0.0055)	(0.0045)	(0.0049)	(0.0039)	(0.0049)	(0.0039)
Age Dependency	0.1278	0.1452	0.2043	0.1947	-0.0101	-0.0044	0.0544	0.0410
	(0.2382)	(0.1589)	(0.2360)	(0.1645)	(0.2138)	(0.1552)	(0.2041)	(0.1520)
OECD dummy	-0.3036***	-0.1809***	-0.3577***	-0.2203***	-0.2627***	-0.1607***	-0.3152***	-0.2001***
	(0.0697)	(0.0515)	(0.0722)	(0.0542)	(0.0701)	(0.0513)	(0.0738)	(0.0570)
Year	-0.0086***	-0.0077***	-0.0086***	-0.0077***	-0.0069***	-0.0059***	-0.0069***	-0.0059***
	(0.0025)	(0.0020)	(0.0025)	(0.0020)	(0.0023)	(0.0018)	(0.0023)	(0.0018)
$Mortality_{t-1}$		31.4209***		30.6817***		32.7356***		31.6477***
		(3.1506)		(3.1195)		(3.9470)		(3.9433)
Constant	12.7577**	10.5145***	12.6504**	10.5270**	9.3744**	6.8739*	9.3050*	6.9159*
	(4.9711)	(3.9695)	(4.9445)	(3.9960)	(4.6552)	(3.6085)	(4.6750)	(3.6518)
Observations	1468	1421	1468	1421	1468	1421	1468	1421
R-squared	0.21	0.33	0.22	0.34	0.16	0.26	0.17	0.27

Robust standard errors clustered over country in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%