The Gorbachev Anti-Alcohol Campaign and Russia's Mortality Crisis

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Abstract

Political and economic transition is often blamed for Russia's 40% surge in deaths between 1990 and 1994. Highlighting that increases in mortality occurred primarily among alcohol-related causes and among working-age men (the heaviest drinkers), this paper investigates an alternative explanation: the demise of the 1985–1988 Gorbachev Anti-Alcohol Campaign. Using archival sources to build a new oblast-year data set spanning 1978–2000, we find a variety of evidence suggesting that the campaign's end explains a large share of the mortality crisis – implying that Russia's transition to capitalism and democracy was not as lethal as commonly suggested.

Crude death rates in Russia soared by 40% between 1990 and 1994, climbing from 11 to nearly 15.5 per thousand.[1] By 2009 standards, the decline in male life expectancy at birth (by nearly 7 years, to 57.6) would tie Russian men with their counterparts in Bangladesh, falling short of male longevity in less-developed countries with troubled population health histories (Botswana, Haiti, North Korea, and Yemen, for example). The magnitude of this surge in deaths – coupled with the Soviet Union's international prominence – has prompted observers to term this demographic catastrophe "the Russian Mortality Crisis."

The underlying cause of the mortality crisis has been hotly debated, but most accounts implicate Russia's political and economic transition.[2] Specific transition-related explanations include: a decline in economic output and employment (Cornia and Paniccia 2000; Brainerd 2001), rapid privatization (Stuckler, King, and McKee 2009; Stuckler, King, and McKee 2012), physiological and psychological stress (Shapiro 1995; Bobak and Marmot 1996; Kennedy, Kawachi, and Brainerd 1998; Leon and Shkolnikov 1998; Gavrilova et al. 2001), rising inequality (Lynch, Smith, Kaplan, and House 2000; Denisova 2010), reductions in the relative price of vodka (Treisman 2010), and deterioration of the medical care system (Ellman 1994).[3]

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[1]Throughout this paper we use the term "Russia" to refer to the Russian state of the Soviet Union (until December 1991) and the Russian Federation (after December 1991).

[2]In response to Stuckler, King, and McKee's (2009) article in *The Lancet* suggesting that privatization was responsible, see Jeffrey Sachs' rebuttal in the *Financial Times* on January 19, 2009 ("Shock Therapy' Had No Adverse Effect on Life Expectancy in Eastern Europe"), the subsequent reply by the authors in the *Financial Times* on January 22, 2009 ("Rapid Privatisation Worsened Unemployment and Death Rates"), and a recapitulation in *The Economist* on January 22, 2009 ("Mass Murder and the Market"). See also re-analyses by Earle and Gehlbach (2010) and Gerry, Mickiewicz and Nikoloski (2010).

The proximate cause of the crisis is less controversial: alcohol consumption soared in Russia between 1990 and 1993 (Leon et al. 1997; Treml 1997; Shkolnikov et al. 1998; Walberg et al. 1998).[4] The types of deaths that increased most during the transition were related to alcohol, either directly (alcohol poisonings and violent deaths) or indirectly (heart attacks and strokes) (Leon et al. 1997; Gavrilova et al. 2000; Brainerd and Cutler 2005). Although most diseases disproportionately kill the young and the old, crisis deaths were also concentrated among working age men – the demographic group that drinks the most.[5]

Recognizing the central role of alcohol, we investigate an alternative explanation for the Russian mortality crisis. Rather than the transition to capitalism and democracy, we study the coincident demise of the (reputedly successful) 1985–1988 Gorbachev Anti-Alcohol Campaign (Leon et al. 1997; Shkolnikov and Nemtsov 1997; Cockerham 1999). The campaign was unprecedented in scale and scope – and it operated through both supply- and demand-side channels, simultaneously raising the effective price of drinking and subsidizing substitutes for alcohol consumption. At the height of the campaign, official alcohol sales had fallen by as much as two-thirds (Russians responded by increasing home-production of alcohol called *samogon* – although our estimates suggest not by nearly enough to offset the reduction in state supply).[6] In practice the campaign lasted beyond its official end– restarting state alcohol production required time, and elevated alcohol prices lingered.

Figures 1a and 1b depict our basic logic (Human Mortality Database 2011). Both crude (Figure 1a) and age-adjusted (Figure 1b) Russian death rates increased linearly between 1960 and 1984, plummeted abruptly with the start of the campaign in 1985, remained below the pre-campaign trend throughout the latter 1980s, rose rapidly during the early 1990s to a temporary peak in 1994, and then largely reverted back to Russia's long-run trend.[7] The crisis could therefore be the combined result of lagged 'catch-up' mortality (as relatively weak marginal survivors saved by the campaign die at higher rates) together with reversion to the long-run trend. A lagged effect of alcohol consumption on mortality is consistent with findings in the medical literature on the delayed effects of alcoholism on both liver cirrhosis and heart disease (see, for instance, Holder and Parker 1992; Laonigro et al. 2009; and Savolainen, Penttila and Karhunen 1992). We develop additional evidence on this point in the appendix using data from the Framingham Heart Study.

We begin by establishing the association between the Gorbachev Anti-Alcohol Campaign and Russian mortality during the latter 1980s.[8] Because adequate sub-national data has not previously been compiled, doing so requires digitizing and harmonizing archival Russian data sources to create a new panel data set of Russian oblasts spanning years 1970–2000.[9] Our reduced-form approach then flexibly traces-out oblast-level changes in alcohol consumption and mortality over time which vary in proportion to pre-campaign alcohol consumption. This approach allows the data to tell us, in a flexible way, the lagged effects of the campaign and its end on Russian mortality.

Because the campaign was highly multifaceted and adequate data on its individual components are largely unavailable, we use pre-campaign alcohol consumption interacted

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[3]Brainerd and Cutler (2005) provide a thorough review of this literature.
[4]Exceptions are Bobak et al. (1999) and Bobak and Marmot (1999), who use survey data to question the role of alcohol consumption in explaining the mortality crisis.
[5]Death rates among males ages 35–44 rose by 74% between 1989 and 1994, for example.
[6]Throughout the paper, we use the term "*samogon*" to mean illegal alcohol generally.
[7]Population aging appears to explain some but not all of the long-term upward trend in mortality in Figure 1A.
[8]This relationship has previously been studied only qualitatively or using aggregate national-level data – see White (1996), Treml (1997), Avdeev et al. (1998), and Nemtsov (2000). Balan-Cohen (2007) finds superior health indicators among children born during the campaign.
[9]Oblasts are Russian administrative units; Data available online.

with year dummies as a summary measure of campaign intensity (assuming areas with greater pre-campaign alcohol consumption to be disproportionately affected – following Bleakley (2007) and (2010), Qian (2008), Miller and Urdinola (2010), and Nunn and Qian (2011), for example).[10] Overall, we find that the campaign is associated with about 400,000 fewer deaths per year, a reduction of 24% relative to the pre-campaign crude death rate.

We then extend our framework to study the link between the end of the Anti-Alcohol Campaign and Russia's transition-era mortality crisis. Harder-drinking oblasts prior to the campaign not only experienced larger mortality declines during the late 1980s, but they also experienced disproportionate increases in deaths during the 1990s. This relationship peaked in the middle of the decade and matches temporal patterns predicted by independent simulations.[11] Causes of death more closely related to alcohol consumption (circulatory disease, accidents and violence, and alcohol poisoning) also increased relatively more in these oblasts during the 1990s. Importantly, these relationships are robust to – and in some cases are in fact strengthened by – controlling for local economic conditions during the transition period (GDP per capita, the employment rate, and employment in private manufacturing – a measure of privatization). All in all, our estimates explain a large share of the Russian mortality crisis.

We conclude by conducting complementary simulation analyses of the temporal relationship between alcohol consumption and survival (using the longest-running panel survey of drinking and mortality of which we are aware –the Framingham Heart Study) and documenting patterns of mortality commensurate with campaign exposure in other former Soviet States and Eastern European countries. On the latter, former Soviet states in the West and in the Baltics exhibit similar mortality declines during the late 1980s followed by similar surges during the early 1990s. This pattern is also present – but attenuated – in former Soviet states with large Muslim populations for whom alcohol policy matters less (in the Caucuses and Central Asia). By contrast, mortality patterns in Eastern European countries undergoing political and economic transitions but not subjected to the campaign (the Czech Republic, Hungary, Poland, and the Slovak Republic) are starkly different. These cross-national patterns are consistent with the demise of the Gorbachev Anti-Alcohol campaign playing an important role in the Russian Mortality Crisis. Taken together, our results suggest that Russia's transition to capitalism and democracy *per se* was not as lethal as often suggested.

I. Drinking in Russia and the Gorbachev Anti-Alcohol Campaign

A. Alcohol Consumption in the Soviet Union and the Russian Federation

The Soviet Union – and Russia in particular – historically ranks among the world's heaviest drinking countries. Alcohol consumption rose steadily between 1950 and 1985 – between 1960 and 1979 alone, alcohol sales nearly quadrupled (with disposable household income spent on alcohol reaching 15–20%) (Treml 1982; Segal 1990; Tarschys 1993; White 1996; McKee 1999). Just prior to the anti-alcohol campaign, annual consumption of pure alcohol in the Soviet Union exceeded 14 liters per capita (compared to 8 liters in the United States) (Nemtsov 2000). This figure is roughly equivalent to adult males consuming half a liter of vodka every two days (Ryan 1995).[12] Given lower levels of drinking in Soviet states with

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[10]Bleakley (2007) and (2010), Qian (2008), Miller and Urdinola (2010), and Nunn and Qian (2011) study population-wide health programs and interventions by assuming that areas with greater pre-campaign exposure to a disease agent or risk-factor benefitted disproportionately.
[11]Using Framingham Heart Study data, we find temporal relationships that are consistent with the pattern of mortality over time that we observe following the end of the anti-alcohol campaign (see Appendix 3).

more Muslims (in the Caucasus and Central Asia, for example), the counterbalancing rate for Russia alone was presumably much higher (Shkolnikov and Nemtsov 1997).

B. The Gorbachev Anti-Alcohol Campaign

By the early 1980s, alcohol abuse was widely recognized as a major cause of death, absenteeism, and low labor productivity in the Soviet Union.[13] Although difficult to estimate, observers suggest that alcohol's cost to the Soviet economy during the 1980s totaled about 10% of national income (Treml 1987; Segal 1990; Tarschys 1993; White 1996).

In response, the Politburo and the Central Committee passed resolutions entitled "Measures to Overcome Drunkenness and Alcoholism" in May of 1985 (shortly after Mikhail Gorbachev became Secretary General). These decrees and subsequent directives of the Central Committee and the Presidium of the Supreme Soviet ushered in the country's most stringent anti-alcohol policies since its 1919–1925 prohibition. Given tight state control of social and economic affairs, rapid implementation and rigid adherence to campaign mandates were possible.

The Gorbachev Anti-Alcohol Campaign consisted of seven broad measures designed to raise the effective price of drinking and subsidize substitute activities. Four were clearly supply-oriented. First, state production of alcohol was drastically reduced. Between June 1985 and May 1986 alone, state production of vodka and hard liquor declined by 30–40% (Segal 1990) and cognac production fell by 44% (White 1996). Second, substantial new restrictions were placed on alcohol sales. Liquor stores were not allowed to sell vodka or wine before 2pm on business days, restaurants were no longer permitted to sell hard liquor, and the official drinking age rose from 18 to 21. Sales near factories, educational institutions, hospitals, and airports were prohibited. Third, the government increased alcohol prices substantially. In 1985 alone, the price of vodka, liqueurs, and cognac rose by 25% (McKee 1999), and prices were increased by about 25% more in 1986 (White 1996). Fourth, heavy new sanctions for public drunkenness and other alcohol-related offenses were introduced. Fines for workplace intoxication were one to two times the mean weekly wage, and both home production of alcohol and possession of homebrew equipment were punishable by large fines or imprisonment.

Three other measures focused on reducing the demand for alcohol. One was heavy subsidization of substitute activities; all Soviet oblasts were required to build and modernize leisure facilities (like parks and sport clubs) and to promote cultural activities. Another was media propaganda and health education programs together with bans on glamorous media depictions of drinking. To encourage sober lifestyles, the government also created a national temperance society (the "All-Union Voluntary Society for the Struggle for Temperance") – within three years, the society had 428,000 branches and more than 14 million members (White 1996). Finally, the government made large efforts to improve the treatment of

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[12]In addition to the quantity consumed, the type and pattern of alcohol consumption in Russia (compared to other heavy-drinking countries like France) has important implications for mortality. A disproportionate amount of consumption can be characterized as 'binge drinking' (defined as three or more measures of alcohol within 1 to 2 hours), especially on weekends and holidays (Bobak et al. 1999; Chenet et al. 1998; Malyutina et al. 2001; McKee and Britton 1998). Alcohol abuse and binge drinking are linked not only to accidents and violent deaths, but more quantitatively important, they are key risk factors for heart attacks and cardiovascular disease (McKee and Britton 1998; McKee, Shkolnikov and Leon 2001; O'Keefe, Bybee and Lavie 2007; Rehm et al. 2009; Tolstrup et al. 2006). Recent estimates suggest that alcohol abuse is responsible for more than half of all deaths in Russian cities among those ages 15–54 (Leon et al. 2007; Zaridze et. al. 2009).

[13]Alcohol played a central role in violent crimes and traffic accidents as well. According to then Interior Minister Vitalii Fedorchuk, two-thirds of all murder, battery, and rape as well as 70–80% of "hooliganism" were committed under the influence of alcohol (Reid 1986; Treml 1991).

alcoholism. Health care system responsibility for compulsory treatment of alcoholism was expanded, and physician supervision of treatment was required for up to five years.

Aggregate state alcohol sales fell by more than 50% between 1984 and 1988 (White 1996). Official figures overstate the decline in alcohol consumption, however, because they do not capture the "moonshining" response to the campaign. Russians have a long-standing tradition of producing *samogon* (literally, "distillate made by oneself," a generic term for illegal alcoholic beverages made from sugar, corn, beets, potatoes, and other ingredients) – and did so more vigorously during the campaign (as Appendix Figure 1 shows).[14]

Reductions in alcohol consumption also varied considerably across Russia. Central to our identification strategy, areas with higher alcohol consumption rates prior to the campaign experienced systematically larger declines during the campaign (Bleakley 2007 and 2010). Appendix Figure 2 shows oblast-level mean alcohol consumption rates for years 1980–1984, Section II describes how we use this variation in our empirical analysis, and Section III investigates the mechanisms underlying this relationship.

C. The Demise of the Anti-Alcohol Campaign

The Soviet Central Committee officially ended the anti-alcohol campaign in October 1988 (because of its unpopularity and the loss of revenue from alcohol sales).[15] In practice, however, the campaign extended beyond its official end for several reasons. First, increasing state production of alcohol required time; vodka production did not reach pre-campaign levels until 1993, for example (White 1996). Second, some campaign sales restrictions (against vodka sales on Sundays, for example) remained in place (White 1996). Third, alcohol prices remained high – 75% higher in 1989 than at the beginning of the campaign in 1985 (authors' calculations). Overall, the result was that the campaign lingered –both official and total alcohol consumption rates (including *samogon*) did not return to pre-campaign levels until the early 1990s. Appendix Figure 1 shows this slow recovery in our own data, concurring with Nemtsov's (2000) suggestion that 1991 was the campaign's *de facto* end date.

II. Data and Empirical Strategy

We used archival sources to create a new panel data set covering 77 Russian oblasts between 1970 and 2000.[16] Table 1 presents descriptive statistics from this data set by study period. In this section we summarize our key sources and variables; Appendix 1 provides greater detail about each source (the intersection of all key variables is generally years 1970 the intersection of all key variables is generally years 1979 the intersection of all key variables is generally years 1980 the intersection of all key variables is generally years 1984–1987, and 1989–2000).

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[14]A fictitious type of *samogon* called *tabouretovka* is made from wooden stools (or "tabourets") (Petrov, Dovich, and Il'f 1997). There were more extreme efforts to obtain alcohol as well: sales of alcohol-based glue increased from 760 to 1000 tons between 1985 and 1987; sales of glass cleaners rose from 6,500 to 7,400 tons over the same period; and there was large-scale theft of industrial alcohol (Treml 1997).

[15]The campaign was also politically divisive within the communist party, and two important proponents of the campaign (Yegor Ligachev and Mikhail Solomentsev) retired from the Politburo at the end of 1987.

[16]All data compiled for this project are available upon request. In addition to true administrative oblasts, our dataset contains 22 *krai* and autonomous republics as well. For simplicity, we generically refer to all of these regions as oblasts. We exclude autonomous *okrugs* from our analysis because information about them is not available for a number of years; we also exclude Chechnya and Ingushetia (typically reported together as Chechnya-Ingush prior to 1991) because of war-related inconsistencies in the data.

A. Economic, Demographic, and Alcohol Data from Goskomstat and Rosstat Yearbooks

We obtained core demographic and alcohol variables from several types of statistical yearbooks compiled by *Goskomstat* (the Soviet national statistical agency) and *Rosstat* (the Russian Federation's national statistical agency). Some yearbook data is available through East View Information Services, a provider of Eurasian archival source materials. We obtained the remainder from the Hoover Institution's "Russian/Soviet/Commonwealth of Independent States Collection" print archives (available in hard-copy format in Russian).[17] To fill gaps in the coverage of these sources, we also used archival records published by scholars outside of the Soviet Union (New World Demographics 1992; Treml and Alexeev 1993; Vassin and Costello 1997; Vallin et al. 2005; Heleniak 2006).

Vital Records—Our core mortality variables are crude death rates per 1,000 population, and alcohol poisoning death rates by gender per 100,000 population. Russian death certificates are certified by physicians (or in less than 10% of the cases, by paramedics), and evaluations of Russia's mortality statistics generally conclude that they are satisfactory in quality with modest under-reporting rates (Andreev 1999; Bennett, Bloom and Ivanov 1998; Leon et al. 1997).[18]

Causes of death in the Soviet Union were classified using a Soviet system with 175 categories; these categories were later harmonized with codes from the World Health Organization's International Classification of Diseases, Ninth Revision (ICD-9).[19] *Goskomstat*'s and *Rosstat*'s statistical yearbooks contain little cause-specific mortality data at the oblast level, however. Given our focus, we have compiled information on deaths directly linked to alcohol consumption (cardiovascular disease, alcohol poisoning, and accident/violent deaths), deaths more indirectly related to alcohol (digestive and respiratory disease deaths), and deaths not closely alcohol-related (cancer deaths) (Vallin et al. 2005). We obtained data on alcohol poisoning deaths for additional years from Vladimir Shkolnikov and colleagues at the Max Planck Institute for Demographic Research (Vallin et al. 2005). Other causes of deaths at the oblast level are unfortunately not available over our period of interest.

Alcohol Sales—As the sole legal producer and distributor of alcohol in the Soviet Union, the government maintained records of alcohol sales (in liters) for principal alcoholic beverages (vodka, beer, wine, cognac, and champagne).[20] Sales by type of beverage are reported in liters of pure alcohol for some years and in thousands of dekaliters in other (partly-overlapping) years. We converted sales data for all years into liters of pure alcohol, following Andrienko and Nemtsov (2006) by assuming each type to have the following alcohol content: vodka: 40%; wine: 14.4%; cognac: 18%; champagne: 22.8%; beer before 1995: 2.85%; beer between 1995 and 1999: 3.37%; and beer after 2000: 3.85%.[21] For each

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[17]We are grateful to Irina Erman and Emily Singer for outstanding Russian language assistance.

[18]Exceptions are Tuva's statistics and regions in the North Caucasus, where reports suggest that infant mortality under-reporting was as high as 25% during the 1980s (Blum and Monnier 1989). These specific oblasts are Tuva, Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai. We repeat the analyses shown in Table 3 excluding these oblasts – Appendix Table 1 shows that the results are similar.

[19]The Russian Federation used the Soviet cause of death classification system until 1999 but also began using the WHO International Classification of Diseases (ICD) system in parallel in 1993 (see Shkolnikov, Mesle and Vallin 1993; Shkolnikov, McKee and Leon 2001). Cause of death records are generally less reliable than other types of mortality data, so we emphasize our crude death rate analyses but supplement them with analyses of cause-specific mortality.

[20]This data excludes information about alcohol sold on military bases. Beginning in 1992, it also excludes alcohol sales at private trade outlets and restaurants. Data for cognac and champagne sales data are only available beginning in the late 1990s (although they constitute a small share of total sales). Finally, it does not measure quality. According to the Russian Trade Committee, the share of alcoholic beverages rejected as substandard was 5.6% in 1991, rising to 12.4% in 1992, 25.6% in 1993, and 30.4% in 1994 (Nemtsov 2002).

[21]For years possible, we verify the validity of our calculations through direct comparison with data on sales measured in pure alcohol.

oblast-year, we divide liters of pure alcohol by the corresponding population estimate, yielding rates of pure alcohol consumption per person for years 1970, 1980–1992, and 1996–2002. White (1996) uses retrospective survey data to suggest that sales data during campaign years were generally not manipulated by politically-motivated officials.

Alcohol Production and Prices—Prior to 1992, the Soviet government controlled alcohol production and set prices administratively (i.e., they were not determined by markets). We use the available, albeit highly incomplete, data on production and prices to speculate (in the conclusion) about the salient mechanisms through which the campaign operated. Government production data are available for vodka, the most popular alcoholic beverage during our study period (covering years 1970covering years 1979covering years 1980covering years 1985, and 1990–2000) and for pure alcohol production (covering years 1989–1992–1994–1995–1997 and 1999–2000).[22]

Oblast-level alcohol prices are only available for post-transition years; annual vodka price data covers years 1992 forward, for example (Goskomstat Rossii 1996c; 1996d; 1997e; 1998e; 2002c; 2006c). For earlier years (1980, 1985 and 1989), we can calculate the implied annual price of pure alcohol from total sales (recorded in rubles) divided by the total quantity sold.

Other Covariates—Some of our analyses control for other determinants of mortality and for other factors proposed to explain the Russian mortality crisis. We assembled oblast-year data on health care infrastructure and workforce (the number of hospitals and the number of doctors per capita) and crude birth rates using *Goskomstat* and *Rosstat* Yearbooks. We also collected data on employment rates and employment rates in private manufacturing from Brown, Earle, and Gehlbach (2009) and Earle and Gehlbach (2010); income per capita from Treml and Alexeev (1993); and immigration and emigration flows from Andrienko and Guriev (2004).[23]

B. Estimating Total Alcohol Consumption (Including Samogon)

Official alcohol sales data do not accurately reflect total alcohol consumption because many Russians make *samogon* at home. Because comprehensive estimates of oblast-year *samogon* production are not available, we extend the work of Nemtsov (2000) to estimate it for the 1980s and early 1990s. Sugar is a critical ingredient in *samogon*, so one approach is based on sugar sales that exceed estimated dietary consumption (Nemtsov 1998). However, this method fails for years 1986 and later when sugar was rationed (Treml 1997).

Nemtsov (2000) therefore developed an alternative indirect technique using forensic records. Both the Soviet Union and the Russian Federation mandate that each oblast's forensic bureau perform autopsies for all violent and accidental deaths as well as deaths with unclear causes. Importantly, these mandatory autopsies systematically document blood alcohol content (albeit in a non-random sample of Russians).[24] Nemtsov (2000) used these records to estimate the association between blood alcohol concentrations and total alcohol consumption, recovering implied *samogon* consumption. Using these estimates, he then predicted *samogon* consumption for twenty-five oblasts between 1980 and 1992 (Nemtsov 2000).[25] Despite their imperfections, the autopsy-based estimates closely match sugar-based estimates in overlapping years and outperform other methodologies (based on hospital

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[22]We use vodka's share of total alcohol production in 1990 at the oblast level to estimate vodka production in 1989.

[23]Other work (such as Stillman and Thomas 2008) investigates the health consequences of Russia's economic crisis late in the 1990s.

[24]The autopsy records used by Nemtsov were not made public during the Soviet era, so manipulation for external political purposes is likely not a concern.

admissions for alcohol-induced psychosis, cirrhosis deaths, and pancreatitis deaths, for example) (McKee 1999; Nemtsov 2000; Balan-Cohen 2007).

We use estimates published in Nemtsov (2000) – together with some algebraic manipulation – to recover underlying parametric relationships (Appendix 2 describes the details of these calculations and their validation). We then use these parameters to predict oblast-year *samogon* consumption and calculate total alcohol consumption as the sum of official sales and *samogon* for years 1980–1992.[26] As Appendix Figure 1 shows, *samogon* consumption rose sharply as official alcohol sales fell during the campaign, closely matching aggregate relationships reported by others (Nemtsov 2000). In our analyses, we use both official alcohol sales and total alcohol consumption estimates in parallel.

C. Empirical Strategy

Our empirical approach estimates the relationship between the Anti-Alcohol Campaign and both (a) contemporaneous mortality during campaign years and (b) subsequent mortality during transition years using a reduced-form approach. Specifically, we pool together all sample years and estimate the association between oblast-year death rates and interactions of oblast-level mean alcohol consumption prior to the campaign with year dummy variables. This strategy follows Bleakley (2007, 2010), Qian (2008), Miller and Urdinola (2010), Nunn and Qian (2011) and others in assuming that areas with greater pre-campaign exposure to a disease agent benefitted more from a population-wide campaign against the disease.[27] In our case, a particular advantage of this approach is that it effectively provides a summary measure of campaign intensity (given that the campaign is highly multifaceted and that data on its individual components is generally unavailable). To flexibly trace out the differential time path of mortality in harder-drinking oblasts relative to more temperate ones during campaign and transition periods, we estimate variants of the following basic equation for oblasts *o* and years *y*:

$$mortality_{oy} = \alpha + \sum_t \beta_t \left[(mean\ pre-campaign\ alcohol\ consumption)_o \times (year)_{yt} \right] + \boldsymbol{\delta_o} + \boldsymbol{\delta_y} + \varepsilon_{oy}, \quad (1)$$

where *mortality* is a death rate (crude death rates per 1,000 or cause-specific death rates per 100,000), (*mean pre-campaign alcohol consumption*) is the mean of oblast *o*'s total alcohol consumption during sample years prior to the campaign (1980–1984), and δ_o and δ_y represent oblast and year fixed effects. We also estimate variants of equation (1) that include oblast-specific linear time trends and oblast-year health system controls (doctors per capita and hospital beds per capita). We hypothesize that $\beta_t < 0$ during campaign years (as oblasts with higher pre-campaign alcohol consumption are disproportionately affected by the campaign) and $\beta_t > 0$ during transition years (as oblasts with larger reductions in mortality during the campaign experience larger death rate increases after its end).

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[25]These oblasts are Altai krai, Amur, Bashkiria, Ekaterinburg, Ivanova, Khabarovsk, Kaluga, Karelia, Kemerov, Kursk, Leningrad, Moscow city, Moscow oblast, Murmansk, Novgorod, Novosibirsk, Omsk, Orel, Rostov, Samara, Saratov, Sakhalin, St. Petersburg city, and Yaroslav.

[26]In short, Nemtsov (2000) provides an unadjusted OLS regression coefficient for the relationship between *samogon*/illegal alcohol (IA) and official alcohol sales (OS) in 1990, and he also reports correlation coefficients between official sales and *samogon* for years 1983, 1985 and 1990 (years preceding, during, and after the campaign). The regression coefficient is equal to Cov(IA,OS)/Var(OS), and the correlation coefficient $r = Cov(IA,OS)/(Var(IA)^{1/2} \times Var(OS)^{1/2})$. Using the variance of official alcohol sales for years in our dataset and assuming the variance of *samogon* to remain constant over time, we calculate implied regression coefficients for each year 1980–1992. We then use these year-specific regression coefficients and our oblast-year official sales data to predict total alcohol consumption (including *samogon*).

[27]This could be true for many reasons – supply restrictions could be targeted to these areas, price elasticities of demand may be greater in these areas, etc. In Section III we investigate the underlying mechanisms associated with variation in campaign intensity.

D. Graphical Evidence

Before turning to econometric results, we first use our data set to examine graphical relationships between the anti-alcohol campaign and Russian crude death rates. Figure 2 shows death rates over time by pre-campaign drinking rates. To construct this figure, we calculate mean total alcohol consumption in each oblast for years 1980–1984. We then graph crude death rates between 1970 and 2000 for the top and bottom quartiles of the distribution of pre-campaign alcohol consumption. Consistent with an effective anti-alcohol campaign, oblasts in the top quartile experienced larger crude death rate reductions in the latter 1980s during the campaign. Then, during Russia's subsequent political and economic transition, this relationship reverses. Between 1990 and 1994, larger crude death rate increases occurred among oblasts with more pre-campaign drinking – and oblasts with less pre-campaign drinking experienced smaller increases. Overall, Figure 2 is consistent with the campaign's end playing an important role in the mortality crisis.

III. Results

A. Russian Mortality during the Anti-Alcohol Campaign

Alcohol Consumption and Mortality—In estimating equation (1), we assume that oblasts with higher pre-campaign alcohol consumption (i.e., that had greater pre-campaign exposure to a disease-causing agent) benefitted relatively more from the population-wide campaign through larger reductions in alcohol consumption. Before analyzing changes in crude death rates, we first show that empirical patterns of drinking over time support this assumption. Regressing per capita alcohol consumption on interactions between mean pre-campaign alcohol consumption and campaign year dummies, Table 2 shows that each additional liter of alcohol consumed per person per year prior to the campaign is associated with 28%–69% decline in per capita alcohol consumption during campaign years.[28]

We then directly estimate changes in crude death rates during the Anti-Alcohol Campaign using equation (1). Table 3 reports year-specific estimates, tracking differential mortality time paths of oblasts with varying levels of pre-campaign alcohol consumption. Focusing on the 1980s, these estimates fall significantly below zero in 1985 and continue to fall further during the campaign, reaching their lowest point in 1988 (significantly lower than in 1985) before rising again and becoming insignificant by the time of transition. Table 3 shows that this pattern of results is robust to the inclusion of oblast-specific linear time trends and other available oblast-year controls (per capita number of doctors and per capita number of hospital beds).[29] Appendix Table 1 also shows that these results are not generally sensitive to the exclusion of oblasts with lower quality vital statistics.[30]

Figure 3 shows death rate changes and 95% confidence intervals implied by median pre-campaign alcohol consumption (14.38 liters per capita each year) throughout the 1980s and 1990s. This figure is based on our flexible reduced-form estimates of the effect of changes in alcohol consumption (with a median decline of about 20% during campaign years). During the campaign, the median oblast's mortality decline in 1985 was −2.07 per 1,000 population, falling to −3.46 per 1,000 in 1988 and rising back towards zero by 1990. This temporal pattern of implied changes in crude death rates closely matches the year-to-year

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[28]We use sample years prior to 1990 to estimate this relationship (we only have our total alcohol consumption measure for years up to 1992).

[29]Instead of the reduced-form approach in Table 3, we can also use a similar TSLS strategy, instrumenting for campaign-year alcohol consumption with average pre-campaign alcohol consumption interacted with year dummies. While the TSLS estimates generally corroborate our reduced-form findings (available upon request), they only identify the contemporaneous mortality effect of the campaign and ignore important dynamic effects which our reduced-form approach captures.

[30]Footnote 20 provides the names of these oblasts.

aggregate deviations during the campaign from Russia's long-term death rate trend shown in Figures 1a and 1b.[31] Scaling the implied death rate changes by Russia's population in 1984, they imply approximately 1.6 million fewer deaths during the four campaign years, with annual death rates 24% below pre-campaign rates (on average).[32]

B. The Anti-Alcohol Campaign and Russian Mortality during the 1990s

Having established the relationship between the Anti-Alcohol Campaign and reductions in mortality during the 1980s, we then investigate how the end of the campaign is related to the subsequent surge in mortality during Russia's political and economic transition. Returning to Table 3, we examine year-specific   estimates from equation (1) for years throughout the 1990s. These estimates track how increases in transition-era mortality vary with pre-campaign alcohol consumption – and mortality declines during the preceding campaign. After returning to zero in 1991/1992, the estimates then become positive in 1993, rise sharply to their peak in 1994/1995, and then fall again in the latter 1990s. Importantly, this temporal pattern of estimates closely matches aggregate deviations from the long-term mortality trend during crisis years as shown in Figures 1a and 1b.

Figure 3 plots changes in death rates implied by these estimates for median pre-campaign alcohol consumption. At the height of the mortality crisis rebound in death rates, excess deaths implied by our model were 5.85 per 1,000. Scaling these estimates by Russia's population in 1989, this implies 2.15 million excess deaths between 1992 and 1995, an average increase of 43% across these years relative to 1989.[33] Although our estimates are accompanied by wide confidence intervals, they suggest that the end of the Anti-Alcohol Campaign played a leading role in explaining Russia's mortality crisis.

Cause-Specific Mortality—Next, we examine changes in three groups of cause-specific death rates with differential relatedness to alcohol consumption. Those most closely related to alcohol are alcohol poisonings, deaths due to cardiovascular disease, and accidents/violent deaths. Causes more indirectly linked to alcohol are respiratory diseases and digestive diseases. Finally, cancer deaths are most weakly related to alcohol (and occur only after a long period of time).

Estimating equation (1) using cause-specific deaths per 100,000 as dependent variables, Figures 4, 5a and 5b show implied changes in cause-specific mortality for median pre-campaign alcohol consumption.[34] Alcohol poisonings, circulatory disease deaths, and accidents/violent deaths rise considerably during the early 1990s in proportion to intensity of the Gorbachev Anti-Alcohol Campaign, and their temporal pattern matches the changes in crude death rates implied by Table 3. Consistent with gender differences in alcohol consumption (see Bobak et al. 1999 and Zaridze et al. 2009, for example), Figure 4 shows

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[31]Appendix Table 3 reports implied crude death rates changes at median pre-campaign alcohol consumption as well as one standard deviation above and below the median.

[32]Averted deaths are calculated by first multiplying coefficient estimates for interactions between pre-campaign mean alcohol consumption and year dummies with median pre-campaign consumption, yielding implied changes in crude death rates. For 1985, 1986, 1988, and 1989, this is: −0.14×14.38=−2.07, −0.20×14.38=−2.81, −0.24×14.38=−3.47, and −0.21×14.38=−3.03 (respectively). These implied changes in crude death are then scaled by the size of the Russian population in 1984 (141,525,504) to obtain implied deaths averted. For 1985, 1986, 1988, and 1989, this is: 293,059; 398,887; 490,468; and 429,414 deaths averted (respectively). Summing over campaign years yields 1,611,828 averted deaths.

[33]Relative to 1989, there were 223,698 excess deaths in 1992, 545,596 in 1993, 717,623 in 1994, and 620,067 in 1995. We calculated the number of implied excess deaths by first multiplying coefficient estimates for interactions between pre-campaign mean alcohol consumption and year dummies with median pre-campaign consumption, yielding implied changes in crude death rates. For 1992, 1993, 1994, and 1995, this is: 0.047×14.38=0.68, 0.221×14.38=3.18, 0.34×14.38=4.89, and 0.407×14.38=5.85 (respectively). These implied changes in crude death rates are then scaled by the population in 1989 to obtain implied excess deaths. For 1992, 1993, 1994, and 1995, this is: 99,338; 467,101; 718,617; and 860,227 excess deaths (respectively), totaling 2,145,283 deaths.

[34]See Appendix Table 2 for the complete regression results.

that alcohol poisonings rise much more for men than for women. Figure 5a then shows that the most quantitatively important increases occur among cardiovascular disease deaths and accidents/violence (a large medical literature implicates alcohol consumption as a leading risk factor for heart attacks and strokes).[35] Predicted respiratory and digestive disease death rates rise to lower levels (consistent with their weaker relationship to alcohol consumption), and the trajectory of predicted cancer deaths is essentially flat throughout the 1990s (shown in Figure 5b).[36]

Robustness to Controlling for Local Economic Conditions—We then consider alternative explanations for our main findings. Given the emphasis that previous research on the mortality crisis has placed on changing economic circumstances, we begin by assessing the robustness of our results to the inclusion of controls for local economic conditions. Oblast-year data is available for real income, the employment rate, and the employment rate in private manufacturing ("privatization") in years 1991 and later. We first re-estimate equation (1) using data from these years – and we then repeat our estimation including these local economic controls. Table 4 Panel A shows that our estimates without economic controls (indexed to 1991) exhibit the same temporal pattern of mortality throughout the 1990s – and importantly, the estimates do not change in a meaningful way with these additional controls. Our findings therefore suggest that campaign-related increases in death rates during the 1990s cannot be explained by "privatization" or other changes in local economic conditions.

We then assess the sensitivity of our findings to other oblast-year controls (immigration and emigration as well as health system measures). These controls are available for years 1990 and forward, so we re-estimate equation (1) using these years and then include the additional controls. As Table 4 Panel B shows, our results again do not appear to be explained by these other factors.

IV. Simulations and Cross-Country Evidence

A. Simulation Evidence on the Temporal Relationship between Alcohol Consumption and Mortality

Although the anti-alcohol campaign lingered for several years after its official repeal (alcohol consumption did not reach its pre-campaign levels until the early 1990s), the Russian mortality crisis followed the campaign's end by several years. This temporal relationship is unsurprising given that the consequences of drinking become manifest over time (as subsequent heart attacks and strokes, for example). To investigate more carefully the timing of deaths following a sharp decrease and subsequent resumption of drinking, we use unique longitudinal data from the Framingham Heart Study in the United States to estimate mortality hazards associated with alcohol consumption. Using these estimates, we then simulate reductions in drinking analogous to those under the anti-alcohol campaign followed by increases in drinking observed during Russia's political and economic transition.[37] Overall, we find strikingly similar temporal patterns of mortality, with excess deaths emerging 2–3 years after the resumption of pre-campaign drinking and lasting for more than a decade. Appendix 3 presents these analyses in detail.

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[35]The medical literature suggests that cardiovascular disease deaths should be quantitatively most important (Chenet et. al. 1998; Britton and Mckee 2000; Corrao et. al. 2000; Hemström 2001; McKee, Shkolnikov, and Leon 2001; Corrao et. al. 2002; Ramstedt 2009).

[36]Similarly, infant mortality is not associated with campaign intensity during the transition era.

[37]Levels of alcohol consumption vary from country to country; however, the simulations will still be informative about the mortality response to sudden (and drastic) changes in alcohol consumption.

B. The Anti-Alcohol Campaign across Other Former Soviet States and Eastern Europe

Finally, if the Gorbachev Anti-Alcohol Campaign explains an important part of the Russian Mortality Crisis, then temporal patterns of mortality commensurate with campaign exposure should be present across other Eastern European countries. Other former Soviet states also experienced the campaign, and the campaign's impact should vary systematically with ethnic/religious composition (with larger campaign-year reductions and larger transition-year increases in countries with lower concentrations of Muslims).[38] Alternatively, non-Soviet Eastern European countries had no anti-alcohol campaign – and therefore should have different temporal patterns of mortality despite experiencing similar political and economic transitions.

Figure 6 shows crude death rate comparisons between Russia and three groups of countries: former Soviet states with a small share of Muslims (Latvia, Lithuania, Estonia, Ukraine, Belarus, and Moldova), former Soviet states with a larger share of Muslims (Armenia, Azerbaijan, Georgia, Uzbekistan, Kazakhstan, Kyrgyzstan, and Turkmenistan), and non-Soviet Eastern European countries (the Czech Republic, the Slovak Republic, Hungary, and Poland). Each panel shows de-trended crude death rate means for one of these country groups (and Russia for comparison), plotting residuals obtained by regressing country-year crude death rates on a linear year variable (Demoscope 2009; World Bank 2010). Former Soviet states with low Muslim concentrations exhibit both crude death rate decreases during the latter 1980s and death rate increases during the early 1990s similar to those in Russia. Alternatively, former Soviet states with higher Muslim concentrations experienced campaign year reductions and transition year-increases that are muted considerably. Finally, death rates over time in non-Soviet Eastern European countries appear unrelated to those in Russia (see also Mesle 2004). These patterns of mortality during the 1980s and 1990s across former Soviet States and Eastern European countries are consistent with our oblast-level findings for Russia.

V. Conclusion

This paper demonstrates an important but under-recognized link between the Gorbachev Anti-Alcohol Campaign and Russia's mortality crisis. Intervening on a variety of margins, the campaign simultaneously raised the cost of drinking and subsidized substitute activities. Alcohol consumption declined markedly, and Russia's crude death rate fell by an average of 24% per year, implying roughly 1.61 million fewer deaths during the latter 1980s. However, the campaign's unpopularity and public finance impact led to its repeal shortly before the collapse of the Soviet Union. The Russian death rate subsequently climbed rapidly – and the increase associated with the campaign's end explains a large share of the Russia's Mortality Crisis (roughly 2.15 million deaths). Former Soviet States and the rest of Eastern Europe also experienced similar temporal patterns of mortality commensurate with their exposure to the Anti-Alcohol Campaign.

If our thesis is correct, then an important subsequent question is: through what underlying behavioral factors did the campaign operate? Unfortunately, data limitations prevent us from providing a definitive answer. In one approach that we tried, we estimated variants of equation (1) to analyze the campaign's relationship with both official state production of vodka and an alcohol price index. The results suggest little evidence that our summary measure of campaign intensity operates either through differential supply shifts or through

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[38]Given Islam's prohibition of intoxicants, we exploit variation in the concentration of Muslims across the former Soviet Union. The underlying logic is that former Soviet states with relatively more Muslims should experience smaller absolute declines in deaths during the campaign and smaller increases in mortality during transition years. Guillot, Gavrilova, and Pudrovska (2011) report congruent evidence from Kyrgyzstan.

differential price increases. However, we are hesitant to draw conclusions given the limitations of the state vodka production and alcohol price index data noted earlier. We emphasize that this is an important area for further research.

Overall, a key implication of our main findings is that Russia's transition to capitalism and democracy was not as lethal as commonly suggested (Stuckler, King, and McKee 2009). However, our findings also do not necessarily imply that alcohol prohibition raises welfare (in Russia or elsewhere), even if it saves lives. Health is only one argument of welfare, and health-improving restrictions on individual choices can cause harm as well as do good.[39]

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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[39]Negative externalities and the role of addiction introduce ambiguity into welfare evaluations of alcohol policies and are beyond the scope of our paper (Becker and Murphy 1988; Becker, Grossman, Murphy 1994; Gruber and Koszegi 2001).

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Figure 1a
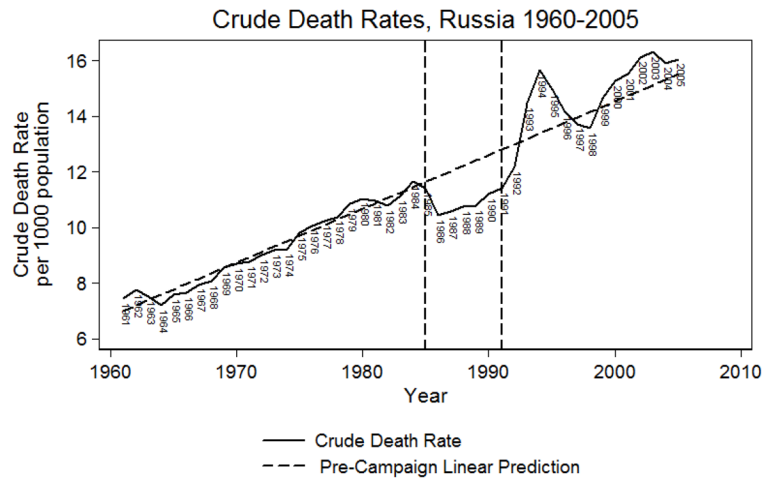
Figure 1b

Figure 1.
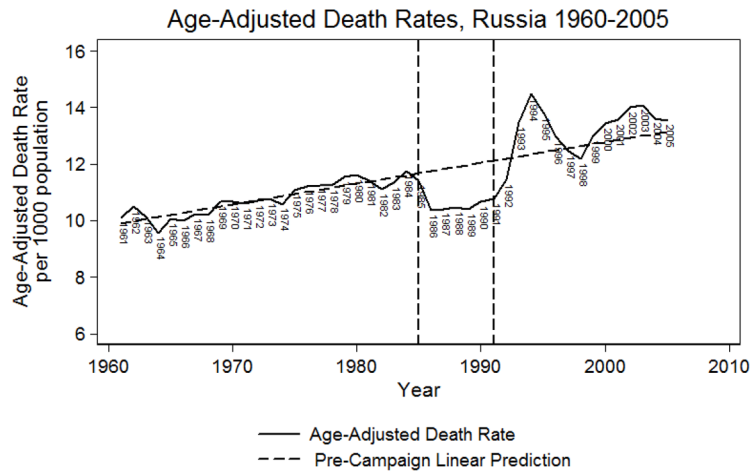Figure 1a. Data available from The Human Mortality Project (2011). Pre-campaign linear trend estimated using ordinary least squares regression of mortality per 1,000 population on pre-campaign year.
Figure 1b. Data available from The Human Mortality Project (2011). Pre-campaign linear trend estimated using ordinary least squares regression of mortality per 1,000 population on pre-campaign year.

Crude Death Rates by Quartile of Pre-Campaign Total Alcohol Consumption, 1970-2000
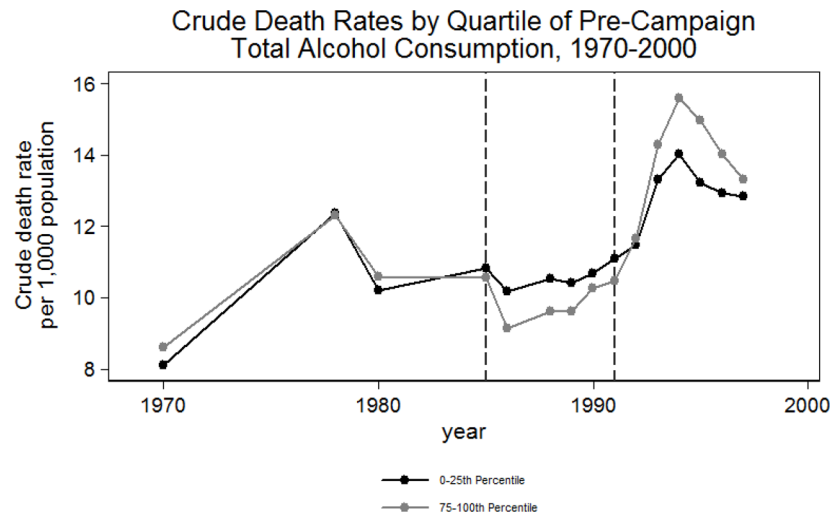
Figure 2.
Crude death rates (per 1,000 population) plotted for oblasts in the top and bottom quartile of alcohol consumption prior to Anti-Alcohol Campaign. Estimates of total alcohol consumption use data on official alcohol sales and estimates of illegal alcohol production. Data on official alcohol sales are available in annual statistical yearbooks compiled by Goskomstat and Rosstat; illegal alcohol production estimated by extending the work of Nemtsov (2000) (see Appendices 1 and 2 for details).

Crude Death Rate Changes Implied by
the Anti-Alcohol Campaign
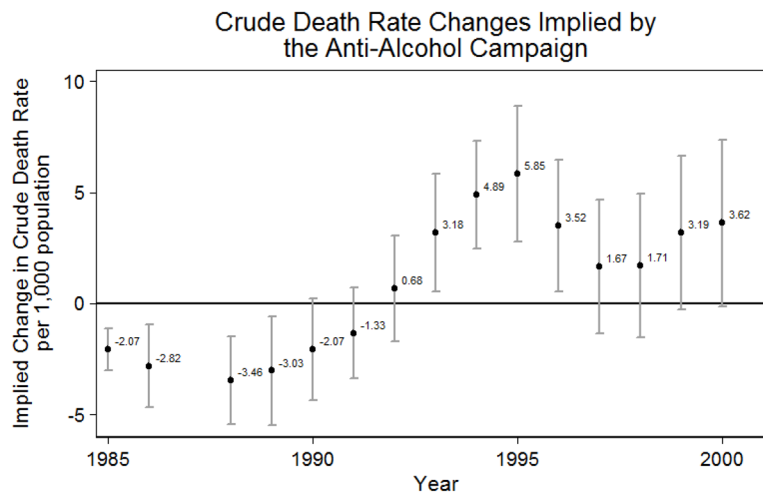
Figure 3.
Campaign effects on crude death rate per 1,000 population plotted with 95% confidence intervals. Estimated coefficients for each year obtained through OLS estimation of equation (1) for interactions between oblast-level mean pre-campaign alcohol consumption and campaign year dummy variables. Coefficients scaled by median pre-campaign alcohol consumption to show implied change in crude death rate. All specifications include oblast and year fixed effects; standard errors clustered at the oblast level. All oblast-year samples are restricted to years prior to 2000 (1970, 1978, 1980, 1985, 1986, and 1988–2000) and exclude Tuva, Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai. Data on death rates and official alcohol sales were obtained from annual statistical yearbooks compiled by Goskomstat and Rosstat through East View Information Services and the Hoover Institution's "Russian/Soviet/Commonwealth of Independent States Collection" print archives with supplementation from New World Demographics (1992), Treml and Alexeev (1993), Vassin and Costello (1997), Vallin et al. (2005) as well as from Vladimir Shkolnikov and colleagues at the Max Planck Institute for Demographic Research; estimates of total alcohol consumption using official alcohol sales supplemented by estimates of illegal alcohol production by extending the work of Nemtsov (2000) (see Appendices 1 and 2 for details).

Figure 4.
Campaign effects on crude death rate per 100,000 population plotted with 95% confidence intervals. Estimated coefficients for each year obtained through OLS estimation of equation (1) for interactions between oblast-level mean pre-campaign alcohol consumption and campaign year dummy variables. Coefficients scaled by median pre-campaign alcohol consumption to show implied change in crude death rate. All specifications include oblast and year fixed effects; standard errors clustered at the oblast level. All oblast-year samples are restricted to years prior to 2000 (1970, 1978, 1980, 1985, 1986, and 1988–2000) and exclude Tuva, Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai. Data on death rates and official alcohol sales were obtained from annual statistical yearbooks compiled by Goskomstat and Rosstat through East View Information Services and the Hoover Institution's "Russian/ Soviet/Commonwealth of Independent States Collection" print archives with supplementation from New World Demographics (1992), Treml and Alexeev (1993), Vassin and Costello (1997), Vallin et al. (2005) as well as from Vladimir Shkolnikov and colleagues at the Max Planck Institute for Demographic Research; estimates of total alcohol consumption using official alcohol sales supplemented by estimates of illegal alcohol production by extending the work of Nemtsov (2000) (see Appendices 1 and 2 for details).

Figure 5a

Accident/Violent Death Rate Changes
Implied by the Anti-Alcohol Campaign

⊢——⊣ Circulatory Disease Deaths
⊢——⊣ Deaths Due to Accident or Violence

Figure 5b

Respiratory, Digestive and Cancer Death Rate Changes
Implied by the Anti-Alcohol Campaign

⊢——⊣ Respiratory Disease Deaths
⊢——⊣ Digestive Disease Deaths
⊢——⊣ Cancer Deaths

Figure 5.
Figure 5a. Campaign effects on crude death rate per 100,000 population plotted with 95% confidence intervals. Estimated coefficients for each year obtained through OLS estimation of equation (1) for interactions between oblast-level mean pre-campaign alcohol consumption and campaign year dummy variables. Coefficients scaled by median pre-campaign alcohol consumption to show implied change in crude death rate. All specifications include oblast and year fixed effects; standard errors clustered at the oblast level. All oblast-year samples are restricted to years prior to 2000 (1970, 1978, 1980, 1985,

1986, and 1988–2000) and exclude Tuva, Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai. Data on death rates and official alcohol sales were obtained from annual statistical yearbooks compiled by Goskomstat and Rosstat through East View Information Services and the Hoover Institution's "Russian/Soviet/Commonwealth of Independent States Collection" print archives with supplementation from New World Demographics (1992), Treml and Alexeev (1993), Vassin and Costello (1997), Vallin et al. (2005) as well as from Vladimir Shkolnikov and colleagues at the Max Planck Institute for Demographic Research; estimates of total alcohol consumption using official alcohol sales supplemented by estimates of illegal alcohol production by extending the work of Nemtsov (2000) (see Appendices 1 and 2 for details).
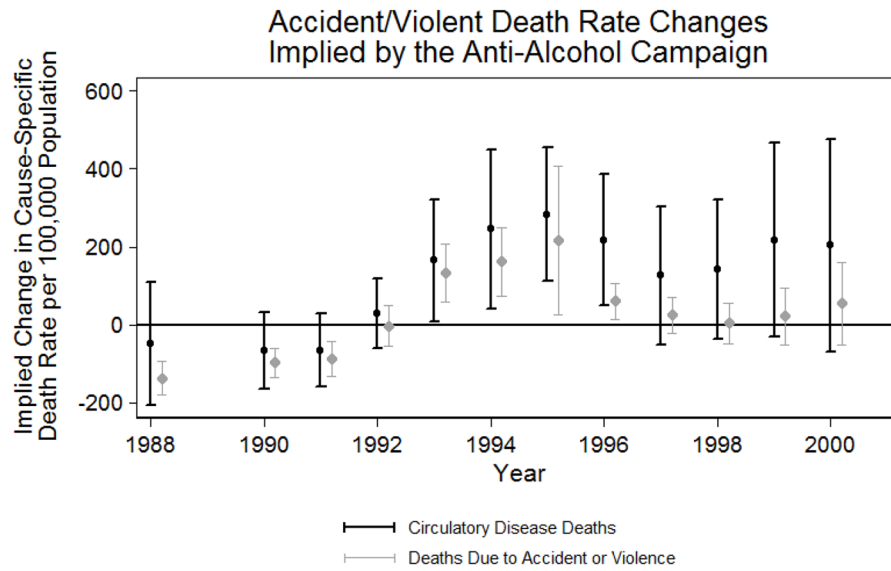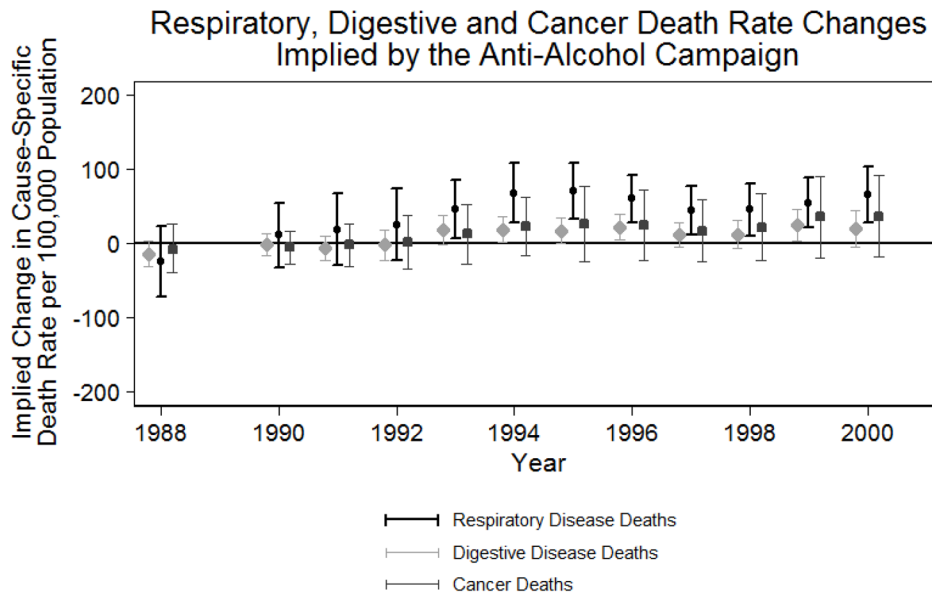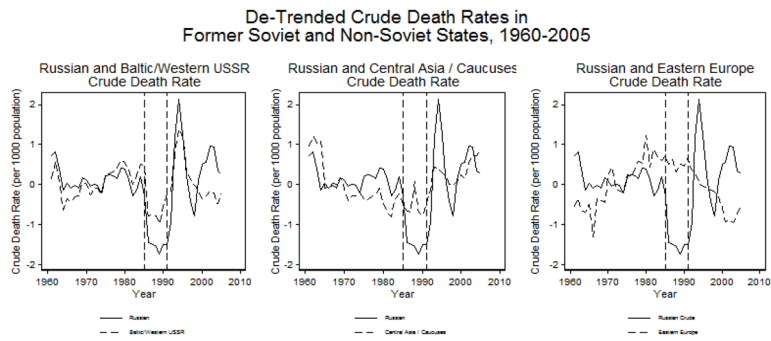
Figure 5b. Campaign effects on crude death rate per 100,000 population plotted with 95% confidence intervals. Estimated coefficients for each year obtained through OLS estimation of equation (1) for interactions between oblast-level mean pre-campaign alcohol consumption and campaign year dummy variables. Coefficients scaled by median pre-campaign alcohol consumption to show implied change in crude death rate. All specifications include oblast and year fixed effects; standard errors clustered at the oblast level. All oblast-year samples are restricted to years prior to 2000 (1970, 1978, 1980, 1985, 1986, and 1988–2000) and exclude Tuva, Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai. Data on death rates and official alcohol sales were obtained from annual statistical yearbooks compiled by Goskomstat and Rosstat through East View Information Services and the Hoover Institution's "Russian/Soviet/Commonwealth of Independent States Collection" print archives with supplementation from New World Demographics (1992), Treml and Alexeev (1993), Vassin and Costello (1997), Vallin et al. (2005) as well as from Vladimir Shkolnikov and colleagues at the Max Planck Institute for Demographic Research; estimates of total alcohol consumption using official alcohol sales supplemented by estimates of illegal alcohol production by extending the work of Nemtsov (2000) (see Appendices 1 and 2 for details).

Figure 6.
Russian mortality data available from The Human Mortality Project (2011); other USSR mortality data from http://www.demoscope.ru; non-USSR mortality data from WDI.

TABLE 1

DESCRIPTIVE STATISTICS

Years:	Pre-Campaign Years (Prior to 1985)		Campaign Years (1985–1989)		Transition Period (1990–2000)		All Years	
	N	Mean	N	Mean	N	Mean	N	Mean
Crude Death Rate	219	10.27 (0.16)	306	10.42 (0.14)	955	13.04 (0.10)	1480	12.09 (0.08)
Official Alcohol Sales	454	9.97 (0.11)	376	5.28 (0.16)	549	5.92 (0.08)	1379	7.08 (0.08)
Total Alcohol Consumption	376	14.56 (0.11)	376	11.46 (0.09)	234	12.96 (0.07)	986	12.99 (0.07)
Alcohol Poisoning Death Rate	73	29.46 (2.14)	151	9.91 (0.48)	864	26.43 (0.67)	1088	24.34 (0.58)
Alcohol Poisoning Death Rate (Male)	73	46.54 (3.21)	151	15.92 (0.76)	864	41.47 (1.01)	1088	38.26 (0.88)
Alcohol Poisoning Death Rate (Female)	73	12.38 (1.28)	151	3.89 (0.25)	864	11.39 (0.38)	1088	10.41 (0.33)
Circulatory Disease Death Rate	77	509.63 (20.22)	78	555.92 (23.59)	959	675.92 (7.71)	1114	656.02 (7.13)
Accident/Violent (and other External Cause) Death Rate	77	166.96 (5.54)	78	116.76 (3.08)	959	210.08 (2.28)	1114	200.57 (2.15)
Respiratory Disease Death Rate	77	97.19 (4.08)	78	66.31 (3.30)	959	68.03 (0.82)	1114	69.93 (0.83)
Digestive Disease Death Rate	77	28.42 (1.46)	78	28.69 (1.55)	959	37.40 (0.37)	1114	36.17 (0.36)
Cancer Death Rate	77	142.76 (4.87)	78	167.93 (5.73)	959	181.14 (1.57)	1114	177.56 (1.47)
Doctors Per Capita	258	3.03 (0.06)	423	4.39 (0.14)	959	5.38 (0.22)	1640	4.75 (0.14)
Hospital Beds Per Capita	258	12.80 (0.18)	423	14.25 (0.12)	956	13.21 (0.09)	1637	13.41 (0.07)
Emigration (in 1,000s)	--	--	--	--	800	38.64 (0.93)	800	38.64 (0.93)
Immigration (in 1,000s)	--	--	--	--	800	38.64 (0.99)	800	38.64 (0.99)
Privatized Manufacturing Employment Rate	--	--	--	--	894	0.53 (0.01)	894	0.53 (0.01)
Average Monthly Income Per Capita (Deflated, in Rubles)	--	--	--	--	753	266.73 (5.50)	753	266.73 (5.50)
Employment Per 1,000 Population	--	--	71	68.09 (9.90)	888	49.04 (0.80)	959	50.45 (1.05)

Data on death rates, official alcohol sales, doctors, hospital beds, internal immigration and emigration, income, and employment are available in annual statistical yearbooks compiled by Goskomstat and Rosstat. We obtained this statistical yearbook data through East View Information Services and the Hoover Institution's "Russian/Soviet/Commonwealth of Independent States Collection" print archives with supplementation from New World Demographics (1992), Treml and Alexeev (1993), Vassin and Costello (1997), Vallin et al. (2005), and Heleniak (2006) as well as from Vladimir Shkolnikov and colleagues at the Max Planck Institute for Demographic Research. Data on employment in private manufacturing are from Brown, Earle, and Gehlbach (2009) and Earle and Gehlbach (2010); data on emigration and immigration is from Andrienko and Guriev (2004). We constructed estimates of total alcohol consumption by extending the work of Nemtsov (2000) for estimating illegal alcohol production. See Appendices 1 and 2 for details. Crude death rate is per 1,000 population. Alcohol sales and consumption is liters per capita. Cause-specific death rates are per 100,000 population.

Table 2

Pre-Campaign Alcohol Consumption and Contemporaneous Drinking During the Anti-Alcohol Campaign

Dependent Variable:	Total Alcohol Consumption			
Pre-Campaign Alcohol Consumption × 1985	−0.280 *** (0.092)	−0.129 (0.091)	−0.542 * (0.294)	−1.154 *** (0.143)
Pre-Campaign Alcohol Consumption × 1986	−0.580 *** (0.124)	−0.323 *** (0.118)	−0.849 *** (0.318)	−1.524 *** (0.122)
Pre-Campaign Alcohol Consumption × 1989	−0.690 *** (0.109)	−0.367 ** (0.171)	−0.926 *** (0.318)	−1.711 *** (0.079)
Pre-Campaign Alcohol Consumption × 1988	−0.683 *** (0.122)	−0.292 (0.208)	−0.918 *** (0.336)	−1.811 *** (0.059)
Pre-Campaign Alcohol Consumption × 1989	−0.619 *** (0.097)	−0.197 (0.285)	−0.878 *** (0.309)	−1.877 *** (0.043)
Additional Controls				
Per capita number of doctors			−0.020 (0.054)	−0.103 *** (0.033)
Per capita number of hospital beds			0.089 (0.132)	0.091 (0.107)
Year Fixed Effects	Yes	Yes	Yes	Yes
Oblast Fixed Effects	Yes	Yes	Yes	Yes
Oblast-Specific Linear Trends	No	Yes	No	Yes
N	752	752	439	439
R^2	0.911	0.958	0.887	0.962

Data on official alcohol sales were obtained from annual statistical yearbooks compiled by Goskomstat and Rosstat through East View Information Services and the Hoover Institution's "Russian/Soviet/Commonwealth of Independent States Collection" print archives with supplementation from New World Demographics (1992), Treml and Alexeev (1993), Vassin and Costello (1997), Vallin et al. (2005) as well as from Vladimir Shkolnikov and colleagues at the Max Planck Institute for Demographic Research. Official alcohol sales augmented with estimates of illegal alcohol production by extending the work of Nemtsov (2000) (see Appendices 1 and 2 for details). Data sources for additional control variables available in Appendix 1. Table cells report OLS estimates obtained from equation (1) for interactions between oblast-level mean pre-campaign alcohol consumption and campaign year dummy variables. All specifications include oblast and year fixed effects. Alcohol consumption measured in liters per capita. Oblast-year samples are restricted to years prior to 1990 (1970, 1978, 1980, 1985, 1986, 1988, and 1989) and exclude Tuva, Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai. Standard errors clustered at the oblast level shown in parentheses.

*
p<0.10,

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p<0.05, and

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p<0.01.

Table 3

Pre-Campaign Alcohol Consumption and Mortality

Alcohol Measure:	Total Alcohol Consumption				Official Alcohol Sales			
Dependent Variable:	**Crude Death Rate**				**Crude Death Rate**			
Campaign Year Interactions								
Pre-Campaign Alcohol Consumption × 1985	−0.199 *** (0.058)	−0.144 *** (0.033)	−0.226 ** (0.086)	−0.064 (0.044)	−0.193 *** (0.056)	−0.138 *** (0.032)	−0.219 ** (0.084)	−0.064 (0.043)
Pre-Campaign Alcohol Consumption × 1986	−0.234 *** (0.057)	−0.196 *** (0.065)	−0.225 *** (0.057)	−0.123 ** (0.061)	−0.227 *** (0.056)	−0.184 *** (0.062)	−0.219 *** (0.055)	−0.121 ** (0.059)
Pre-Campaign Alcohol Consumption × 1988	−0.306 *** (0.052)	−0.241 *** (0.069)	−0.322 *** (0.086)	−0.150 ** (0.063)	−0.293 *** (0.051)	−0.225 *** (0.065)	−0.315 *** (0.084)	−0.149 ** (0.061)
Pre-Campaign Alcohol Consumption × 1989	−0.278 *** (0.054)	−0.211 ** (0.085)	−0.292 *** (0.090)	−0.119 (0.078)	−0.265 *** (0.053)	−0.194 ** (0.080)	−0.282 *** (0.088)	−0.117 (0.075)
Crisis Year Interactions								
Pre-Campaign Alcohol Consumption × 1990	−0.213 *** (0.055)	−0.144 * (0.080)	−0.234 ** (0.093)	−0.060 (0.083)	−0.204 *** (0.053)	−0.133 * (0.076)	−0.226 ** (0.091)	−0.061 (0.080)
Pre-Campaign Alcohol Consumption × 1991	−0.167 ** (0.072)	−0.093 (0.072)	−0.174 ** (0.083)	−0.027 (0.080)	−0.156 ** (0.071)	−0.078 (0.069)	−0.163 ** (0.081)	−0.025 (0.078)
Pre-Campaign Alcohol Consumption × 1992	−0.034 (0.065)	0.047 (0.084)	−0.040 (0.075)	0.116 (0.103)	−0.032 (0.064)	0.052 (0.079)	−0.039 (0.073)	0.109 (0.098)
Pre-Campaign Alcohol Consumption × 1993	0.131 (0.099)	0.221 ** (0.093)	0.123 (0.110)	0.299 *** (0.106)	0.125 (0.095)	0.218 ** (0.087)	0.115 (0.106)	0.281 *** (0.100)
Pre-Campaign Alcohol Consumption × 1994	0.243 * (0.123)	0.340 *** (0.085)	0.237 * (0.136)	0.425 *** (0.093)	0.227 * (0.118)	0.328 *** (0.079)	0.220 * (0.131)	0.397 *** (0.087)
Pre-Campaign Alcohol Consumption × 1995	0.324 *** (0.118)	0.407 *** (0.107)	0.306 ** (0.124)	0.496 *** (0.100)	0.306 *** (0.113)	0.394 *** (0.100)	0.287 ** (0.119)	0.466 *** (0.097)
Pre-Campaign Alcohol Consumption × 1996	0.159 * (0.087)	0.245 ** (0.103)	0.141 (0.093)	0.332 *** (0.117)	0.145 * (0.084)	0.236 ** (0.096)	0.126 (0.091)	0.307 *** (0.112)
Pre-Campaign Alcohol Consumption × 1997	0.028 (0.095)	0.116 (0.105)	0.010 (0.100)	0.203 * (0.116)	0.018 (0.092)	0.113 (0.098)	−0.000 (0.097)	0.181 (0.112)
Pre-Campaign Alcohol Consumption × 1998	0.028 (0.090)	0.119 (0.113)	0.010 (0.097)	0.204 (0.130)	0.019 (0.087)	0.117 (0.105)	0.001 (0.095)	0.183 (0.125)
Pre-Campaign Alcohol Consumption × 1999	0.129 (0.137)	0.222 * (0.121)	0.118 (0.145)	0.310 ** (0.127)	0.112 (0.133)	0.211 * (0.113)	0.096 (0.140)	0.278 ** (0.122)
Pre-Campaign Alcohol Consumption × 2000	0.156 (0.155)	0.252 * (0.131)	0.148 (0.162)	0.344 ** (0.134)	0.138 (0.151)	0.241 * (0.123)	0.125 (0.156)	0.311 ** (0.128)
Additional Controls								
Per capita number of doctors			−0.006 (0.013)	0.006 (0.010)			−0.006 (0.013)	0.005 (0.009)

Alcohol Measure:	Total Alcohol Consumption		Official Alcohol Sales	
Dependent Variable:	Crude Death Rate		Crude Death Rate	
Per capita number of hospital beds	0.014 (0.073)	−0.042 (0.036)	0.012 (0.074)	−0.043 (0.036)
Year Fixed Effects	Yes	Yes	Yes	Yes
Oblast Fixed Effects	Yes	Yes	Yes	Yes
Oblast-Specific Time Trends	No	Yes	No	Yes
N	1,371	1,371	1,293	1,293
R^2	0.947	0.975	0.951	0.977

Data on death rates and official alcohol sales were obtained from annual statistical yearbooks compiled by Goskomstat and Rosstat through East View Information Services and the Hoover Institution's "Russian/Soviet/Commonwealth of Independent States Collection" print archives with supplementation from New World Demographics (1992), Treml and Alexeev (1993), Vassin and Costello (1997), Vallin et al. (2005) as well as from Vladimir Shkolnikov and colleagues at the Max Planck Institute for Demographic Research; estimates of total alcohol consumption by extending the work of Nemtsov (2000) for estimating illegal alcohol production (see Appendices 1 and 2 for details). Data sources for additional control variables available in Appendix 1. Table cells report OLS estimates obtained from equation (1) for interactions between oblast-level mean pre-campaign alcohol consumption and campaign year dummy variables. All specifications include oblast and year fixed effects. Crude death rates are per 1,000 population. All oblast-year samples are restricted to years prior to 2000 (1970, 1978, 1980, 1985, 1986, 1988, and 1989–2000) and exclude Tuva, Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai. Standard errors clustered at the oblast level shown in parentheses.

*
$p<0.10$,

**
$p<0.05$, and

***
$p<0.01$.

Table 4 Panel A

Pooled Estimates with Economic Controls - Transition Years

Alcohol Measure:	Total Alcohol Consumption			
Dependent Variable:	**Crude Death Rate**			
<u>Transition Year Interactions</u>				
Campaign Intensity × 1992	0.134 *** (0.040)	0.146 *** (0.043)	0.201 *** (0.050)	0.233 *** (0.067)
Campaign Intensity × 1993	0.301 *** (0.067)	0.332 *** (0.071)	0.401 *** (0.074)	0.495 *** (0.088)
Campaign Intensity × 1994	0.413 *** (0.083)	0.458 *** (0.082)	0.541 *** (0.094)	0.672 *** (0.099)
Campaign Intensity × 1995	0.450 *** (0.078)	0.549 *** (0.084)	0.572 *** (0.097)	0.748 *** (0.203)
Campaign Intensity × 1996	0.285 *** (0.046)	0.383 *** (0.046)	0.410 *** (0.057)	0.619 *** (0.172)
Campaign Intensity × 1997	0.154 *** (0.039)	0.251 *** (0.030)	0.269 *** (0.060)	0.530 *** (0.194)
Campaign Intensity × 1998	0.154 *** (0.041)	0.250 *** (0.041)	0.272 *** (0.060)	0.583 *** (0.206)
Campaign Intensity × 1999	0.258 *** (0.074)	0.350 *** (0.043)	0.334 *** (0.082)	0.699 *** (0.196)
Campaign Intensity × 2000	0.284 *** (0.087)	0.377 *** (0.052)		
<u>Additional Controls</u>				
Per Capita Number of Doctors			−0.001 (0.018)	−0.005 (0.016)
Per Capita Number of Hospital Beds			0.004 (0.072)	−0.049 (0.094)
Per Capita Immigration Rate			0.001 (0.019)	0.033 (0.022)
Per Capita Emigration Rate			0.001 (0.012)	0.001 (0.019)
Privatized Manufacturing Employment			−0.042 (0.284)	−0.167 (0.266)
Employment per 1,000 population (%)			0.012 (0.014)	0.026 ** (0.013)
Real monthly income 1991 rubles			−0.001 (0.000)	0.000 (0.001)
Year Fixed Effects	Yes	Yes	Yes	Yes
Oblast Fixed Effects	Yes	Yes	Yes	Yes
Oblast-Specific Time Trends	No	Yes	No	Yes
N	785	785	649	649
R^2	0.965	0.978	0.967	0.978

Data on death rates and official alcohol sales were obtained from annual statistical yearbooks compiled by Goskomstat and Rosstat through East View Information Services and the Hoover Institution's "Russian/Soviet/Commonwealth of Independent States Collection" print archives with supplementation from New World Demographics (1992), Treml and Alexeev (1993), Vassin and Costello (1997), Vallin et al. (2005) as well as from Vladimir Shkolnikov and colleagues at the Max Planck Institute for Demographic Research. Official alcohol sales augmented with estimates of illegal alcohol production by extending the work of Nemtsov (2000) (see Appendices 1 and 2 for details). Data on private manufacturing employment available from Brown, Earle and Gehlback (2009) and Earle and Gehlback (2010). Data sources for additional control variables available in Appendix 1. Table cells report OLS estimates obtained from equation (1) for interactions between oblast-level mean pre-campaign alcohol consumption and campaign year dummy variables. All specifications include oblast and year fixed effects. Crude death rates are per 1,000 population. All oblast-year samples are restricted to years prior to 2000 (1991–2000 for specifications including real monthly income and 1990–2000 for all other specifications) and exclude Tuva, Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai. Standard errors clustered at the oblast level shown in parentheses.

*
p<0.10,

**
p<0.05, and

***
p<0.01.

Table 4 Panel B

Pooled Estimates with Economic Controls - Transition Years

Alcohol Measure:	Total Alcohol Consumption				Crude Death Rate			
Dependent Variable:								
Transition Year Interactions								
Campaign Intensity × 1991	0.072 (0.070)	0.009 (0.026)	0.079 (0.083)	0.005 (0.025)	0.058 (0.063)	0.010 (0.024)	−0.005 (0.023)	0.025 (0.023)
Campaign Intensity × 1992	0.206 *** (0.077)	0.149 *** (0.036)	0.214 ** (0.090)	0.143 *** (0.039)	0.201 *** (0.073)	0.176 *** (0.045)	0.171 *** (0.045)	0.196 *** (0.049)
Campaign Intensity × 1993	0.373 *** (0.095)	0.324 *** (0.064)	0.384 *** (0.109)	0.323 *** (0.066)	0.372 *** (0.093)	0.373 *** (0.075)	0.345 *** (0.064)	0.400 *** (0.070)
Campaign Intensity × 1994	0.485 *** (0.109)	0.444 *** (0.075)	0.498 *** (0.124)	0.446 *** (0.079)	0.498 *** (0.118)	0.494 *** (0.095)	0.462 *** (0.090)	0.518 *** (0.087)
Campaign Intensity × 1995	0.535 *** (0.093)	0.519 *** (0.081)	0.547 *** (0.101)	0.521 *** (0.080)	0.553 *** (0.096)	0.575 *** (0.079)	0.523 *** (0.073)	0.584 *** (0.070)
Campaign Intensity × 1996	0.370 *** (0.066)	0.349 *** (0.038)	0.382 *** (0.080)	0.351 *** (0.039)	0.377 *** (0.069)	0.415 *** (0.038)	0.343 *** (0.037)	0.428 *** (0.047)
Campaign Intensity × 1997	0.239 *** (0.073)	0.213 *** (0.026)	0.250 *** (0.087)	0.213 *** (0.025)	0.241 *** (0.076)	0.291 *** (0.029)	0.201 *** (0.042)	0.310 *** (0.037)
Campaign Intensity × 1998	0.239 *** (0.067)	0.208 *** (0.042)	0.250 *** (0.082)	0.206 *** (0.041)	0.237 *** (0.069)	0.294 *** (0.041)	0.207 *** (0.044)	0.334 *** (0.045)
Campaign Intensity × 1999	0.341 *** (0.125)	0.304 *** (0.029)	0.356 ** (0.146)	0.300 *** (0.032)	0.346 ** (0.134)	0.405 *** (0.058)	0.274 *** (0.080)	0.417 *** (0.066)
Campaign Intensity × 2000	0.368 ** (0.143)	0.326 *** (0.041)	0.387 ** (0.166)	0.326 *** (0.042)				
Additional Controls								
Per Capita Number of Doctors			0.003 (0.013)	0.004 (0.012)	−0.016 (0.017)	−0.018 (0.017)	0.002 (0.017)	−0.007 (0.018)
Per Capita Number of Hospital Beds			−0.015 (0.072)	−0.062 (0.063)	0.039 (0.064)	−0.048 (0.066)	0.021 (0.065)	−0.048 (0.079)
Per Capita Immigration Rate					−0.005 (0.018)	0.024 (0.016)	0.002 (0.020)	0.031 (0.020)
Per Capita Emigration Rate					−0.012 (0.012)	0.004 (0.008)	−0.007 (0.013)	−0.000 (0.015)
Privatized Manufacturing Employment							0.062 (0.303)	−0.096 (0.269)
Employment per 1,000 population (%)							0.022 *** (0.006)	0.026 *** (0.007)
Real monthly income 1991 rubles								
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Oblast Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Oblast-Specific Time Trends	No	Yes	No	Yes	No	Yes	No	Yes
N	865	865	855	855	751	751	736	736
R^2	0.965	0.979	0.964	0.979	0.968	0.979	0.969	0.979

Data on death rates and official alcohol sales were obtained from annual statistical yearbooks compiled by Goskomstat and Rosstat through East View Information Services and the Hoover Institution's "Russian/Soviet/Commonwealth of Independent States Collection" print archives with supplementation from New World Demographics (1992), Treml and Alexeev (1993), Vassin and Costello (1997),

Vallin et al. (2005) as well as from Vladimir Shkolnikov and colleagues at the Max Planck Institute for Demographic Research. Official alcohol sales augmented with estimates of illegal alcohol production by extending the work of Nemtsov (2000) (see Appendices 1 and 2 for details). Data on private manufacturing employment available from Brown, Earle and Gehlback (2009) and Earle and Gehlback (2010). Data sources for additional control variables available in Appendix 1. Table cells report OLS estimates obtained from equation (1) for interactions between oblast-level mean pre-campaign alcohol consumption and campaign year dummy variables. All specifications include oblast and year fixed effects. Crude death rates are per 1,000 population. All oblast-year samples are restricted to years prior to 2000 (1991–2000 for specifications including real monthly income and 1990–2000 for all other specifications) and exclude Tuva, Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai. Standard errors clustered at the oblast level shown in parentheses.

*
p<0.10,

**
p<0.05, and

***
p<0.01.