Preliminary and Incomplete: Not for Distribution or Citation without Authors' Permission

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

Christina Gathmann and Grant Miller*

March 2010

Political and economic transition is often blamed for Russia's 40% surge in deaths between 1990 and 1994 (termed the "Russian Mortality Crisis"). Highlighting that increases in mortality occurred primarily among alcohol-related causes and among working-age men (the heaviest drinkers), this paper propose a different explanation: the demise of the 1985-1988 Gorbachev Anti-Alcohol Campaign. We use archival sources to build a new oblast-year dataset spanning 1970-2005 and find that: (1) The campaign was associated with substantially fewer deaths, (2) Oblasts with larger campaign-era reductions in alcohol consumption and mortality experienced larger transition year increases, and (3) Other former Soviet states and Eastern European countries exhibit similar mortality patterns commensurate with their campaign exposure. The campaign's end explains roughly one-third of the mortality crisis, suggesting that Russia's transition to capitalism and democracy was not as lethal as previously suggested.

*Gathmann: University of Mannheim, CESifo, and IZA (cgathmann@uni-mannheim.de); Miller: Stanford Medical School and National Bureau of Economic Research (NBER) (ngmiller@stanford.edu). We are grateful to Jay Bhattacharya, Eva Deuchert, Jeremy Goldhaber-Fiebert, Ron Lee, Juan Saavedra, Piedad Urdinola, and Juan Vargas for helpful suggestions; to Vladimir Shkolnikov, Betsy Brainerd, Scott Gehlbach and Daniel Treisman for providing supplemental data; to Irina Erman, Emily Singer, and Nicole Smith for superb research assistance; and to the National Institute of Child Health and Human Development (K01 HD053504) and the Stanford Center on the Demography and Economics of Health and Aging (P30 AG 17253) for financial support. All publicly available data digitized for this project is available upon request. We alone are responsible for the views in this paper as well as all errors.

1. Introduction

Crude death rates in the Russia Federation soared by 40% between 1990 and 1994, climbing from 11 to nearly 15.5 per thousand.[1] By 2009 standards, the associated 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 precise cause of the mortality crisis has been hotly debated, but most hypotheses suggest the distal cause to be 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), physiological and psychological stress (Shapiro 1995, Kennedy, Kawachi, and Brainerd 1998, Leon and Shkolnikov 1998), rising inequality (Lynch, Smith, Kaplan, and House 2000), and breakdown of the medical care system (Ellman 1994).[3] The proximate cause of the crisis is less controversial: alcohol consumption soared in Russia between 1990 and 1993 (Leon et al. 1997, Shkolnikov et

[1] Throughout this paper we use the term "Russia" to refer to the Russian state of the Soviet Union (up to December 1991) and the Russian Federation (after December 1991).
[2] In response to Stuckler, King, and McKee's (2009) recent 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 Earle and Gehlbach's (2010) re-analysis.
[3] Brainerd and Cutler (2005) provide a thorough review of this literature. Many of these papers are not specific about the behavioral mechanisms that they implicate, particularly in light of mixed findings on the cyclicality of mortality (Ruhm 2000, Dehejia and Lleras-Muney 2004, van den Berg, Lindeboom, and Portrait 2006, Baird, Friedman, and Schady 2007, Fishback, Haines, and Kantor 2007, Schady and Smitz 2009, Miller and Urdinola 2010, and Bhalotra forthcoming).

al., 1998, Treml 1997, 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) (Brainerd and Cutler 2005; Garvrivola et al. 2000, Leon et al. 1997). 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 propose and test a different explanation for the Russian mortality crisis. Rather than transition to capitalism and democracy *per se*, we study the coincident demise of the (reputedly successful) 1985-1988 Gorbachev Anti-Alcohol Campaign. The campaign was unprecedented in scale and scope, simultaneously raising the price of drinking and subsidizing substitutes for alcohol consumption. Figure 1 depicts the basic logic of our hypothesis. Crude 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 reverted back to Russia's long-run trend. The crisis could therefore be the combined result of 'catch-up' mortality merely postponed by the campaign together with reversion to the long-run trend.

We begin by establishing the relationship between the Gorbachev Anti-Alcohol Campaign and Russian mortality during the latter 1980s.[6] To do so, we have digitized and harmonized numerous Russian data sources to create a new panel data set of Russian oblasts spanning years 1970-2005. 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

[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] This relationship has previously only been studied qualitatively or with aggregate national-level data – see White 1996, Treml 1997, and Nemtsov 2000.

samogon), albeit by an amount far insufficient to offset the reduction in state supply. The accompanying decline in crude death rates during campaign years was about 8%, implying 446,000 fewer deaths in total. Alcohol poisonings varied in the same way, with percentage point declines among men more than twice as large as declines among women. Although campaign intensity was targeted to areas with above average growth in alcohol consumption and mortality during the early 1980s, controlling directly for pre-campaign trends increases the magnitude of our estimates. We also employ a new instrumental variables strategy, instrumenting for campaign intensity using the interaction between local oblast population share Muslim prior to the campaign and campaign year dummies (because alcohol policy matters considerably less for Muslims). Our results are generally consistent across a wide variety of estimation strategies.

To study the link between the Gorbachev Anti-Alcohol Campaign and Russia's mortality crisis, we then relate variation in campaign intensity to the magnitude of the mortality crisis. Russian oblasts with more intense campaigns (and larger campaign-year mortality declines) systematically experienced larger mortality crises during the early 1990s. This relationship is present only during crisis years, disappearing as Russia reverted to its long run mortality trend. 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 early 1990s. <ADD TEXT HERE ON IV APPROACH> Overall, our estimates explain roughly one-third of the Russian mortality crisis – and as much as 40% during peak years.

We conclude by documenting broad patterns of mortality commensurate with campaign exposure in other former Soviet States and Eastern European countries. Former Soviet states in the West and in the Baltics exhibit similar mortality declines during the latter 1980s followed by similar surges during the early 1990s. This pattern is also present – but attenuated – in former

Soviet states with large Muslim populations (in the Caucuses and Central Asia). Mortality patterns in Eastern European countries undergoing political and economic change 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 was not as lethal as previously thought.

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

2.1 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% – and 10% of the Soviet population over age 15 estimated to be alcoholics) (Segal 1990, McKee 1999, Tarschys 1993, Treml 1982, White 1996). Just prior to the anti-alcohol campaign that we study, annual pure alcohol consumption in the Soviet Union was 14.2 liters per capita (compared to 13.5 liters in France and 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).[7] Given low levels of drinking in Soviet states with

[7] In addition to the quantity consumed, the type of alcohol consumption in Russia (compared to other heavy-drinking countries like France) also 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 generally (McKee and Britton 1998; McKee et al. 2001, O'Keefe et al. 2007, Rehm et al. 2009, Tolstrup et al. 2006). 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).

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

2.2 The Gorbachev Anti-Alcohol Campaign

By the early 1980s, alcohol abuse had become a major cause of death, absenteeism, and reduced labor productivity in the Soviet Union.[8] Some studies suggest that labor productivity fell by as much as 30% after weekends or paydays, for example (Richardson 1999; Segal 1990). Although difficult to estimate, observers also estimate that alcohol's cost to the Soviet economy during the 1980s totaled about 10% of national income (Segal 1990; Tarschys 1993, Treml 1987, 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's rise to Secretary General). These decrees and subsequent directives of the Central Committee and the Presidium of the Supreme Soviet ushered enacted the country's most stringent anti-alcohol policies since its 1919-1925 prohibition. Given strict state control of social and economic affairs, rapid implementation and rigid adherence to campaign tenants were possible.

Supply- and Demand-Side Interventions

The Gorbachev Anti-Alcohol Campaign consisted of seven broad measures designed to raise the price of drinking and to subsidize substitute activities. Four were clearly supply-oriented interventions. First, state production of alcohol was drastically reduced. Between June

[8] Alcohol played a central role in traffic accidents and violent crimes 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).

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 stiff 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 as well as bans on positive 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 alcoholism. Health care system responsibility for compulsory treatment of alcoholism was expanded, and physician supervision of treatment for alcoholism was required for up to five years.

Anecdotal Impact, Heterogeneity, and Behavioral Responses

State alcohol sales fell by about 50% between 1984 and 1988 (White, 1996), and there was considerable geographic heterogeneity in these reductions. Across republics, for example, Latvia's decline in alcohol consumption was roughly seven times greater than in wine-oriented Armenia (Treml 1982). Within Russia, vodka sales in Kirov, Kamchatka, Karelia, and Sakhalin (in the east) fell four times more than in Southern areas. Some of these regional differences were due to heterogeneity in application of campaign laws and regulations. Heavy-drinking Baltic and Slavic regions were targeted to receive 'special attention' during the campaign, for example (Reid 1986).[9]

Differences in behavioral responses to the campaign presumably played an important role as well. An increase in "moonshining" was one clear household adaptation. Russians have a long-standing tradition of producing *samogon* at home (literally, "distillate made by oneself" – a generic term for illegal alcoholic beverages made from sugar as well as corn, beets, and/or potatoes among other ingredients[10]) – and did so more vigorously during the campaign. Exact *samogon* production figures do not exist, but estimates suggest that net alcohol consumption (taking increases in *samogon* production into account) had fallen by about 25-30% at the peak of the campaign.[11]

A third source of variation in campaign-era reductions in alcohol consumption is differences in the ethnic – and religious – composition of local populations. Predominantly Slavic areas in the north and northeastern parts of the Soviet Union drank much more than areas with substantial Muslim populations in the south and southwest. Given anecdotal reports of

[9] In Ulyanovsk oblast, for example, annual alcohol consumption was among the highest in the Russia, exceeding 25 liters per person. The reportedly extra-ordinary leadership of local party secretary G. V. Kolbin reduced annual consumption to 4 liters per person – below the national average (Takala 2002).

[10] A supposedly fictitious type of *samogon* called *tabouretovka* is made from wooden stools (or "tabourets") (Petrov, Dovich and Il'f 1997).

[11] 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).

campaign targeting (and econometric evidence of our own – see Section 5.2), our empirical strategy capitalizes on this source of variation. Specifically, we exploit Islamic restrictions on alcohol consumption to develop an instrumental variables strategy using oblast population share Muslim shortly before the campaign (in interaction with time) as an instrument for campaign intensity.

2.3 The Demise of the Anti-Alcohol Campaign and Subsequent Transition

The Soviet Central Committee officially ended the anti-alcohol campaign in October 1988 (although the campaign lingered because increasing production required time). There were two immediate reasons: the campaign's unpopularity and loss of public revenue.[12] On the former, because the campaign targeted alcohol consumption more than alcoholism, even moderate drinkers were subject to repression and punishment (Reitan 2001, Partanen 1993). Police raided weddings to enforce campaign laws, and simply buying a bottle of wine under unauthorized circumstances could land the buyer in a treatment clinic (White 1996).

On the latter, 12-14% of state revenue prior to the campaign depended on excise taxes levied on state alcohol sales and profits (exceeding income tax revenue and social security contributions) (Treml 1997). The Soviet government therefore lost an estimated 10 billion rubles per year (about 10% of total indirect taxes) during the campaign (White 1996). Given the Soviet Union's economic woes during the latter 1980s, relinquishing a substantial amount of short-term public revenue became untenable (even if it produced longer-term gains).

Following the dissolution of the Soviet Union in December 1991, a January 1992 presidential decree allowed most prices to be set by the market. Vodka was deemed an

[12] 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.

"essential good" (together with milk, bread, and baby food), however, so its price continued to be regulated. Price regulation coupled with hyperinflation caused relative price of alcohol to plummet; between December 1991 and December 1995, the alcohol price index rose by 895% while the food price index rose 1,739% (Treisman 2008).[13]

3. Data

To study the effectiveness of the Gorbachev Anti-Alcohol Campaign and its subsequent relationship with the Russian mortality crisis, we have used archival sources to create a new panel data set of 77 Russian oblasts spanning years 1970-2000.[14] Table 1 presents descriptive statistics from this dataset (means for all years as well as for pre-campaign, campaign, and mortality crisis periods separately). In this section we summarize our key sources and variables; Appendix 1 provides greater detail about each source and the years for which each variable is covered (the intersection of all key variables is generally 1970, 1979, 1980, 1984, 1985-1987, and 1989-2005).

3.1 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). While mortality data was not publicly released between 1974 and 1986, the publication of demographic yearbooks containing mortality statistics

[13] With the end of exclusive state production of alcohol in 1992, alcohol quality in Russia also deteriorated. 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. The quality of imported alcohol was even worse: 67.2% were rejected as failing to meet regulatory standards in 1994 (Nemtsov 2002).

[14] All data compiled for this project is 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 Chechnya and Ingushetia (typically reported together as Chechnya-Ingush prior to 1991) because of war-related inconsistencies in the data.

resumed under Gorbachev in 1986. 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. These volumes are available in Russian and in hard-copy format.[15] To fill gaps in the coverage of East View and Hoover Institution records, we use archival records published by scholars outside the Soviet Union (New World of Demographics 1992, Treml and Alexeev 1993, Vallin et al. 2005, and Vassin and Costello 1997, for example).

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. Our sources' statistics are compiled from Russian death certificates which report the main cause of death (see the paragraph below) and are certified by a physician (or in less than 10% of the cases, a paramedic). Deaths in the Soviet Union and the Russian Federation are first registered with district statistical bureaus (Zapis Aktov Grazhdanskogo Sostoyaniya, or ZAGS) and then are reported to oblast authorities. Oblast statistical agencies then produce summary tables for the Central Office of Statistics of the National Economy, later renamed *Goskomstat* (and eventually *Rosstat*). Evaluations of Russia's mortality statistics generally conclude that they are of satisfactory quality with acceptable under-reporting rates (Andreev 1999, Bennett et al. 1998, Leon et al. 1997, and Norton et al. 1999). 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).[16] To create death rates from numbers of deaths, population counts from the 1970, 1979,

[15] We are grateful to Irina Erman and Emily Singer for outstanding help with these Russian materials.
[16] 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 our main OLS and IV campaign effectiveness analyses excluding these oblasts – Appendix Tables A1 and A2 show that the resuls are similar to those reported in Tables 2 and 5.

1989 Soviet censuses and the 2002 Russian Federation census are used to calculate arithmetic means for each year, yielding population denominators (Shkolnikov and Jdanov 2006).

Causes of death in the Soviet Union were classified using a Soviet system with 175 categories; these categories were later harmonized with World Health Organization's International Classification of Diseases (ICD-9) codes.[17] *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 (or which respond to alcohol only after many years: cancer deaths) (Vallin, Andreev, Mesle, and Shkolnikov 2005). We obtained data on alcohol poisoning deaths for additional years from Vladimir Shkolnikov and others at the Max Planck Institute for Demographic Research (Shkolnikov et al. 2005).

Alcohol Sales and Prices. As the sole producer and distributor of alcohol in the Soviet Union (other than *samogon* – see Section 3.2), the government maintained records of alcohol sales (in liters) for principal alcoholic beverages (vodka, beer, wine, cognac, and champagne).[18] 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

[17] 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. 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.

[18] 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).

before 1995: 2.85%; beer between 1995 and 1999: 3.37%; and beer after 2000: 3.85%.[19] For each oblast-year, we divide liters of pure alcohol by the corresponding population estimate, yielding rates of pure alcohol consumption per person. Using survey data, White (1996) provides suggestive evidence that sales data during campaign years were not fabricated by politically-motivated officials.

Oblast-year alcohol price data is available only for years 1992 and later and only for vodka (Treisman 2008). However, we can also calculate average alcohol prices before and during the campaign using information on production and sales (which are reported both in dekaliters and in monetary value (for a subset of years)), yielding average prices of pure alcohol for 1970, 1980, 1985, and 1989.[20]

Muslim Population Share. To implement the instrumental variables approach described in Section 4, we use the share of each oblast's population that was Muslim according to the 1979 Soviet population census provided by Heleniak (2006).

Control Variables. To control for measures linked to other explanations proposed for the Russian mortality crisis, we assembled data on economic conditions (income per capita and the employment rate), health care (the number of hospitals and the number of doctors per capita), and migration (both domestic and international immigration and emigration).

3.2 *Samogon* Production Estimates

Official alcohol sales data underestimate total alcohol consumption because many Russians make *samogon* at home as well. Several methodologies have been developed to

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

[20] This price data is available in nominal terms, so we use the Russian Consumer Price Index to create real prices for years 1991 and forward (the only years for which the CPI is available); prior to 1991, prices were administratively set and changed very little (Treml and Alexeev 1993).

estimate *samogon* production. Because sugar is a critical ingredient, one is based on sugar sales records in excess of the Soviet Union's average consumption (24.3 kg per capita per year). However, this method fails for years 1986 and later when sugar became a rationed good (Treml 1997).

Nemtsov (1998; 2000) developed an alternative measure using forensic records from violent and accidental deaths. Because forensic records were not made public in the Soviet Union, post-mortem measures of blood alcohol content were subject to relatively little political scrutiny (and possible manipulation). Nemtsov (1998; 2000) shows that dividing the difference between the number of autopsies reporting alcohol content in the blood and the number of deaths due to acute alcohol poisoning by the number autopsies with no blood alcohol present yields a rate that closely tracks total alcohol consumption (calculated as the sum of official alcohol sales and sugar-based *samogon* estimates) for years 1983-1986. Assuming that the same parametric relationship between total alcohol consumption and this autopsy-based ratio holds for later years as well, this methodology yields oblast-year estimates of total alcohol consumption (including *samogon*) for years 1980-1994 that closely match national estimates produced by others when aggregated (Treml 1997, for example). Appendix 2 describes our estimation of total alcohol consumption – and *samogon* production – in greater detail.

3.3 Measuring Anti-Alcohol Campaign Intensity

As Section 2.2 describes, the anti-alcohol campaign was a multifaceted intervention, making the measurement of campaign intensity difficult. Moreover, to the best of our knowledge, comprehensive records of individual campaign activities are unavailable. We therefore take a simple approach, judging campaign intensity according to the percent change in

each oblast's campaign-year alcohol consumption relative to consumption in that oblast between 1980 and 1984. In doing so, we recognize that this measure may reflect demand as well; we consider the implications of this and of campaign targeting generally in Section 5.3. We build two specific campaign intensity measures: one using official sales of pure alcohol and the other using total consumption (including *samogon* production as described above in Section 3.2).[21] We term these measures "official consumption" and "full consumption," respectively. Figure 2 shows the distribution of these two campaign intensity variables across all campaign oblast-years. At its height, our measure of official consumption during the campaign was as much as 60% below pre-campaign consumption, while our measure of full consumption was 25-30% below pre-campaign levels.

4. Empirical Strategy

4.1 The Gorbachev Anti-Alcohol Campaign and Russian Mortality during the 1980s

We first focus on understanding the relationship between the Gorbachev Anti-Alcohol Campaign and Russian mortality during the latter 1980s. To do so, we begin by estimating the basic relationship between intensity of the anti-alcohol campaign and different measures of mortality in oblasts o and years y:

$$(1) \qquad mortality_{oy} = \alpha + \beta(intensity_{oy}) + \delta_o + \delta_y + \varepsilon_{oy},$$

where *mortality* is one of our death rate measures (crude death rates per 1,000 or gender-specific alcohol poisoning death rates per 100,000), *intensity* is either official or full alcohol consumption, and δ_o and δ_y represent oblast and year fixed effects (respectively). We also estimate variants of this equation that include oblast-specific linear time trends. To focus on comparisons between campaign years and those that preceded them, we use sample years prior to

[21] We assume alcohol sold and *samogon* produced in a given year to be consumed in that same year.

1990. To study the *samogon* production response to the anti-alcohol campaign, we also use our *samogon* production estimates (the difference between full and official alcohol consumption) as the dependent variable, assessing its relationship to the official consumption measure of intensity (which excludes *samogon* by construction).

Given historical accounts suggesting that campaign intensity was targeted to areas with disproportionately increasing pre-campaign alcohol consumption (we examine this possibility directly in Section 5.3), we also develop a new instrumental variables approach. Specifically, given Islam's restrictions on the use of intoxicants, we exploit the considerable variation in Muslim composition of Russia's oblasts to instrument for oblast-year campaign intensity using interactions between the Muslim population share in 1979 and campaign year dummies. The basic logic of our approach is that areas with greater Muslim concentration should experience smaller mortality reductions during the campaign – and if our proposition about the mortality crisis is correct, areas with relatively more Muslims should also experience smaller mortality increases during transition years.[22] Figure 3 shows the distribution of Muslims across the Russian oblasts in 1979; the heaviest concentrations are in the Caucasus and Central Asia (Heleniak 2006).

Instrumenting for *intensity* in equation (1) with the the interaction between 1979 population share Muslim and campaign year dummies, our first-stage relationship becomes:

$$(2) \qquad intensity_{oy} = \alpha + \Sigma_t \gamma_t [(1979\ pop\ share\ Muslim)_o \times (campaign\ year)_{yt}] + \sigma_o + \sigma_y + \xi_{oy},$$

and the second-stage relationship is then:

$$(3) \qquad mortality_{oy} = \alpha + \beta(intensity_{oy}) + \delta_o + \delta_y + \varepsilon_{oy},$$

[22] Because we use population share Muslim in 1979, we minimize the influence of any campaign-era or subsequent migration along religious lines. Adherence to Islam also has other implicates other health behaviors related to mortality (such as dietary restrictions), but these are unlikely to vary in the same temporal pattern as the anti-alcohol campaign.

where all variables are defined as in equation (1). Section 5.3 demonstrates that the first-stage relationship between $intensity_{oy}$ and $\Sigma_t \gamma_t[(1979\ pop\ share\ Muslim)_o \times (campaign\ year)_{yt}]$ is sufficiently strong (Staiger and Stock 1997).

4.2 The Relationship between the Anti-Alcohol Campaign and the "Russian Mortality Crisis"

After establishing the relationship between the anti-alcohol campaign and Russian mortality during the 1980s, we then examine how the end of the campaign was related to the mortality crisis. Specifically, we relate mean campaign intensity to the time-varying pattern of mortality during the 1990s by using our sample from years 1990 and later to estimate equations of the following general form:

(4) $$outcome_{oy} = \alpha + \Sigma_t \beta_t[(mean\ intensity)_o \times (transition\ year)_{yt}] + \delta_o + \delta_y + \varepsilon_{oy},$$

where (*mean intensity*) is defined as the average of the variable *intensity* in equation (1) across campaign years, (*transition year*) is a vector of dummy variable for each year in the sample, and all other variables are defined as before. The pattern of βs over time allows us to analyze flexibly how the mortality crisis evolved over time in a way systematically related to preceding mortality declines during the anti-alcohol campaign. We also use year-specific estimates of β together with different definitions of excess deaths during the mortality crisis to calculate the share of crisis explained by the end of the campaign.

<ADD TEXT HERE ON IV APPROACH>

4.3 Graphical Evidence

Before formally estimating the relationship between anti-alcohol campaign intensity and mortality (with a hypothesized negative relationship during the campaign and a positive

relationship during crisis years), Figure 4 first presents graphical evidence on death rates over time by amount of pre-campaign drinking. To construct this figure, we use our full alcohol consumption variable to calculate oblast means for years 1980-1984. Splitting the distribution of pre-campaign alcohol consumption into quartiles, we then graph crude death rates by quartile between 1970 and 2005. Consistent with effectiveness of anti-alcohol campaign, the largest crude death rate reductions during campaign years occurred among oblasts in the top quartile of pre-campaign drinking. Then, during Russia's subsequent political and economic transition shortly after the campaign, this relationship reverses. Between 1990 and 1994, the largest crude death rate increases occurred among oblasts with highest pre-campaign alcohol consumption – and the smallest increases occurred among oblasts with lowest pre-campaign consumption. The differential change between highest and lowest quartiles between 1990 and 1994 is about 1.5 deaths per 1,000 – or about one-third of the aggregate national increase during crisis years.

5. Results: The Anti-Alcohol Campaign and Mortality during the 1980s

5.1 Campaign Intensity and Mortality during the 1980s

Table 2 first presents campaign intensity estimates obtained from equation (1). Because our intensity variables are percent changes constructed as fractions, the estimates shown can be interpreted as changes in crude death rates per 1,000 associated with a 100% increase in alcohol consumption. The first column shows that a 100% rise in full alcohol consumption is associated with 6.465 per 1,000 increase in the crude mortality rate. Using mean intensity across campaign years, the implied decrease in death rates linked to the campaign is 0.84 deaths per 1,000 – a decline of about 8%. In the 1984 Russian population, this implies approximately 111,500 deaths

averted per year, totaling 446,000 throughout the campaign.[23] The second column re-estimates equation (1) including oblast-specific linear time trends. The resulting campaign intensity estimate is smaller but is statistically indistinguishable from the estimate in the first column. The third and fourth columns report comparable results using official alcohol consumption to measure campaign intensity. They are smaller than those obtained using full consumption (but not statistically different from their counterparts), an unsurprising finding given that they do not include *samogon* (they overstate the true change in alcohol consumption associated with a given change in mortality). Appendix Table A3 shows that these estimates are robust to the inclusion of oblast-year controls for fertility rates, doctors per capita, and hospitals per capita.

Table 3 then studies changes in alcohol poisoning deaths during the campaign. The first three columns re-estimate equation (1) using total and gender-specific alcohol poisoning death rates per 100,000 as dependent variables. The resulting campaign intensity estimates imply that oblasts with more intense campaigns experienced larger reductions in alcohol poisoning deaths during campaign years. These declines are large for both men (34%) and women (58%) but are more than twice as large for men in percentage point terms (Russian men drink much more that Russian women).[24]

The fourth column of Table 3 then examines the *samogon* production response to the campaign. Specifically, it uses *samogon* production (measured as the difference between full and official alcohol consumption) as the dependent variable and official alcohol consumption

[23] Mean campaign intensity (using full alcohol consumption) across campaign years is -0.13; 6.465×-0.13≈-0.84 per 1,000 population. Prior to the anti-alcohol campaign, the Russian crude death rate was approximately 10.5 per 1,000; 0.84/10.5≈ 0.08. The 1984 Russian population is estimated to have been 132,631,000; 0.84×132,631 ≈,111,500 averted deaths per year.

[24] A reduction of 123.2 male alcohol poisoning deaths per 100,000 multiplied by a mean campaign intensity (using full alcohol consumption) across campaign years of -0.13 is 123.2×-0.13≈16 deaths fewer per 100,000. For women, a reduction of 55.6 alcohol poisoning deaths implies 55.6×-0.13≈7 deaths fewer per 100,000. The preceding pre-campaign year for which data on alcohol poisonings is available is 1978, when male poisoning deaths were 46.5 per 100,000 and female poisoning deaths were 12.4 per 100,000. For men, 16/46.5≈0.34; for women, 7/12.4≈0.58.

(which excludes *samogon* by construction) to re-estimate equation (1). Household production of *samogon* increased more during campaign years in oblasts with more intense campaigns. For mean oblast-year campaign intensity, the implied household production increase is about 11%.[25]

5.2 Targeting of Campaign Intensity

Given suggestive historical accounts (Reid 1986; Takala 2002), we next consider whether or not there is econometric evidence that oblast-year campaign intensity was targeted to areas perceived to "need" it relatively more. To do so, we calculate the 1980-1984 changes in full alcohol consumption and 1980-1985 changes in crude death rates and regress 1985 campaign intensity (constructed using full alcohol consumption) on each. Because we are unable to include oblast fixed effects, we also control for official alcohol consumption and crude death rates (respectively) in 1980. The first two columns of Table 4 show these results, suggesting that campaign intensity was in fact targeted to areas with relative increases in pre-campaign alcohol consumption and death rates even after controlling for different levels of alcohol consumption and mortality prior to the campaign.

To consider further the implications of campaign targeting for our analyses, we then re-estimate equation (1) controlling for death rate differences proportionate to future campaign intensity during years prior to the campaign. We do so by interacting mean campaign intensity with indicator variables for pre-campaign years. The last two columns of Table 4 show these results (with and without linear oblast time trends). The interaction terms are generally negative but declining in absolute value, suggesting that more intense campaigns occurred in areas with higher but declining crude death rates during the 1970s. However, controlling for these pre-

[25] Mean oblast-year campaign intensity (using official alcohol consumption, which does not include *samogon* production) shows a decline of pure alcohol consumed per person of 35%. Hence, $-0.35 \times 1.25 \approx 0.44$. Estimated *samogon* production in 1984 is 4.18 liters of pure alcohol per person; hence, $0.44/4.18 \approx 0.11$.

campaign differences yields campaign intensity estimates that suggest the same basic relationship with death rates during the latter 1980s as those shown in Table 2.

5.3 Instrumental Variables Estimates for Campaign Intensity and Mortality during the 1980s

Given evidence of campaign targeting, we develop and use a new instrumental variables strategy as well. Specifically, we instrument for campaign intensity using interactions between oblast population share Muslim in 1979 and campaign year indicators as shown in equation (2). The rationale is that given Islam's prohibition of alcohol consumption (and considerable variation in the population share Muslim across Russia's oblasts – ranging from negligible amounts up to 85%), areas with greater Muslim concentrations should experience smaller mortality declines during campaign years. Figures 5a and 5b depict alcohol consumption and crude death rates (respectively) over time for the top and bottom deciles of the distribution of Muslim concentration in 1979. In areas with relatively more Muslims, both alcohol consumption and mortality rates fell more during the campaign – and then rose more during Russia's political and economic transition in the early 1990s.

Table 5 shows estimates for campaign intensity obtained from equation (3) (and corresponding first-stage F statistics for the instruments). Both columns (with and without oblast-specific time trends) suggest patterns of mortality change similar to the OLS estimates in Tables 2 and 4, (although the estimates conditional on linear oblast time trends are now relatively larger rather than smaller). For mean campaign intensity across oblast-years, the estimate in the second column implies that the anti-alcohol campaign was associated with a crude death rate reduction of 0.7 per 1,000, a decline of roughly 7%. The implied number of annual deaths

averted during the campaign is about 92,850 (or approximately 370,000 throughout the campaign).[26]

Overall, a variety of OLS and IV estimates provide consistent evidence of substantial crude death rate reductions in Russia under the Gorbachev Anti-Alcohol Campaign.

6. Results: The Anti-Alcohol Campaign and Russia's Mortality Crisis

6.1. Campaign Intensity and Mortality during the 1990s

Having established a relationship between the anti-alcohol campaign and mortality reductions during the 1980s, we next consider how the end of the campaign shortly prior to Russia's political and economic transition may have contributed to the subsequent sharp increase in deaths. Relating crude death rates during the 1990s to campaign intensity, Table 6 presents OLS results obtained by estimating equation (4) (with and without oblast-specific trends). Oblasts experiencing more intense campaigns had disproportionate increases in mortality during the early and mid-1990s, with mean campaign intensity implying crude death rates that were as much as1.2 per 1,000 higher than they would otherwise have been in 1995.[27] The magnitude of this relationship peaked during the mid-1990s – at the height of the "mortality crisis" – and then fell again later in the decade.[28]

6.2 Instrumental Variables Estimates for Campaign Intensity and Mortality during the 1990s

<ADD HERE>

[26] 5.321×-0.13≈0.7 per 1,000 population fewer deaths per year. 0.7/10.5≈ 0.07, and 0.7×132,631≈92,850 averted deaths per year (or 370,000 averted deaths over four years).
[27] Multiplying mean campaign intensity (-0.13) by the estimate for 1995 (-9.426), -0.13×-9.426≈1.2.
[28] Allowing for different crude death rate trends in each oblast produces larger estimates with the same general temporal pattern.

6.3. Campaign Intensity and Cause-Specific Mortality during the Crisis

We then investigate 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/violence. Causes that are more indirectly linked to alcohol are respiratory disease and digestive disease deaths. Finally, cancer deaths are at best weakly related to alcohol– and only after a considerable time lag (so there should be no contemporaneous response of cancer deaths to alcohol consumption).

Table 7 shows estimates from equation (4) using these cause-specific death rates as dependent variables, and Figure 6 plots these coefficient estimates by cause as well. Alcohol poisonings, circulatory disease deaths, and accidents/violence rise considerably during the early 1990s in a manner proportionate to intensity of the anti-alcohol campaign during the 1980s, and their temporal pattern during the mortality crisis closely resembles the pattern shown for crude death rates in Table 6.[29] The most quantitatively meaningful changes occur among cardiovascular disease deaths and accidents/violence. Although also important contributors to overall death rates, estimates for respiratory and digestive diseases are somewhat smaller – consistent with their weaker relationship to alcohol consumption. Finally, estimates for cancer deaths (which should not respond to contemporaneous alcohol consumption) are only weakly related and after a long period of time) are generally insignificant during the early 1990s.

6.4 Robustness to the Inclusion of Additional Controls for Alternative Crisis Explanations

To probe the sensitivity of our estimates in Table 6 to the inclusion of controls that proxy for alternative explanations proposed for the mortality crisis, we re-estimate equation (4)

[29] The alcohol poisoning estimates become considerably less precise conditional on oblast-specific linear time trends, losing their statistical significance at conventional levels, although they remain statistically indistinguishable from those estimated without linear oblast time trends.

including doctors and hospital beds per capita (reflecting health care system strength) and income per capita and employment rates (reflecting local economic conditions). Table 8 reports these results. Overall, our estimates of the association between campaign intensity and mortality rates during the 1990s are robust to the inclusion of these additional controls, suggesting that they are not explained by these other factors.

6.5 How Much of the Mortality Crisis is Explained by the End of the Anti-Alcohol Campaign?

We next calculate the share of the Russian Mortality Crisis explained by the estimates in Table 9. Doing so requires that we first define excess mortality during the crisis. We use several definitions: crude death rate differences between years 1990, 1991, and 1992 and each peak crisis year 1993-1995. Table 8 shows our calculations for each combination using estimates from the first and third columns of Table 6 (estimated with and without oblast-specific linear time trends, respectively). Our preferred calculations emphasize crisis year mortality relative to 1991 and campaign intensity estimates conditional on oblast time trends (shown in the second column of the bottom panel). These results suggest that the end of the anti-alcohol campaign explains an average of about one third of crisis mortality – and as much as 40% during peak years.

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

Finally, if the Gorbachev Anti-Alcohol Campaign explains a meaningful share 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 greater concentrations of Muslims). 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 7 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 large share of Muslims (in the Caucuses and Central Asia: Armenia, Azerbaijan, Georgia, Uzbekistan, Kazhakstan, 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 rates for Russia and one group of countries, plotting residuals obtained by regressing crude death rates on a single linear year variable. 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 high 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 temporal patterns of mortality across other former Soviet States and Eastern European countries are consistent with our oblast-level findings for Russia.

7. Conclusion

This paper demonstrates an important but under-recognized link between the Gorbachev Anti-Alcohol Campaign and Russia's mortality crisis. Through increases in the price of drinking and reductions in the price of substitute activities, the campaign was associated with a 67%

reduction in official alcohol consumption and an 8% decline Russia's crude death rate (or about 446,000 averted deaths) during the late 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 this increase explains roughly one third of the so-called "Russian Mortality Crisis" during the early 1990s (and as much as 40% across peak years). We document commensurate patterns across other former Soviet States (which experienced the Anti-Alcohol Campaign to varying degrees) and the rest of Eastern Europe as well.

An important implication of this finding is that Russia's transition to capitalism and democracy was not as lethal as often suggested (Stuckler, King, and McKee 2009). However, our findings do not necessarily imply that alcohol prohibition raises welfare – even if it saves lives. Health is just one of many arguments of social welfare, so health-improving restrictions on individual choices can potentially do as much harm as good.[30] These competing considerations are important as Russia now embarks on a newly-minted Anti-Alcohol Campaign.

[30] Negative externalities and the possibility of addiction introduce ambiguity into welfare evaluations of alcohol policies (and are beyond the scope of our paper) <ADD RATIONAL ADDICTION REFERENCES>.

References

Andreev, E. 1999. "The dynamics of mortality in the Russian Federation," in: *Health and Mortality: Issues of Global Concern*, edited by the United Nations, New York: UN, pp.262-83.

Andrienko, Y. and A. Nemtsov. 2006. "Estimation of Individual Demand for Alcohol," CEFIR/NES Working paper #89, Centre for Economic and Financial Research at New Economic School, Moscow.

Baird, S., Friedman, J., and N. Schady. 2007. "Aggregate Income Shocks and Infant Mortality: Evidence from the Developing World," Unpublished manuscript, World Bank Development Research Group.

Bennett, N.G., Bloom, D.E., Ivanov S.F. (1998). "Demographic implications of the Russian mortality crisis." *World Development,* 26: 1921-1937.

Bhalotra, S. Forthcoming. "Fatal Fluctuations? Cyclicality in Infant Mortality in India," *Journal of Development Economics*.

Blum, A. and A. Monnier. 1989. "Recent Mortality Trends in the U.S.S.R.: New Evidence," *Population Studies*, 43, 211-41.

Bobak, M. and M. Marmot. 1999. "Alcohol and mortality in Russia: is it different than elsewhere?" *Annals of Epidemiology*, 9, 335-338.

Bobak, M., McKee, M., Rose, R. and M. Marmot. 1999. "Alcohol consumption in a national sample of the Russian population," *Addiction*, 94, 857-66.

Brained, E. 2001. "Economic Reform and Mortality in the former Soviet Union: A study of the Suicide epidemic in the 1990s," *European Economic Review*, 45, 1007-19.

Brainerd, E. and D. Cutler. 2005. "Autopsy on an Empire", *Journal of Economic Perspectives*, 19, 107-30.

Chenet, L., McKee, M., Leon, D., Shkolnikov, V., and S. Vassin. 1998. "Alcohol and cardiovascular mortality in Moscow: new evidence of a causal association," *Journal of Epidemiology and Community Health*, 52, 772-4.

Cornia, G. and R. Paniccià. 2000. "The Transition Mortality Crisis: Evidence, Interpretation and Policy Responses," in Cornia and Paniccià (eds.) *The Mortality Crisis in Transitional Economies*. Oxford: Oxford University Press.

Dehejia, R. and A. Lleras-Muney. 2004. "Booms, Busts and Babies' Health," *Quarterly Journal of Economics* 119(3): 1091-1130.

Earle, J.S. and S. Gehlbach. 2010. "Did mass privatisation really increase post-communist mortality?" *The Lancet*, 375: 372.

Ellman, M. 1994. "The increase in death and disease under 'Katastroika,'" *Cambridge Journal of Economics* 18(4): 329-355.

Fishback, P., Haines, M., and S. Kantor. 2007. "Births, Deaths, and New Deal Relief during the Great Depression," *Review of Economics and Statistics* 89(1): 1-14.

Gavrilova N.S., Semyonova, V.G., Evdokushkina G.N., Ivanova, A.E. and L.A. Gavrilov. 2005. "Problems with mortality data in Russia." Paper presented at the Population Association of America Annual Meeting in Philadelphia.

Heleniak, T. 2006. "Regional Distribution of the Muslim Population of Russia." *Eurasian Geography and Economics*, 47, 426-448.

Petrov, E. I., Dovich, A.und I. Il'f. 1997 [1928]. *The Twelve Chairs*. Evanston, IL: Northwestern University Press.

Leon, D., Chenet, L., Shkolnikov, V., Zakharov, S., Shapiro, J., Rakhmanova, G., Vassin, S. and M. NcKee. 1997. "Huge variation in Russian mortality rates in 1984-1994. Artifact, alcohol or what?" *The Lancet*, 350, 383-388.

Leon, D. and V. Shkolnikov. 1998. "Social stress and the Russian mortality crisis," *Journal of the American Medical Association*, 279: 790-91.

Leon, D., Saburova L., Tomkins S. et al. 2007. Hazardous alcohol drinking and premature mortality in Russia: a population based case-control study. *The Lancet*, 369: 2001–9.

Lynch, J., Davey Smith, G., Kaplan, G., and J. House. 2000. "Income Inequality and Mortality: Importance to Health of Individual Income, Psychosocial Environment, or Material Conditions," *British Medical Journal* 320(7243): 1200-1204.

Kennedy, B., Kawachi, I., and E. Brainerd. 1998. "The Role of Social Capital in the Russian Mortality Crisis," *World Development* 26(11): 2029-2043.

Malyutina, A., Bobak, M., Kurilovitch, S., Ryizova, E., Nikitin, Y. and M. Marmot. 2001. "Alcohol consumption and binge drinking in Novosibirsk, Russia, 1985-95," *Addiction*, 96, 987-95.

McKee, M. 1999. "Alcohol in Russia," *Alcohol and Alcoholism*, 34, 824-9.

McKee, M. and A. Britton. 1998. "The positive relationships between alcohol and heart disease in Eastern Europe: potential physiological mechanisms," *Journal of the Royal Society of Medicine*, 91, 402-407.

McKee, M.; Shkolnikov, V. and D. Leon. 2001. "Alcohol is implicated in the fluctuations in cardiovascular disease in Russia since the 1980s," *Annals of Epidemiology*, 11, 1-6.

Mesle, F. 2004. "Mortality in Central and Eastern Europe: long-term trends and recent upturns," Demographic Research, Special Collection 2, 43-70.

Mesle F., Shkolnikov V., Hertrich V., and J. Vallin. 1996. "Tendances recentes de la mortalite par cause en Russie, 1965-1994,", Paris: Institut National d'Etudes Demographiques.

Miller, G. and P. Urdinola. 2010. "Cyclicality, Mortality, and the Value of Time: The Case of Coffee Price Fluctuations and Child Survival in Colombia," *Journal of Political Economy* 118(1): 113-155.

Nemtsov, A.V. 1998. "Alcohol-related harm and alcohol consumption in Moscow before, during and after a major anti-alcohol campaign," *Addiction*, 93, 1501–1510.

Nemtsov, A.V. 2000. "Estimates of total alcohol consumption in Russia, 1980-1994." *Drug and Alcohol Dependence*, 58: 133-142.

Nemtsov, A.V. 2002. "Alcohol-related human losses in Russia in the 1980s and 1990s," *Addiction*, 97, 1413-25.

New World Demographics. 1992. *The First Book of Demographics for the Republics of the former Soviet Union, 1951-1990*. Shady Side, MD.: New World Demographics, L.C.

O'Keefe, J.H., Bybee, K.A. and C.J. Lavie. 2007. "Alcohol and cardiovascular health: the razor-sharp double-edged sword." *Journal of the American College of Cardiology*, 50:1009–1014.

Partanen, J. 1993. "Failures in alcohol policy: lessons from Russia, Kenya, Truk and history," *Addiction*, 88, 129S-134S.

Rehm, J., Mathers, C., Popova, S., Thavorncharoensap, M., Teerawattananon, Y., and J. Patra. 2009. "Global Burden of Disease and Injury and Economic Cost Attributable to Alcohol Use and Alcohol-Use Disorders," *The Lancet* 373: 2223-2233.

Reid, C. 1986. "Soviet social reform in the 1980s: the anti-alcohol campaign as antidote for a flagging economy", Ottawa, Canada: Department of National Defense.

Reitan, T. 2001. "The operation failed but the patient survived. Varying assessments of the Soviet Union's last anti-alcohol campaign," *Communist and Post-Communist Studies*, 34, 241-60.

Richardson, E. 1999. "The Struggle for Sobriety under Gorbachev and Yeltsin," Research Papers in Russian and East European Studies, 1999/1, March.

Ruhm, C. 2000. "Are Recessions Good For Your Health?" *Quarterly Journal of Economics* 115(2): 617-650.

Ryan, M. 1995. "Alcoholism and rising mortality in the Russian federation," *British Medical Journal*, 310, 6980, 646-49.

Sachs, J. 2009. "Shock Therapy had no Adverse Effect on Life Expectancy in Eastern Europe," *The Financial Times*, January 19, 2009.

Schady, N and M. Smitz. 2009. "Aggregate Economic Shocks and Infant Mortality: New Evidence for Middle-Income Countries," Unpublished manuscript, World Bank Development Research Group.

Segal, B. 1990. *The Drunken Society – Alcohol Abuse and Alcoholism in the Soviet Union*. New York: Hippocrene Books.

Shapiro, J. 1995. "The Russian Mortality Crisis and Its Causes," in: *Russian Economic Reform in Jeopardy?* Edited by A. Aslund, London: Pinter Publishers.

Shkolnikov, V., Cornia, G., Leon, D., Mesle F. 1998. "Causes of the Russian mortality crisis: Evidence and interpretations." *World Development*, 26, 1995-2011.

Shkolnikov, V. and D. Jdanov. 2006. "About Mortality Data for Russia," mimeo, Max-Planck Institute for Demographic Research, Rostock, Germany.

Shkolnikov, V., McKee, M., and D. Leon. 2001. "Changes in life expectancy in Russia in the mid-1990s", *The Lancet*, 257, 917-21.

Shkolnikov, V., Meslé, F. and J. Vallin. 1996. "Health crisis in Russia. I. Recent trends in life expectancy and causes of death from 1970 to 1993." *Population: An English Selection*, 8: 123-154.

Shkolnikov, V.M. and A.V. Nemtsov. 1997. "The anti-alcohol campaign and variations in Russian mortality. In: *Premature Death in the New Independent States,* edited by Bobadilla, J.L.; C.A. Costello and F. Mitchell. Washington: National Academy Press.

Staiger, D. and J. Stock. 1997. "Instrumental Variables Regression with Weak Instruments," *Econometrica* 65: 557–586.

Stuckler, D., King, L., and M. McKee. 2009. "Mass Privatisation and the Post-Communist Mortality Crisis: A Cross-National Analysis," *The Lancet* 373: 399-407.

Takala, I.R. 2002. *Veseliie Rusi: istoriia alkogol'noi problem v Rossii*, St. Petersburg: Zhumal Neva.

Tarschys, D. 1993. "The Success of a Failure: Gorbachev's Alcohol Policy, 1985-88," *Europe-Asia Studies*, 45, 1, pp. 7-25.

The Economist. 2009. "Mass Murder and the Market," January 22, 2009.

Tolstrup J, Jensen, M.K., Tjonneland, A, Overvad, K., Mukamal, K.J. and M. Gronbaek. 2006. "Prospective study of alcohol drinking patterns and coronary heart disease in women and men." *British Medical Journal*, 332:1244–1248.

Treisman, D. 2008. "Pricing Death: The Political Economy of Russia's Alcohol Crisis," mimeo, UCLA.

Treml, V. 1982. *Alcohol in the USSR: A Statistical Study*. Durham, N. C.: Duke University Press.

Treml, V. 1987. "Drinking and Alcohol Abuse in the USSR in the 1980s." in: *Quality of life in the Soviet Union*, edited by H. Herlemann, Boulder, CO: Westview Press.

Treml, V. 1991. "Drinking and Alcohol Abuse in the USSR in the 1980s," in: *Soviet Social Problems*, edited by D.E. Powell and W.D. Connor, New York, NY: Westview Press, pp. 119-136.

Treml, V. 1997. *Soviet and Russian Statistics on Alcohol Consumption and Abuse*, In: *Premature Death in the New Independent States,* edited by Bobadilla, J.L.; C.A. Costello and F. Mitchell. Washington: National Academy Press, pp. 220–38.

Treml, V. and M. Alexeev. 1993. "The Second Economy and the Destabilizing Effect of Its Growth on the State Economy in the Soviet Union: 1965-1989," Berkeley-Duke Occasional Papers on the Second Economy in the USSR No. 36.

Vallin, J., E. Andreev, F. Mesle and V. Shkolnikov. 2005. "Geographical diversity of cause-of-death patterns and trends in Russia," *Demographic Research*, 12, 323-80.

Vallin, J., Meslé F., Shkolnikov, V, and V. Hertrich. 1996. "Tendances Récentes de la Mortalité par Cause en Russie, 1965–1994." Mimeo, Paris: INED.

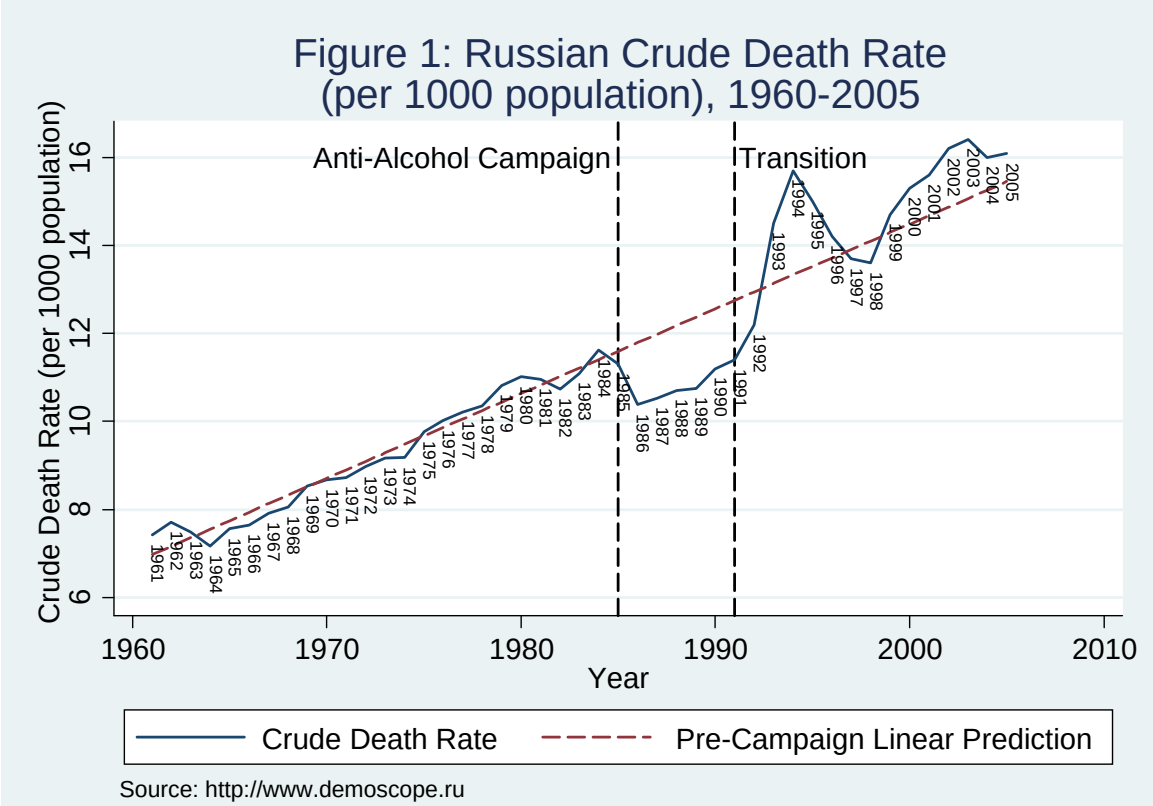
van den Berg, G., Lindeboom, M., and F. Portrait. 2006. "Economic Conditions Early in Life and Individual Mortality," *American Economic Review* 96(1): 290-302.

Vassin, S.A. and C.A. Costello. 1997. "Spatial, Age, and Cause-of-Death Patterns of Mortality in Russia, 1988-1989," in: *Premature Deaths in the New Independent States*, edited by Bobadilla, J.L.; C.A. Costello and F. Mitchell. Washington: National Academy Press, pp.66-119.

Walberg, P, M. McKee, V. Shkolnikov, L. Chenet and D. Leon. 1998. "Economic change, crime, and mortality crisis in Russia: regional analysis," *British Medical Journal*, 317, 312-18.

White, S. 1996. *Russia Goes Dry: Alcohol, State and Society*. New York: Cambridge University Press.

Zaridze, D., Brennan, P., Boreham, J., Boroda, A., Karpov, R., Lazarev, A., Konobeevskaya, I., Igitov, I., Terechova, T., Boffetta, P., and R. Peto. 2009. "Alcohol and Cause-Specific Mortality in Russia: A Retrospective Case-Control Study of 48,557 Adult Deaths," *The Lancet* 373: 2201-2214.



Source: http://www.demoscope.ru

Figure 2: Distribution of Anti-Alcohol Campaign Intensity, 1985-1990

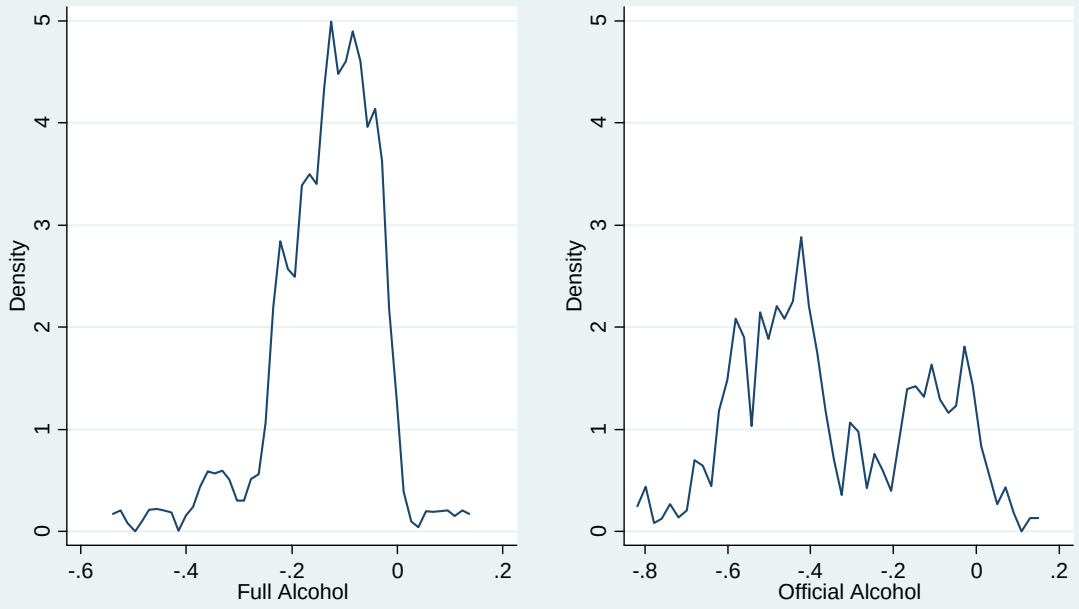
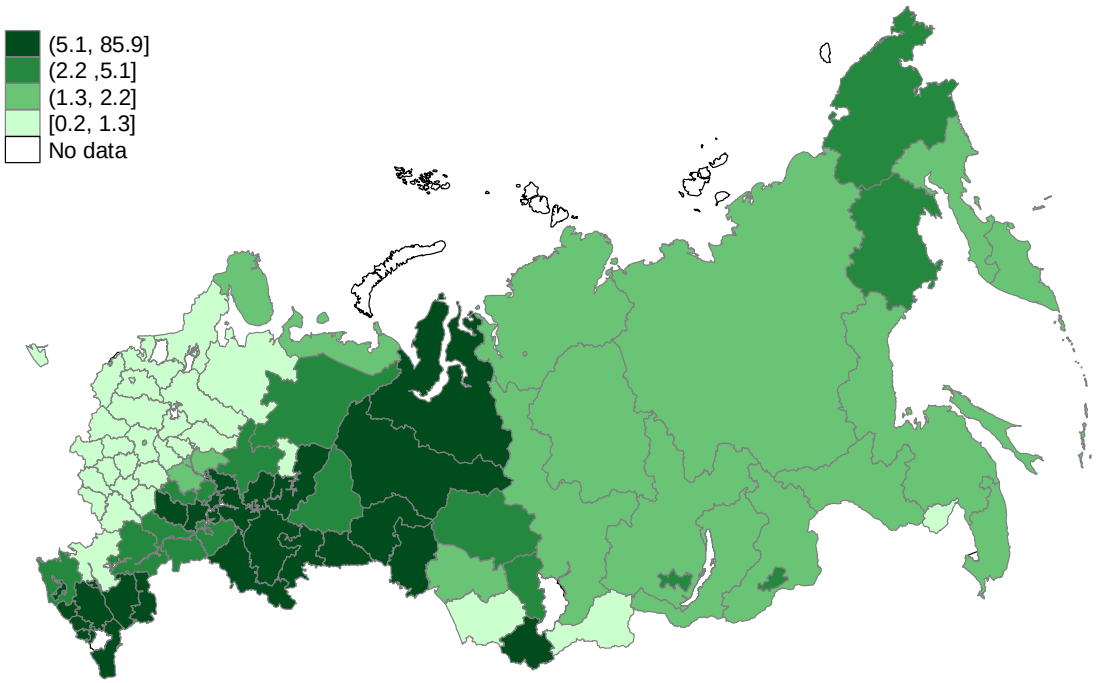


Figure 3: Muslim Concentration across Russia's Oblasts



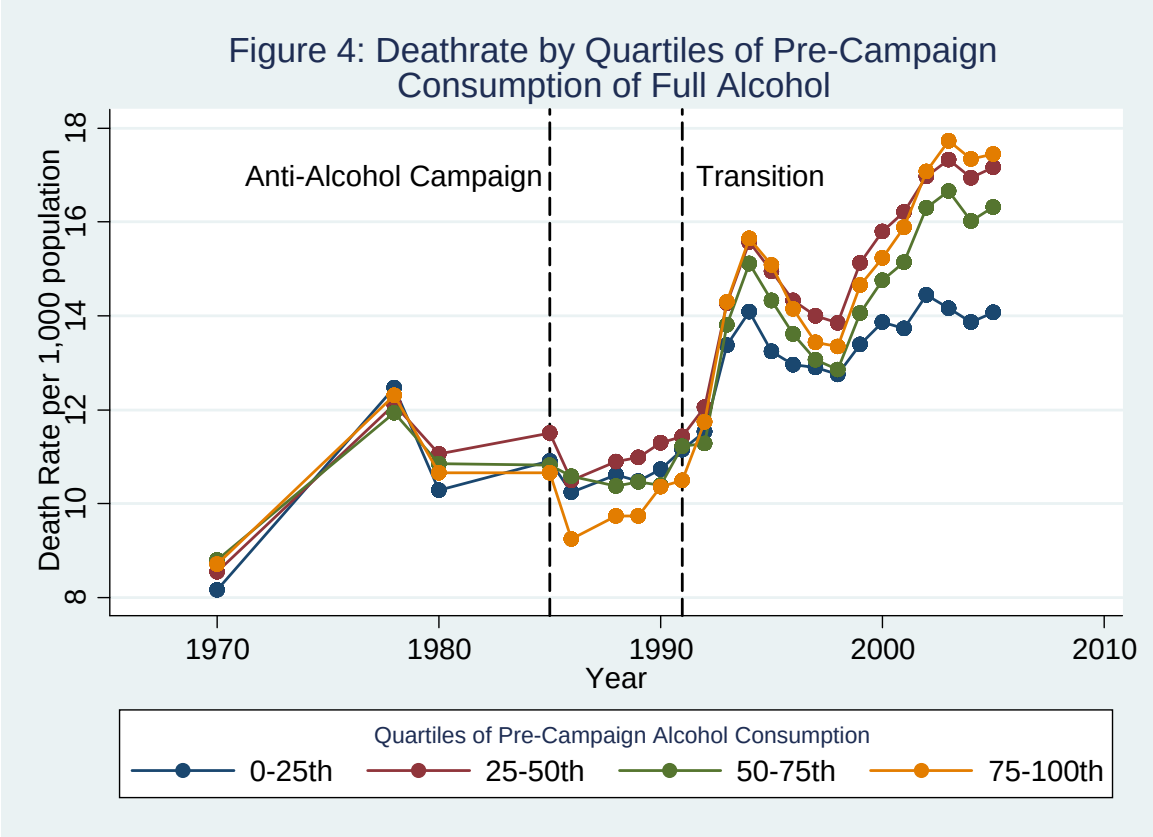


Figure 4: Deathrate by Quartiles of Pre-Campaign Consumption of Full Alcohol
Anti-Alcohol Campaign
Transition
Death Rate per 1,000 population
8
10
12
14
16
18
1970
1980
1990
2000
2010
Year
Quartiles of Pre-Campaign Alcohol Consumption
0-25th
25-50th
50-75th
75-100th

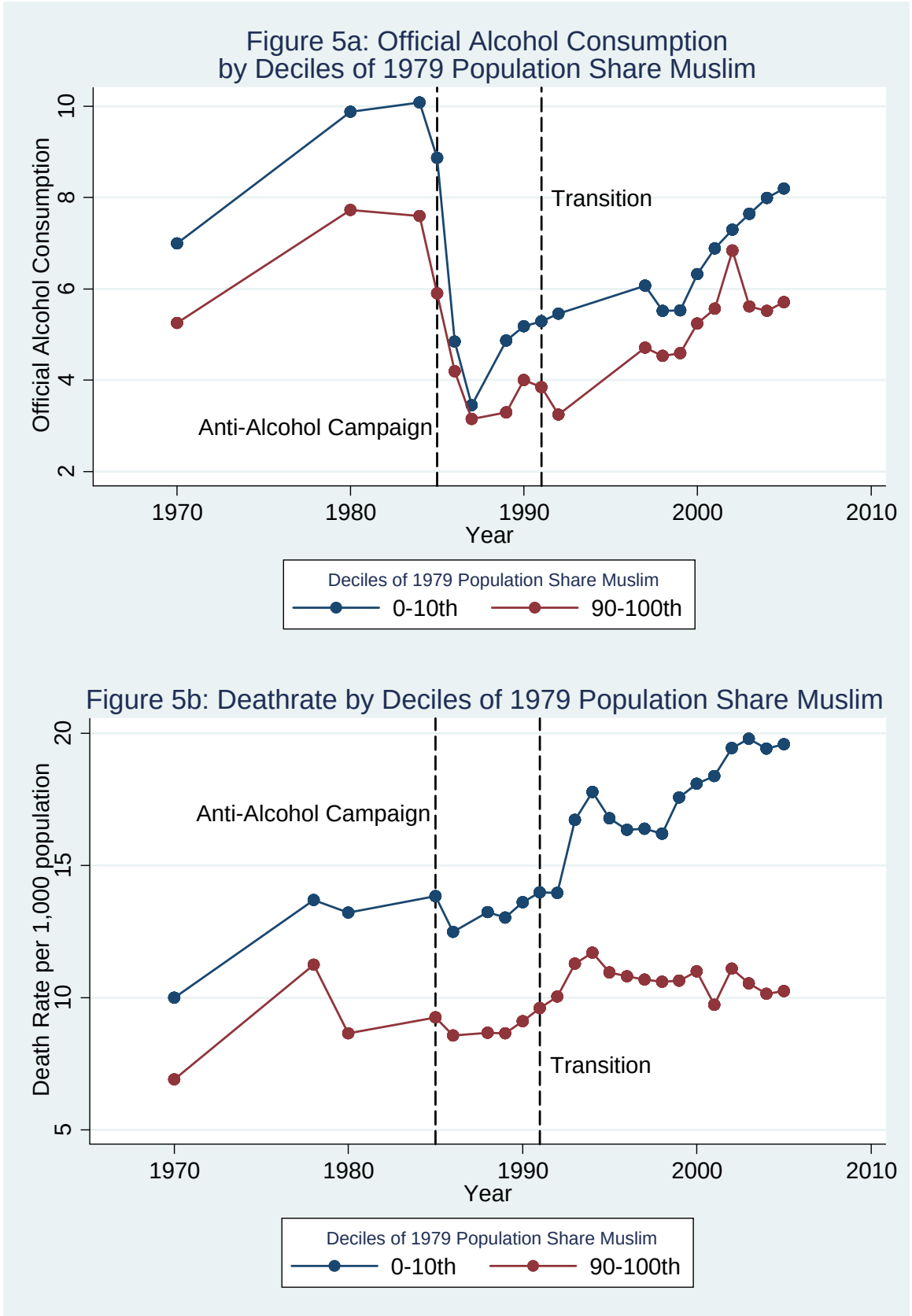


Figure 5a: Official Alcohol Consumption
by Deciles of 1979 Population Share Muslim
Official Alcohol Consumption
2
4
6
8
10
Transition
Anti-Alcohol Campaign
1970
1980
1990
2000
2010
Year
Deciles of 1979 Population Share Muslim
0-10th
90-100th
Figure 5b: Deathrate by Deciles of 1979 Population Share Muslim
Death Rate per 1,000 population
5
10
15
20
Anti-Alcohol Campaign
Transition
1970
1980
1990
2000
2010
Year
Deciles of 1979 Population Share Muslim
0-10th
90-100th

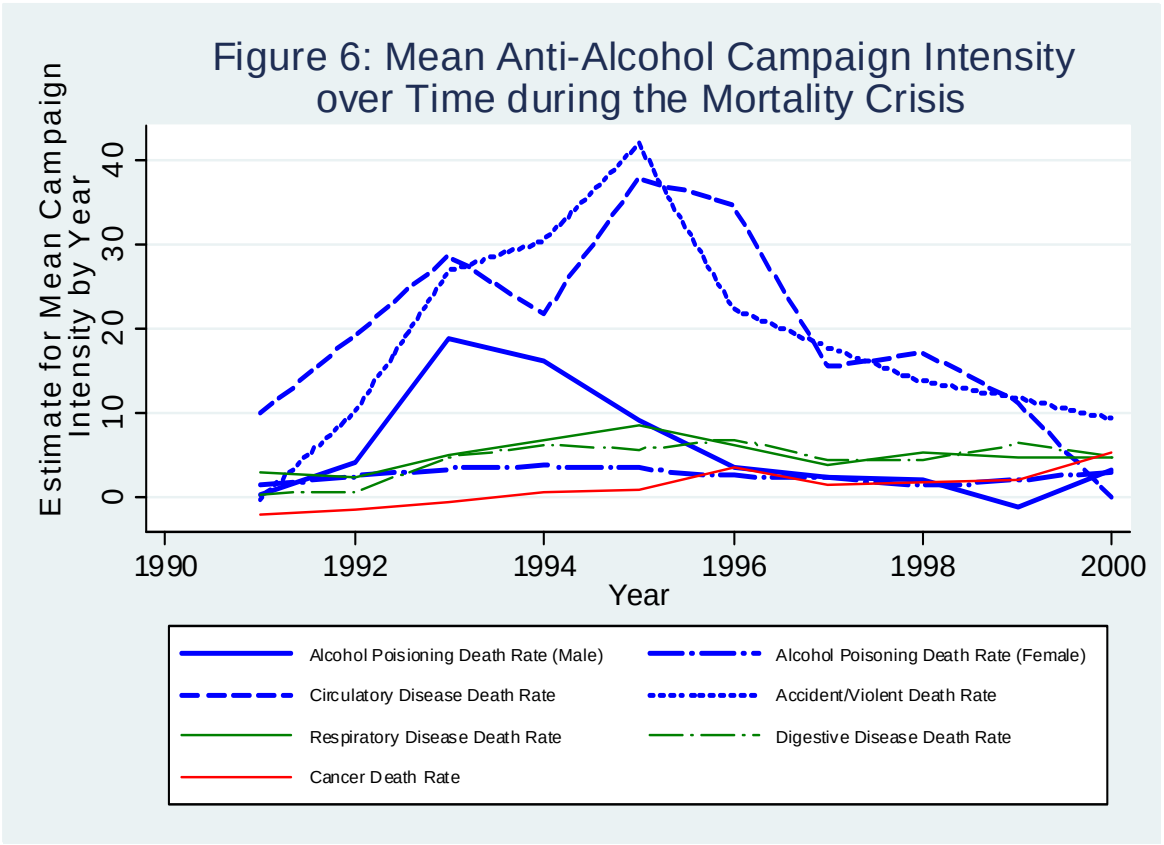
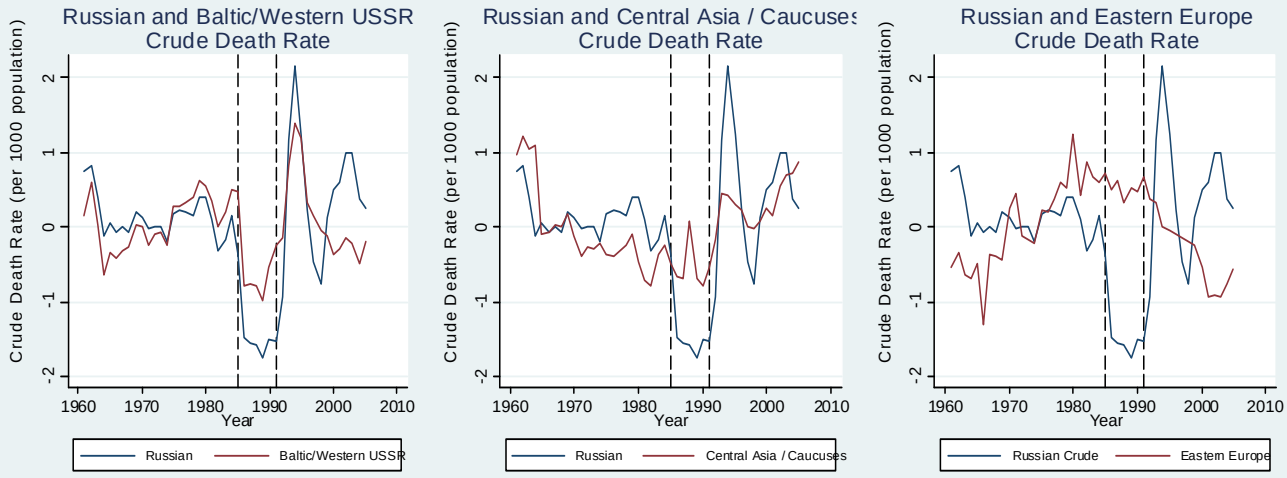


Figure 6: Mean Anti-Alcohol Campaign Intensity over Time during the Mortality Crisis
Estimate for Mean Campaign Intensity by Year
0
10
20
30
40
1990
1992
1994
1996
1998
2000
Year
Alcohol Poisioning Death Rate (Male)
Alcohol Poisoning Death Rate (Female)
Circulatory Disease Death Rate
Accident/Violent Death Rate
Respiratory Disease Death Rate
Digestive Disease Death Rate
Cancer Death Rate

Figure 7: De-Trended Crude Death Rates in Former Soviet and Non-Soviet States, 1960-2005



Source: http://www.demoscope.ru, non-USSR WDI

TABLE 1:
DESCRIPTIVE STATISTICS

Alcohol Measure:	Pre-Campaign Years<=1985		Campaign Years>=1985 & <=1989		Mortality Crisis Years>=1990		All Years	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Crude Death Rate	10.27	(0.16)	10.42	(0.14)	13.90	(0.10)	12.93	(0.08)
Full Alcohol Consumption	14.38	(0.17)	12.37	(0.12)	12.60	(0.07)	13.05	(0.08)
Official Alcohol Consumption	9.84	(0.17)	6.33	(0.16)	6.97	(0.09)	7.37	(0.08)
Alcohol Poisioning Death Rate	29.46	(2.14)	9.91	(0.48)	29.92	(0.61)	27.97	(0.55)
Alcohol Poisioning Death Rate (Male)	46.54	(3.21)	15.92	(0.76)	46.82	(0.91)	43.82	(0.83)
Alcohol Poisioning Death Rate (Female)	12.38	(1.28)	3.89	(0.25)	13.03	(0.35)	12.12	(0.31)
Cancer Death Rate	142.76	(4.87)	167.93	(5.73)	182.49	(1.27)	179.79	(1.23)
Circulatory Disease Death Rate	509.63	(20.22)	555.92	(23.59)	732.01	(7.15)	712.16	(6.79)
Respiratory Disease Death Rate	97.19	(4.08)	66.31	(3.30)	68.78	(0.69)	70.06	(0.69)
Digestive Disease Death Rate	28.42	(1.46)	28.69	(1.55)	43.51	(0.44)	42.02	(0.43)
Accident/Violent (and other External Cause) Death Rate	166.96	(5.54)	116.76	(3.08)	225.38	(2.16)	217.04	(2.08)
Average monthly income per capita (in Rubles)	1.19	(0.04)	1.96	(0.05)	2025.27	(80.45)	1655.73	(68.56)
Employment Rate per capita	.	.	68.09	(9.90)	48.55	(0.55)	49.54	(0.73)
Average monthly wage per capita	159.91	(3.90)	207.76	(7.03)	170396.00	(10,394.59)	137521.70	(8,539.54)
Number of Doctors	4664.76	(323.28)	8095.48	(548.25)	8262.85	(274.32)	7786.15	(220.92)
Number of Hospital Beds	18012.37	(933.61)	23687.53	(974.79)	20455.20	(476.09)	20814.89	(395.69)
Price of Ordinary Vodka, Rubles per Liter	.	.	.	.	6944.47	(365.58)	6944.47	(365.58)
Price of Domestic Beer, Rubles per Liter	.	.	.	.	32.00	(0.52)	32.00	(0.52)
Price of Pure Alcohol, Rubles per Liter	16.99	(0.25)	33.27	(0.78)	23.54	(1.63)	24.25	(0.94)
Price of Ordinary Vodka, Deflated using CPI	.	.	.	.	13.85	(0.18)	13.85	(0.18)
Samogon Production	3.94	(0.02)	5.58	(0.10)	7.57	(0.06)	5.95	(0.08)

TABLE 2:
CHANGES IN CRUDE DEATH RATES UNDER THE GORBACHEV ANTI-ALCOHOL CAMPAIGN

Alcohol Measure:	**Full Alcohol Consumption**		**Official Alcohol Consumption**	
Campaign Intensity	6.465***	3.767***	4.349***	2.139***
	(1.437)	(0.815)	(0.825)	(0.517)
Year Fixed Effects	Yes	Yes	Yes	Yes
Oblast Fixed Effects	Yes	Yes	Yes	Yes
Oblast-Specific Linear Trends	No	Yes	No	Yes
N	373	373	396	396
R^2	0.951	0.984	0.950	0.983

The dependent variable in all regressions is the crude death rates per 1,000 population. All oblast-year samples are restricted to years 1970-1989. Standard errors clustered at the oblast level shown in parentheses. *p<0.10, **p<0.05, and ***p<0.01.

TABLE 3:
ALCOHOL POISONING AND SOMAGON PRODUCTION
UNDER THE ANTI-ALCOHOL CAMPAIGN

Alcohol Measure:	**Full Alcohol Consumption**			**Official Alcohol Consumption**
Dependent Variable:	Alcohol Poisioning Death Rate	Alcohol Poisioning Death Rate (Male)	Alcohol Poisioning Death Rate (Female)	Samogon Production
Campaign Intensity	89.38***	123.2***	55.60***	-1.257***
	(29.51)	(40.15)	(20.81)	(0.254)
Year Fixed Effects	Yes	Yes	Yes	Yes
Oblast Fixed Effects	Yes	Yes	Yes	Yes
Oblast-Specific Linear Trends	No	No	No	No
N	146	146	146	315
R^2	0.866	0.872	0.826	0.985

Death rates are per 1,000 population. All oblast-year samples are restricted to years 1970-1989. Standard errors clustered at the oblast level shown in parentheses. *p<0.10, **p<0.05, and ***p<0.01.

TABLE 4:
THE CORRELATION BETWEEN PRE-CAMPAIGN TRENDS AND CAMPAIGN INTENSITY AND THEIR IMPACT ON CAMPAIGN EFFECTIVENESS ESTIMATES

Dependent Variable:	Campaign Intensity 1985	Campaign Intensity 1985	Crude Death Rate	
1980-1984 Change in Alcohol	-0.0280***			
	(0.00619)			
1980-1985 Change in Crude Death Rate		-0.0390***		
		(0.0111)		
1980 Official Alcohol Sales	-0.00383			
	(0.00290)			
1980 Crude Death Rate		0.0111***		
		(0.00329)		
Mean Campaign Intensity × 1978			-6.093***	-9.595***
			(2.029)	(1.717)
Mean Campaign Intensity × 1980			-1.759	-4.815***
			(1.524)	(1.287)
Campaign Intensity			3.590***	4.275***
			(1.154)	(0.997)
Year Fixed Effects	No	No	Yes	Yes
Oblast Fixed Effects	No	No	Yes	Yes
Oblast-Specific Linear Trends	No	No	No	Yes
N	79	80	363	363
R^2	0.483	0.395	0.952	0.985

The alcohol measure in all regressions is full alcohol consumption. Crude death rates are per 1,000 population. The oblast-year sample used for the last two columns is restricted to years 1970-1989. Standard errors clustered at the oblast level shown in parentheses. *p<0.10, **p<0.05, and ***p<0.01.

TABLE 5:
INSTRUMENTAL VARIABLES ESTIMATES OF CRUDE DEATH RATE CHANGES UNDER THE ANTI-ALCOHOL CAMPAIGN

Alcohol Measure:	**Full Alcohol Consumption**	
Campaign Intensity	2.737*	5.321***
	(1.465)	(0.968)
Year Fixed Effects	Yes	Yes
Oblast Fixed Effects	Yes	Yes
Oblast-Specific Linear Trends	No	Yes
First-Stage F Statistic	25.80	22.46
N	370	370
R^2	0.946	0.984

The dependent variable in all regressions is the crude death rates per 1,000 population. All oblast-year samples are restricted to years 1970-1989. The interaction between 1979 population share Muslim and campaign year is used to instrument for percent change alcohol in each campaign year. Standard errors clustered at the oblast level shown in parentheses. *p<0.10, **p<0.05, and ***p<0.01.

TABLE 6:
THE GORBACHEV ANTI-ALCOHOL CAMPAIGN AND RUSSIA'S 'MORTALITY CRISIS'

Alcohol Measure:	**Full Alcohol Consumption**			
Mean Campaign Intensity × 1991	-1.116	(1.883)	0.0350	(1.293)
Mean Campaign Intensity × 1992	-4.056**	(1.920)	-3.566***	(1.291)
Mean Campaign Intensity × 1993	-5.286**	(2.222)	-5.298***	(1.320)
Mean Campaign Intensity × 1994	-5.326**	(2.390)	-5.868***	(1.360)
Mean Campaign Intensity × 1995	-7.648***	(2.490)	-9.426***	(1.401)
Mean Campaign Intensity × 1996	-5.926***	(1.964)	-8.065***	(1.460)
Mean Campaign Intensity × 1997	-3.153*	(1.705)	-5.653***	(1.527)
Mean Campaign Intensity × 1998	-3.072**	(1.468)	-5.932***	(1.600)
Mean Campaign Intensity × 1999	-2.699	(2.448)	-5.924***	(1.680)
Mean Campaign Intensity × 2000	-2.494	(2.744)	-6.078***	(1.764)
Year Fixed Effects	Yes		Yes	
Oblast Fixed Effects	Yes		Yes	
Oblast-Specific Linear Trends	No		Yes	
N	1257		1257	
R^2	0.929		0.976	

The dependent variable in all regressions is the crude death rates per 1,000 population. The alcohol measure used in all regressions is mean campaign year official alcohol sales plus estimated samogon production. Oblast-year samples are restricted to years 1990-2005. Standard errors clustered at the oblast level shown in parentheses. *p<0.10, **p<0.05, and ***p<0.01.

TABLE 7:
THE GORBACHEV ANTI-ALCOHOL CAMPAIGN AND CAUSE-SPECIFIC DEATH RATES DURING RUSSIA'S 'MORTALITY CRISIS'

	Alcohol-Related								Weakly Alcohol-Related				Weakly Alcohol-Related (with a Lag)	
	Alcohol Poisioning Death Rate (Male)		Alcohol Poisoning Death Rate (Female)		Circulatory Disease Death Rate		Accident/Violent (and other External Cause) Death Rate		Respiratory Disease Death Rate		Digestive Disease Death Rate		Cancer Death Rate	
Mean Campaign Intensity × 1991	-3.952	7.265	-11.67*	-6.151	-76.60**	-73.31	1.516	4.383	-24.61	-36.03**	-4.102	-6.167	15.07	8.722
	(20.53)	(17.07)	(6.065)	(4.749)	(37.09)	(46.52)	(16.56)	(16.36)	(17.10)	(18.01)	(6.242)	(6.903)	(10.73)	(11.46)
Mean Campaign Intensity × 1992	-33.15*	-10.71	-19.06**	-8.020	-148.5***	-145.9**	-77.60***	-72.88***	-18.04	-41.48**	-5.845	-10.37	10.52	-2.882
	(18.36)	(17.97)	(8.423)	(9.872)	(47.97)	(63.83)	(26.10)	(20.31)	(17.02)	(18.21)	(8.614)	(9.119)	(12.92)	(14.48)
Mean Campaign Intensity × 1993	-145.3**	-111.6	-26.58**	-10.02	-221.0*	-166.0*	-208.0***	-188.2***	-39.84*	-68.10***	-37.42***	-40.28***	4.008	-10.67
	(59.90)	(69.20)	(13.19)	(13.83)	(116.4)	(92.48)	(61.97)	(51.20)	(22.73)	(21.38)	(10.00)	(8.967)	(21.08)	(17.36)
Mean Campaign Intensity × 1994	-125.3	-80.46	-29.60	-7.507	-167.5	-123.7	-234.7***	-215.7***	-52.13**	-93.83***	-48.00***	-54.13***	-4.262	-27.13*
	(79.31)	(95.38)	(22.79)	(25.31)	(135.6)	(111.3)	(73.06)	(54.74)	(25.11)	(23.04)	(11.36)	(11.34)	(22.42)	(15.01)
Mean Campaign Intensity × 1995	-70.24**	-16.63	-26.62	0.615	-292.0**	-291.4***	-323.3**	-313.1**	-66.14***	-125.6***	-44.13***	-56.02***	-8.232	-42.78**
	(34.65)	(39.65)	(17.16)	(15.14)	(114.9)	(107.8)	(140.4)	(136.0)	(24.17)	(21.55)	(11.58)	(12.85)	(26.23)	(20.01)
Mean Campaign Intensity × 1996	-26.68	38.59	-19.92	12.91	-268.7**	-268.9***	-172.4***	-160.3***	-47.45*	-118.9***	-53.69***	-68.04***	-27.24	-68.84***
	(34.02)	(24.61)	(16.84)	(9.489)	(116.1)	(98.09)	(37.46)	(36.57)	(26.18)	(23.71)	(12.99)	(14.64)	(24.83)	(19.66)
Mean Campaign Intensity × 1997	-17.80	59.14**	-18.01	20.41*	-119.5	-120.4	-137.7***	-123.7***	-29.55	-113.1***	-34.45***	-51.25***	-11.43	-60.08***
	(39.14)	(24.01)	(20.94)	(11.40)	(104.2)	(114.6)	(39.06)	(38.13)	(24.86)	(22.96)	(9.190)	(12.55)	(23.42)	(13.63)
Mean Campaign Intensity × 1998	-17.16	71.46***	-10.62	33.38***	-133.6	-135.1	-106.5***	-90.65*	-40.91*	-136.4***	-33.98***	-53.24***	-15.03	-70.73***
	(49.87)	(25.76)	(20.31)	(9.771)	(101.2)	(130.1)	(33.79)	(49.56)	(21.68)	(23.14)	(10.18)	(13.29)	(28.32)	(16.07)
Mean Campaign Intensity × 1999	8.440	108.7***	-15.87	33.73**	-87.71	-89.87	-90.99**	-73.32	-36.22	-143.8***	-49.73***	-71.44***	-17.59	-80.33***
	(44.84)	(20.50)	(24.99)	(13.03)	(147.3)	(112.3)	(44.97)	(51.02)	(30.80)	(27.70)	(13.79)	(12.92)	(30.96)	(20.96)
Mean Campaign Intensity × 2000	-25.61	86.33***	-24.16	31.02***	-0.165	4.484	-72.24	-58.16*	-36.30	-153.0***	-37.32***	-62.86***	-40.76	-107.6***
	(53.20)	(26.77)	(23.25)	(10.15)	(165.1)	(117.6)	(78.43)	(34.94)	(32.66)	(23.56)	(12.97)	(14.26)	(29.61)	(29.71)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Oblast Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Oblast-Specific Linear Trends	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
N	1304	1304	1304	1304	1260	1260	1260	1260	1260	1260	1260	1260	1260	1260
R^2	0.775	0.866	0.774	0.862	0.949	0.985	0.875	0.933	0.820	0.910	0.797	0.924	0.958	0.984

The dependent variable in all regressions is the crude death rates per 1,000 population. The alcohol measure used in all regressions is mean campaign year official alcohol sales plus estimated samogon production. Oblast-year samples are restricted to years 1990-2005. Standard errors clustered at the oblast level shown in parentheses. *p<0.10, **p<0.05, and ***p<0.01.

<NEED TO ADD SOME TEXT ON THE DEPENDENT VARIABLES>

TABLE 8:
THE GORBACHEV ANTI-ALCOHOL CAMPAIGN AND RUSSIA'S 'MORTALITY CRISIS'
WITH ADDITIONAL CONTROLS FOR ALTERNATIVE EXPLANATIONS

Alcohol Measure:	**Full Alcohol Consumption**					
Mean Campaign Intensity × 1991	-1.157	-0.0546	-2.873	-1.403**	-2.964	-1.464**
	(1.887)	(0.868)	(2.723)	(0.587)	(2.690)	(0.597)
Mean Campaign Intensity × 1992	-4.120**	-3.619***	-4.942*	-4.533***	-5.075*	-4.491***
	(1.950)	(0.783)	(2.932)	(0.930)	(2.905)	(0.912)
Mean Campaign Intensity × 1993	-5.340**	-5.367***	-5.482	-6.037***	-5.641*	-6.021***
	(2.264)	(1.301)	(3.349)	(1.631)	(3.327)	(1.485)
Mean Campaign Intensity × 1994	-5.376**	-5.946***	-5.171	-6.256***	-5.394	-6.234***
	(2.433)	(1.439)	(3.513)	(1.985)	(3.497)	(1.873)
Mean Campaign Intensity × 1995	-7.712***	-9.411***	-7.837**	-10.19***	-8.004**	-10.01***
	(2.519)	(1.883)	(3.346)	(2.533)	(3.299)	(2.427)
Mean Campaign Intensity × 1996	-5.987***	-8.042***	-6.036**	-8.672***	-6.199**	-8.470***
	(2.003)	(1.036)	(2.972)	(2.126)	(2.910)	(1.973)
Mean Campaign Intensity × 1997	-3.208*	-5.636***	-3.425	-6.140**	-3.581	-5.954**
	(1.739)	(1.154)	(2.863)	(2.597)	(2.806)	(2.403)
Mean Campaign Intensity × 1998	-3.126**	-5.914***	-3.355	-6.450**	-3.511	-6.252**
	(1.507)	(1.598)	(2.710)	(3.060)	(2.664)	(2.822)
Mean Campaign Intensity × 1999	-2.756	-5.967***	-3.474	-6.831**	-3.630	-6.621**
	(2.493)	(1.412)	(3.587)	(3.005)	(3.538)	(2.795)
Mean Campaign Intensity × 2000	-2.530	-6.128***	-3.545	-7.204**	-3.677	-6.964**
	(2.776)	(1.505)	(3.914)	(3.103)	(3.871)	(2.886)
Doctors per Capita	Yes	Yes	No	No	Yes	Yes
Hospital Beds per Capita	Yes	Yes	No	No	Yes	Yes
Income per Capita	No	No	Yes	Yes	Yes	Yes
Employment per Capita	No	No	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Oblast Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Oblast-Specific Linear Trends	No	Yes	No	Yes	No	Yes
N	1249	1249	1196	1196	1195	1195
R^2	0.930	0.977	0.932	0.979	0.932	0.979

The dependent variable in all regressions is the crude death rates per 1,000 population. The alcohol measure used in all regressions is mean campaign year official alcohol sales plus estimated samogon production. Oblast-year samples are restricted to years 1990-2005. Standard errors clustered at the oblast level shown in parentheses. *p<0.10, **p<0.05, and ***p<0.01.

TABLE 9:
SHARE OF THE RUSSIAN MORTALITY CRISIS EXPLAINED
BY THE GORBACHEV ANTI-ALCOHOL CAMPAIGN

Definition of Crisis Mortality:	Difference between Crisis Year and 1990 Explained by the Campaign	Difference between Crisis Year and 1991 Explained by the Campaign	Difference between Crisis Year and 1992 Explained by the Campaign
Panel A: Crisis Year Estimates without Linear Oblast Time Trends:			
1993	21.27%	27.08%	30.87%
1994	15.70%	18.63%	20.33%
1995	26.74%	32.86%	36.63%
Panel B: Crisis Year Estimates with Linear Oblast Time Trends:			
1993	21.32%	27.14%	30.94%
1994	17.30%	20.52%	22.40%
1995	32.95%	40.50%	45.15%

Predicted change in crude death rates for each mortality crisis year obtained by multiplying mean campaign intensity by the parametric estimates for crisis year interactions shown in Table 6. Predicted changes were then divided by actual changes in crude death rates using the methods shown at the top of each column to obtain shares of the mortality crisis shown in each cell.

Appendix 1: Data

This appendix describes the sources used to construct our new oblast-year panel data set spanning 1970-2005 that includes mortality rates, official sales and illegal home-production of alcohol, and socio-economic and demographic characteristics. We use the term "oblast" throughout, but geographic areas also include several krais (Altaiskii, Krasnodarskiy, Krasnoyarskii, Khabarovskii, Primorskii, Stavropolski) and autonomous republics (Altai, Bashkortostan, Buryatiya, Chuvash, Dagastan, Kabardino-Balkarskaya, Kalmykaya, Karachaevo-Cherkesskaya, Karelia, Khakasiya, Komi, Marii-El, Mordovaya, North Osetiya-Alaniya, Sakha, Taatarstan, Tuva, Udmurtskaya).

From the 1960s until 1986, statistics on deaths, alcohol production/consumption, and crime were collected but not made publicly available for political purposes. Under Glasnost and Mikhail Gorbachev's leadership, however, the Central Statistical Office of the Soviet Union (*Goskomstat*) resumed publication of oblast-level mortality statistics in annual demographic yearbooks in 1986 (publication of official alcohol sales data and crime statistics resumed shortly thereafter – in 1987 and 1988, respectively). Since the 1980s, an estimated 94% of all deaths in Russia have been medically certified (with the remainder certified by trained paramedics called *feldshers*) (Shkolnikov et al. 1996). Oblast governments then use these death records to construct oblast-level mortality statistics by age, sex, and cause. In principle, these oblast-year statistics are available from *Goskomstat* (and its successor *Rosstat*). Obtaining these records is not easy in practice, so we also conducted a comprehensive search of all Russian and English language publications with statistics on mortality, alcohol, and crime in constructing our dataset.

Vital Statistics

Our primary dependent variable is the crude death rate (CDR), which is defined as the number of deaths per 1,000 people. The CDR is calculated as the number of deaths from all causes in a calendar year divided by the mid-year *de facto* population (the official inter-censual population estimate) and is available for years 1970, 1978, 1980, 1985, 1986, and 1988-2005 (Goskomstat SSSR 1987; New World Demographics 1992; Goskomstat Rossii 1992; 1993a; 1995; 1996b-2005b).

We also study death rates (per 100,000 population) by several categories of causes. In the Soviet Union, cause-specific deaths were reported using a Soviet classification system containing 175 categories. These were later reclassified according to the World Health Organization's International Classification of Diseases (ICD) (see below). Given the focus of our study, an important cause of death is alcohol poisoning (a marker for a broader set of alcohol-related deaths). The Soviet Union and Russian Federation require that sudden, unexpected deaths be investigated (almost always involving an autopsy). Cases of alcohol poisoning are identified when blood alcohol concentrations exceed 250 mg/dl and in the absence of other apparent causes. Alcohol poisoning deaths are reported separately for men and women and are available for years 1978/9 and 1988-2005. These data were graciously provided by Vladimir Shkolnikov. To convert alcohol poisoning deaths (which are reported by age group for years 1989-2005) into overall death rates (per 100,000), we use the 1998 European Standard Population. Alcohol poisoning death rates are then the weighted average of the age-specific rates (using standardized population shares as weights).

In addition to alcohol poisonings, we study data on deaths by other major causes: neoplasms/cancers (group 2, codes 140-239), circulatory diseases including cardiovascular

diseases (group 7, codes 390-459), acute respiratory infections (group 8, codes 460-519), diseases of the digestive system (group 9, codes 520-579) and accidental/violent deaths (accidents, other poisonings, homicide, and suicide (group 17, codes 800-999). About half of deaths in the last category are thought to be alcohol-related (Nemtsov 1998; 2000). These data are available for 1978/8, 1988/9 and annually since 1990 (Goskomstat Rossii 1993b; Goskomstat Rossii 1996b-2005b; Vallin et al. 2005).

Evaluations of Russia's mortality statistics generally conclude that they are acceptable in quality with relatively little under-reporting. Exceptions are Tuva and regions in the North Caucasus (Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai) where studies of infant mortality under-reporting suggest rates as high as 25% during the 1980s (Blum and Monnier 1989). The cause of death statistics appear somewhat less reliable as many alcohol related deaths seem to be classified as cardiovascular disease or cause unknown (Andreev 1999, Gavrilova et. al. 2005, Zaridze et al. 2009).

Between 1969 and 91, the Soviet cause-of-death classification system was changed three times (in 1970, 1981 and 1988). The Soviet system from 1965 to 1970 was similar to WHO ICD-8 codes, and the revisions in 1981 and 1988 closely resembled WHO ICD-9 codes (Goskomstat created a key matching the two) (Shkolnikov et al. 1996). The analyses of Vallin et al. (1996) suggest that the changes in 1970 and 1981 did not influence the registration of deaths from major causes (at least at ages up to age 65) (Vallin et al. 1996). The 1988 revision simply merged the previous classification's 'employment-related' and 'non-employment-related' alcohol poisoning subgroups into a single category. A comparison of data from Russia and the three Baltic countries (Estonia, Latvia, and Lithuania which shifted before 1999) shows no discontinuity, suggesting that data before and after the coding change are roughly comparable (Mesle et al. 1996).

Population Measures

Population estimates used to convert deaths into death rates are based on the Soviet censuses of 1970, 1979, and 1989 Soviet censuses and the 2002 census of the Russian Federation. These censuses were conducted on January15, 1970; January17, 1979 and 1989; and between October 9 and 16, 2002. Using census population counts, *Goskomstat* produced official population estimates for January 1 of each census year. For inter-census years, oblast statistical offices estimated their populations using information on births and deaths as well. Population estimates were also adjusted using data on internal migration collected by the Ministry of the Interior. Mid-year *de facto* populations used as denominators for constructing rates are calculated as arithmetic means of population estimates at the beginning of a given year and the subsequent year (Goskomstat SSSR 1990; New World Demographics 1992; Goskomstat Rossii 1993c; Goskomstat 1996a-2005a).

Alcohol Production, Sales, and Prices

As a monopolist, the government of the Soviet Union decided official alcohol production, pricing, foreign trade, and domestic distribution. *Goskomstat* collected statistics on alcohol sales from reports of government retail trade networks across the country (but do not alcohol sold on military bases). After Russia's political and economic transition, *Rosstat* continued collecting data in the same way, although data after 1992 do not include legal private trade and restaurant

sales. More importantly, official sales statistics also do not include illegal home production of alcohol ('*samogon*').

Data on official sales are reported in billions of rubles and in volume of pure alcohol for years 1970, 1980, 1985 and 1989. In addition, official sales data are reported in liters of pure alcohol per person for 1970, 1980, 1984, 1985 and 1989-1992. We also have information on sales of specific types of alcoholic beverages (vodka, wine, beer, champagne, and cognac). The numbers for individual beverages sales are reported in liters per person and are available for years 1970, 1980, 1984, 1985, 1989-1992, and 1997-2005. Sales data for cognac and champagne were available since 1999 only. We converted the sales data for specific types of beverages into total sales of pure alcohol using the following assumptions about alcohol concentrations for each type of beverage (from Andrienko and Nemtsov 2006): Russian vodka 40%; wine 14.4%; cognac 18%; champagne 22.8%; beer 2.85% (before 1995), 3.37% (between 1995 and 1999), and 3.85% (after 2000). To summarize, we calculate alcohol consumption per capita in liters of pure alcohol from sales of different types of alcoholic beverages using the following formula:

Liters of Pure alcohol = 0.144*wine + 0.4*vodka+ 0.228*champagne + 0.18*cognac
+ 0.285*beer*1(1970-1994) + 0.337*beer*1(1995-1999) + 0.389*beer*1(2000-2005).

We thus generate a panel of oblast-level total alcohol sales data from 1970 to 2005 (with gaps). The data prior to 1997 (when both official sales and sales of specific beverages types are reported) show that our calculations using beverage-specific data closely matches the *Goskomstat* official data on pure alcohol sales.

Alcohol prices are available at the oblast level only following Russia's political and economic transition. Specifically, we have annual information about the price of a liter of domestic vodka at the end of year beginning in 1992 (Goskomstat Rossii 1996c; 1996d; 1997e; 1998e; 2002c; 2006c). For earlier years, we calculate alcohol prices using information on official alcohol sales and production. For alcohol sales, we have data on liters per person and sales in rubles for years 1970, 1980, 1985, and 1989. In addition, we have data on alcohol production in both 1,000s of liters and rubles per person for years 1999-2004. We then calculate the average price of a liter of pure alcohol between 1970 and 1989 by dividing total sales in rubles by the total quantity sold (or produced). Similarly, we calculate the price of pure alcohol after 1999 by multiplying total alcohol production in rubles per person by the oblast population and then dividing by total alcohol produced (in liters).

Additional Data Sources (Not Cited in the Text)

Goskomstat Rossii. 1992. *Pokazateli sotsial'nogo razvitiia respublik, kraev i oblasteĭ Rossiĭskoĭ Federatsii*. Moscow: Goskomstat.

Goskomstat Rossii. 1993a. *Pokazateli sotsial'nogo razvitiia respublik, kraev i oblasteĭ Rossiĭskoĭ Federatsii*. Moscow: Goskomstat.

Goskomstat Rossii. 1993b. *Demograficheskii Ezhegodnik Rossii*. Moscow: Goskomstat.

Goskomstat Rossii. 1993c. *Rossiĭskaia Federatsiia v 1992 godu*. Moskow: Goskomstat.

Goskomstat Rossii. 1994. *Rossiĭskiĭ Statisticheskiĭ Ezhegodnik: statisticheskiĭ sbornik*. Moscow: Goskomstat.

Goskomstat Rossii. 1995. *Demograficheskii Ezhegodnik Rossii*. Moscow: Goskomstat.

Goskomstat Rossii. 1996a-2005a. *Rossiiskii statisticheskii ezhegodnik,* Moscow: Goskomstat.

Goskomstat Rossii. 1996b-2005b. *Demograficheskii Ezhegodnik Rossii*. Moscow: Goskomstat.

Goskomstat Rossii. 1996c, 2002c, 2006c. *Tseny v Rossii : statisticheskiĭ sbornik*, Moscow: Goskomstat.

Goskomstat Rossii. 1996d. *Srochnoe Soobshchenie ob izmenenii tsen na prodovolstvennie tovari posostoyaniyu na 30 dek 1996*, Moscow: Goskomstat.

Goskomstat Rossii. 1997e-1998e. *Srednie ts eny na prodovolstvennie tovary v dekabrya.* Moscow: Goskomstat.

Goskomstat Rossii. 1997f-2001f. *Regiony Rossii*, Moscow: Goskomstat.

Goskomstat Rossii. 1998g, 2000g, 2002g. *Promyshlennost' Rossii: statisticheskii sbornik.* Moscow: Goskomstat.

Goskomstat Rossii. 1999h-2004h. *Proizvodstvo i oborot etilovogo spirta i alkogol'noi produktsii v Rossiiskoi Federatsii*. Moscow: Goskomstat.

Goskomstat Rossii. 2002i-2005i. *Regiony Rosii. Sotsial'no-ekonomicheskie pokazateli***,** Moscow: Goskomstat.

Goskomstat Rossii. 2002j, 2006j. *Ekonomicheskaia aktivnost' naseleniia Rossii*. Moscow: Goskomstat.

Goskomstat SSSR. 1987. *Naselenie SSSR*, Moskow: Finansy i statistika.

Goskomstat SSSR. 1990a. *Demograficheskii Ezhegodnik SSSR*. Moscow: Goskomstat.

Goskomstat SSSR. 1990b. *Narodnoe khoziaistvo SSSR: statisticheskii ezhegodnik*, Moscow: Goskomstat.

Appendix 2: Calculation of "Full Alcohol Consumption" (Pure Alcohol Sales and *Samogon* Production)

Alcohol sales data only capture official sales of state-produced alcoholic beverages. However, there is considerable anecdotal evidence that illegal production of alcoholic beverages, especially *samogon*, increased markedly during the Gorbachev Anti-Alcohol campaign. Ignoring this behavioral response would lead us to over-estimate the intensity of the campaign and possibly under-estimate the campaign's link with mortality reductions.

We therefore require some method of estimating illegal alcohol production (primarily *samogon*) to construct our full alcohol consumption measure (which combines *samogon* and official consumption). Nemtsov (1998, 2000) developed an indirect method to infer total alcohol consumption before, during and after the campaign. This approach was first applied to Moscow (Nemtsov 1998) and later extended to other Russian oblasts (Nemtsov 2000). In urban places such as Moscow, sugar is the main ingredient required for the *samogon* production. Nemtsov therefore used sugar sales data to calculate excess sugar consumption in Moscow by subtracting the food standard of sugar from total sales.[31] Together with the average sugar concentration of *samogon*, this excess sugar measure then yields an estimated volume of *samogon* production. This approach may be considered reasonable for years up to 1986 (it was used specifically for years 1983-1986), when sugar rationing began in the Soviet Union.

To obtain estimates of *samogon* production over a longer time period, Nemtsov then sought a measure that was highly correlated with official alcohol sales but was also observed outside of the 1983-1986 period. He therefore turned to forensic records for violent and accidental deaths. The Soviet Union and the Russian Federation required oblast-level forensic bureaus to conduct autopsies for all violent and accidental deaths as well as deaths without clear causes. These forensic records report for all cases both causes of death and blood alcohol content. Because these records were never made public during the Soviet era, there is little reason to suspect systematic manipulation for political purposes.

Specifically, this autopsy-based approach uses the ratio of autopsies with positive blood alcohol content (minus deaths due to acute alcohol poisoning) to the number of autopsies with no blood alcohol content. This measure closely tracks the spatial and geographic pattern of total alcohol consumption according to the sugar-based samogon measure for Moscow between 1983 and 1986 and outperforms other candidate proxies considered by Nemtsov (such as hospital admissions for alcohol-induced psychosis, cirrhosis deaths, and pancreatitis deaths). Assuming that the same relationship between total alcohol consumption and share of autopsies with positive blood alcohol content holds for other Russian oblasts as well, Nemtsov used the share of autopsies with positive blood alcohol content in 25 other oblasts to predict total alcohol consumption for these twenty-five oblasts between 1980 and 1993 (representing 45% of the total Russian population – see Nemtsov 2000).[32]

Russian autopsy records are not available to us. However, we are able to make use of the statistical relationship between official sales and the Nemtsov (2000) measure of total alcohol

---

[31] Nemtsov (1998) uses the minimum amount of sugar sold (per person and month) in the state retail network during the period 1983 to 1986. The figure he uses – 24.3 kg of sugar (recorded for September of 1985) – is close to the average sugar consumption (24 kg) in the Soviet Union as reported by the Institute of Nutrition of the Soviet Union in the Academy of Medical Sciences.

[32] These oblasts were 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, Yaroslav.

consumption (including *samogon*) to approximate total alcohol consumption. We specifically proceeded as follows. Equation (2) in Nemtsov (2000) reports the linear regression coefficient of *samogon* consumption on official sales for 1990: *samogon* = 12.38 – 1.02*official sales. Because the univariate regression slope is equal to Cov(*Samogon*, Sales)/(Var(Sales)$^{1/2}$), we can recover the covariance using the observed variance of official sales. The correlation coefficient between *samogon* production and official sales reported in the paper (r=-0.6) also allows us to recover the standard deviation of illegal consumption. Given available data, this approach allows us to calculate the covariance between *samogon* and official sales for years 1980, 1984, 1985, 1989, and 1991-1993. Assuming that the variance of official sales remains roughly constant over time, we calculate the regression coefficients for all years. We also require an estimate of the constant for years other than 1990 (which is given in equation (2) in Nemtsov (2000)). To obtain this, we use information on official sales and total consumption for all of Russia reported in Table 3 of Nemtsov (2000). Because we know total consumption (the dependent variable) and official sales (the independent variable) for Russia as well as the slope coefficient (from the calculation before), we can then derive the regression constant.

With our recovered constant and slope coefficients, we then predict total consumption (including *samogon*) using official sales data for 1980, 1984, 1985, 1989, 1990, 1991, 1992. To informally validate these total (or "full") consumption estimates, we compare means to the total consumption averages for the six large regions in Russia (North and Northwest region, Central region, Northern Caucasus, Urals and Volga region, Western Siberia, Russian Far East) reported in Table 5 and to the overall averages of total consumption reported in Table 5 of Nemtsov (2000). Our calculations provide estimates of total consumption that are very close to Nemtsov's published figures. As a final step, we use our coefficient estimates and official alcohol sales data to predict full alcohol consumption for the remaining Russian oblasts for the years with observable data from 1980 to 1993.

APPENDIX TABLE A1:
CHANGES IN CRUDE DEATH RATES UNDER THE GORBACHEV ANTI-ALCOHOL CAMPAIGN WITHOUT LOWER DATA QUALITY OBLASTS

Alcohol Measure:	**Full Alcohol Consumption**		**Official Alcohol Consumption**	
Campaign Intensity	7.936***	3.707***	4.775***	2.474***
	(1.418)	(1.199)	(0.870)	(0.458)
Year Fixed Effects	Yes	Yes	Yes	Yes
Oblast Fixed Effects	Yes	Yes	Yes	Yes
Oblast-Specific Linear Trends	No	Yes	No	Yes
N	338	338	361	361
R2	0.955	0.986	0.954	0.986

The dependent variable in all regressions is the crude death rates per 1,000 population. All oblast-year samples are restricted to years 1970-1989 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, **p<0.05, and ***p<0.01.

APPENDIX TABLE A2:
INSTRUMENTAL VARIABLES ESTIMATES OF CRUDE DEATH RATE CHANGES UNDER THE ANTI-ALCOHOL CAMPAIGN WITHOUT LOWER DATA QUALITY OBLASTS

Alcohol Measure:	**Full Alcohol Consumption**	
Campaign Intensity	5.273	11.89***
	(4.636)	(3.952)
Year Fixed Effects	Yes	Yes
Oblast Fixed Effects	Yes	Yes
Oblast-Specific Linear Trends	No	Yes
First-Stage F Statistic	15.84***	7.30***
N	338	338
R^2	0.953	0.978

The dependent variable in all regressions is the crude death rates per 1,000 population. All oblast-year samples are restricted to years 1970-1989 and and exclude Tuva, Dagastan Republic, Ingushitya Republic, Chechen Republic, Kabardino-Balkarskaya Republic, Karachaevo-Cherkesskaya Republic, North Osetiya-Alaniya Republic, Krasnodarskiy Krai, and Stavropolski Krai. The interaction between 1979 population share Muslim and campaign year is used to instrument for percent change alcohol in each campaign year. Standard errors clustered at the oblast level shown in parentheses. *p<0.10, **p<0.05, and ***p<0.01.

APPENDIX TABLE A3:
CHANGES IN CRUDE DEATH RATES UNDER THE GORBACHEV ANTI-ALCOHOL CAMPAIGN
CONTROLLING FOR ADDITIONAL OBLAST-YEAR COVARIATES

Alcohol Measure:	**Full Alcohol Consumption**							
Campaign Intensity	5.848***	3.200***	5.900***	3.399***	5.936***	3.443***	5.948***	3.374***
	(1.600)	(0.947)	(1.537)	(1.126)	(1.578)	(1.126)	(1.692)	(1.134)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Oblast Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Oblast-Specific Linear Trends	No	Yes	No	Yes	No	Yes	No	Yes
Controls:								
Fertility Rate	Yes	Yes	No	No	No	No	Yes	Yes
Doctors per Capita	No	No	Yes	Yes	No	No	Yes	Yes
Hospital Beds per Capita	No	No	No	No	Yes	Yes	Yes	Yes
N	318	318	312	312	311	311	311	311
R2	0.952	0.991	0.953	0.992	0.953	0.992	0.953	0.992

The dependent variable in all regressions is the crude death rates per 1,000 population. All oblast-year samples are restricted to years 1970-1989. Standard errors clustered at the oblast level shown in parentheses. *p<0.10, **p<0.05, and ***p<0.01.