SOCIAL STRUCTURE AND DEVELOPMENT:
A LEGACY OF THE HOLOCAUST IN RUSSIA*

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We document a statistical association between the severity of the persecution, displacement and mass murder of Jews by the Nazis during World War II and long-run economic and political outcomes within Russia. Cities that experienced the Holocaust most intensely have grown less, and both cities and administrative districts (oblasts) where the Holocaust had the largest impact have worse economic and political outcomes since the collapse of the Soviet Union. We provide evidence that the lasting impact of the Holocaust may be attributable to a permanent change it induced in the social structure across different regions of Russia. *JEL* Codes: O11, P16, N40.

I. INTRODUCTION

The mass murder of as many as 6 million Jews in the Holocaust during World War II was a major cataclysmic event for Europe, Russia, and the world. In this article, we investigate some of the economic and political legacies of the Holocaust within Russia.[1]

Our empirical analysis shows a persistent correlation between the severity of the persecution, displacement, and mass murder of Jews due to the Holocaust and long-run economic and political outcomes in Russia. We construct a proxy measure for the severity of the Holocaust by using the prewar fraction of the population of

Jewish origin in cities and oblasts (an administrative unit with a typical size between a U.S. county and state) and interacting it with information on which areas were under German occupation during World War II. We also use information on changes in the size of the Jewish population before and after World War II (only for oblasts). We find that cities where the Holocaust was more intense have relatively lower population today and have voted in greater numbers for communist candidates since the collapse of the Soviet Union. Similar results also hold for oblasts that were impacted relatively more by the Holocaust. Such oblasts have lower levels of per capita income and lower average wages today. Moreover, they tend to exhibit greater vote shares for communist candidates during the 1990s and higher support for preserving the Soviet Union in the referendum of 1991.

By its nature, the evidence we present in this article is based on historical correlations and should thus be interpreted with caution. We cannot rule out the possibility that some omitted factor might be responsible for the statistical association between the severity of the Holocaust and the long-run economic, political, and social development of Russian cities and oblasts. Nevertheless, the patterns we document are generally robust across different specifications. We also show that prior to World War II, the economic performance of these areas did not exhibit differential trends.

One difficulty with the interpretation of our results is that the magnitudes of the estimated effects are large. For example, using the city-level data, our estimates suggest that the "average" occupied city (meaning a city with the average fraction of Jewish population among occupied cities) would have been about 14% larger in 1989 had it not been occupied by the Nazis. This effect is significantly larger than the possible direct impact of the Holocaust on the size of city populations through the mass murder of the Jewish inhabitants. Though this magnitude might reflect the presence of omitted factors, it may also result if the Holocaust caused a divergent trend among Russian cities and oblasts. The general pattern of our results, which show an effect growing over time, is consistent with such divergence.

We investigate two possible channels through which the Holocaust may have caused a divergent trend across Russian cities and oblasts: (1) its impact on social structure (the size of the middle class); and (2) its impact on educational attainment. There is a long tradition in social science linking social structure, in
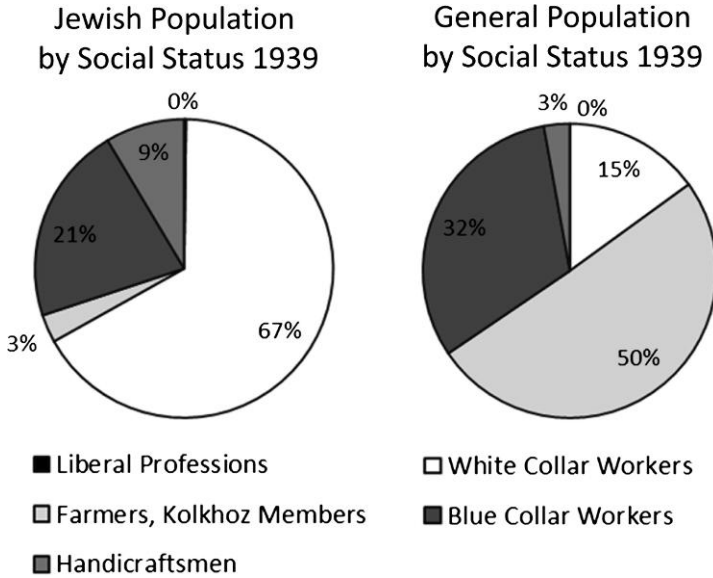
Jewish Population by Social Status 1939

General Population by Social Status 1939

0%
9%
21%
3%
67%

3% 0%
15%
32%
50%

■ Liberal Professions   □ White Collar Workers
□ Farmers, Kolkhoz Members   ■ Blue Collar Workers
■ Handicraftsmen

FIGURE I
Jewish and General Population by Social Status, 1939

particular the presence of a large middle class, to political and economic development.[2] Before the initiation of Operation Barbarossa on June 22, 1941, which led to the German occupation of extensive parts of westem Russia, Jews were heavily overrepresented in what we would typically consider to be middle-class occupations.[3] Over 67% of the Jews living in Russia held white-collar jobs, whereas only about 15% of non-Jews had white-collar occupations (see Figure I). Jews thus constituted a large share of the

2. De Tocqueville (1835, 1840, [2000]), Pirenne (1925, 1963), and Moore (1966) viewed the size of the middle class as a key factor in promoting political development. Recent works emphasizing this viewpoint include Huntington (1968), Lipset (1959), and Dahl (1971). Murphy, Vishny and Shleifer (1989), Engerman and Sokoloff (1997), Acemoglu, Johnson, and Robinson (2005), and Acemoglu and Robinson (2006) propose different mechanisms through which the existence of a large and/or politically powerful middle class might encourage long-run economic and political development.

3. Altshuler (1993a) estimates a total Jewish population of 2,864,467 for Russia, the Ukraine, and Belarus in 1939. The exact number and distribution of Holocaust victims is controversial in the historical literature. Nevertheless, the scholarly consensus is that around 1 million Jewish victims of the Holocaust were residents of the former Soviet Union (see Maksudov 2001a).

middle class. For example, in the occupied areas with the largest Jewish communities, 10% of white-collar workers in the trade and health care sectors, and 68% of all physicians were Jewish. After the invasion of the Soviet Union, the Nazis initiated the Holocaust and systematically persecuted and murdered the Jewish population of the territories they occupied. The Holocaust was therefore a major shock to the social structure of the invaded regions. We document a statistical association between the Holocaust and the size of the middle class after the war (in 1959) and more recently (in 1970, 1979, and 1989).

One complication with interpreting the channel between the Holocaust and contemporary outcomes is that until the 1990s, the Soviet Union was a centrally planned economy. Thus the divergence may not be directly attributable to changes in relative prices or economic returns. However, the presence of central planning does not rule out potential local economic and political effects. For example, the size of the middle class may have influenced economic and social development through political channels because the local bureaucracy and local party officials were typically recruited from the middle class. Moreover, the initial shock to the size of the middle class may have propagated through central planning itself. The existing consensus is that Soviet economic planning determined the allocation of resources in a highly "history-dependent" manner.[4] Thus the postwar changes in the occupational, industrial, and educational mix of a city or an oblast could have plausibly affected what types of resources were allocated to that area in future plans, leading to an overall pattern of divergence triggered by postwar differences.[5]

Although the effect on the size of the middle class is a plausible catalyst for large adverse effects of the Holocaust over the long term, the evidence we are able to provide is again based on historical correlations. We thus exercise due caution in the interpretation of our results.

4. This is discussed in Roland (2000), who describes the process of resource allocation in the Soviet Union as "planning from the achieved level" (p. 8).

5. It should be emphasized that central planning tended to focus on outputs, and Hanson (2003, 12) notes: "People were not sent under compulsory plan instructions to work at this or that enterprise. They could and did change jobs of their own volition ... By and large ...there was a market relationship between the state as employer and the household sector as a provider of labour services. People needed to be induced by pecuniary and non-pecuniary benefits to work at a particular workplace."

An obvious challenge to our results is that Russian society was subject to other large and persistent shocks throughout both the 1920s, 1930s, and during the postwar era. These include the Stalinist purges in the 1930s and the great famine that struck the countryside in 1932 and 1933 following the collectivization of agriculture and the draconian grain requisitioning policies.[6] Perhaps most important, the entire Soviet Union suffered tremendous loss of life and hardship under German occupation.[7] These shocks, terrible though they were, appear not to confound our results. The famine mostly devastated rural areas, but most Jews were in urban areas. The Stalinist purges also caused much damage on Russians and Jews, and may be confounding our results (though the purges before World War II were not specifically targeted at Jews, but at supposed opponents of the regime). As an attempt to separate the effects of the Holocaust from other potential long-run impacts of German occupation, we report both results that rely only on comparisons among cities occupied by the Nazis as well as results from regressions that control for estimates of the total loss of life. These results are very similar to our baseline findings.

An additional challenge is that the effects we are estimating might be partly due to differences in the current fraction of the population that are Jewish. We believe that this alternative mechanism is unlikely to be responsible for our results because few Jews remain in different parts of Russia today (only 0.11% of the population in 1989 and less after the 1990s) and our results are robust to controlling for the current Jewish fraction of the population.[8]

Finally, it is unclear how the economic interpretation of our findings would generalize beyond the Russian context. First, as noted, central planning during the communist era may have contributed to the persistent impact of the Holocaust on social

6. On the famine, see Conquest (1986), Davies and Wheatcroft (2004), and Maksudov (2001b); and on Stalinist purges, see Conquest (1990).
7. The total loss of Russian life during the war is estimated to be about 26–27 million (Ellman and Maksudov 1994).
8. While all of our key economic and political outcome variables are for the 1990s and early 2000s, and thus could potentially be affected by Jewish outmigration from Russia, we show that the effects on city population and size of the middle class are present before the 1990s, suggesting that the effects we find are unlikely to be a simple consequence of Jewish outmigration in the 1990s.

structure. Second, the relationship between the size of the middle class and political and economic development may have been qualitatively different during the communist era than in a market economy. Third, the association between the Holocaust and our economic outcomes (which are measured in 2002) may have become particularly pronounced only after the collapse of communism. Available data do not enable us to provide direct evidence on these possibilities.

The Holocaust undoubtedly had many diverse cultural, social, and psychological effects, many of which have been studied by historians and other scholars. Nevertheless, it appears that the quantitative consequences of the Holocaust for long-run economic and political development have not previously been examined. This also appears to be true with respect to earlier persecutions of Jews, such as their expulsion from Spain in 1492.[9] There is a voluminous academic literature on the origins, causes, nature, and influence of the Holocaust. Part of this work focuses on issues such as what lessons have been drawn from the Holocaust or how societies, individuals, and families that lived through it have dealt with this experience (e.g., Bartov 2000; Stone 2004; Berenbaum 2007). The study of the political consequences of the Holocaust has focused on the extent of anti-Semitism, the implications for the strength of nationalism, and the formation of the state of Israel. Economic issues are discussed in the Holocaust literature in several contexts. One is the expropriation of the wealth and assets of Jewish people (e.g., Rickman 2006; Aly 2007). Another is the economic loss incurred during the war itself by the murder of so many skilled workers (Hilberg 2003). Expropriations of Jewish assets in themselves may have had long-run effects, for example on postwar income distribution, and Gross (2006) argues that they can explain the persistence of anti-Semitism in Poland. Particularly relevant to our study is Waldinger's recent work on the effect of the expulsion of Jewish academics on German universities (Waldinger 2009).

Our findings on long-run economic consequences relate to a broader literature about the enduring effects of negative shocks or crises. Perhaps the most famous example concerns the economic

9. The one example where the wholesale persecution and explusion of a religious community has been recognized to have had long-run economic effects is the case of the Huguenots (Scoville 1960; Benedict 2001).

and institutional consequences in Europe of the outbreak of the Black Death in the 1340s (North and Thomas 1973). Another famous example is Olson (1982)'s argument that the destruction and dislocation wrought by World War II in Europe promoted economic growth by destroying rent-seeking coalitions. Other examples include the effects of the 1840s Irish famine on emigration and industrialization (O'Rourke 1994; Ó Gráda 2000), the effects of general loss of life and economic damage caused by wars (Davis and Weinstein 2002; Barber and Dzeniskevich 2005; Miguel and Roland 2007), and the persistent effects of slavery and slave trade on Sub-Saharan Africa (e.g., Law 1991; Lovejoy 2000; Nunn 2008). In related research, Chaney (2008) studies the long-run impact of the 1609 expulsion of 120,000 Moriscos (descendants of Muslims converted to Christianity during the Spanish reconquest) and finds that 178 years later former Morisco areas were relatively more agrarian. It is also worth noting that the long-run implications of general collapses in population may be very different from the long-run implications of events that change the composition of the population in terms of social structure and educational attainment, such as the Holocaust and the Cambodian genocide (which specifically targeted educated and middle-class Cambodians, see e.g., Kiernan 2002). This might be at the root of the differences between our results, which show significant long-run implications, and those of Davis and Weinstein (2002) and Miguel and Roland (2008), who do not find such long-run effects from general collapses in population in Japan and Vietnam.

The article proceeds as follows. Section II reviews the historical background of the Jewish population of Russia, the German occupation of the Soviet Union, and the Holocaust. Section III discusses the data and its construction, presents some descriptive statistics, and explains our measures of the potential impact of the Holocaust in more detail. Section IV investigates the relationship between the potential impact of the Holocaust and economic and political outcomes across Russian cities. Section V then looks at similar relationships at the oblast level and also documents the relationship between the Holocaust and the evolution of the size of the middle class. Section VI contains additional robustness checks. Section VII concludes, and the Online Appendix contains additional robustness checks and details on data construction.

II. THE HOLOCAUST IN SOVIET RUSSIA

II.A. *Distribution of the Jewish Population in Prewar Russia*

The key source of variation in our measure of the impact of the Holocaust is the location of the Jews in Russia before the German occupation. The origins of Jewish communities in Russia were in the Greek colonies around the Black Sea in the third or fourth century B.C.E. Jewish communities spread into Armenia and the Crimea, and it appears that the conversion of the Khazars of the Northern Caucuses to Judaism in the eighth century played an important role in establishing large Jewish populations in southern Russia and the Ukraine (see Beizer and Romanowski 2007). After the collapse of the Khazarian state, Jews scattered over a large territory in western Russia.

The other main source of Jewish settlements in the Soviet Union was the kingdom of Poland and Lithuania. In the fourteenth century Lithuania gained control of large parts of western Russia, and by the end of the century the first privileges were granted to Jewish communities. Poland became something of a haven for Jews during this period and was the recipient of migration from other parts of Europe, including Spain after the expulsion of the Jews in 1492. During this early period, the principality of Moscow, the hub of the future Russian state, was very hostile to Jews and excluded them from its territories. The Russian expansion west, however, brought large Jewish communities within its borders. This was particularly so with the three partitions of Poland in 1772, 1793, and 1795. The location of Jews was institutionalized with a decree by Catherine the Great in 1791, which confirmed their right to live where they had been in Poland and on the Black Sea shore; these areas, along with Bessarabia, annexed in 1812, and parts of the Napoleonic kingdom of Poland, annexed in 1815, formed the "Jewish Pale." The Pale consisted of about 20% of the territory of European Russia, and included much of present-day Lithuania, Belarus, Poland, Moldova, Ukraine, and parts of western Russia. The Jews formed about one ninth of the population of this area. Beizer and Romanowski (2007, 532) describe the social role of the Jews as: "they essentially formed the middle class between the aristocracy and the landowners on the one hand, and the masses of enslaved peasants on the other."

Until the Pale was abolished in February 1917, there were few opportunities for Jews to live outside it. Alexander II granted the right of residence throughout Russia to selected "useful" Jews, such as wealthy merchants (in 1859), university graduates (in 1861), and certified craftsmen (in 1865), but restrictions on Jews became more severe after his assassination in 1881 (Kappeler 2001). According to the census of 1897, within the Pale, Jews formed 72.8% of all those engaged in commerce and 31.4% of those engaged in crafts and industry.

After the October Revolution in 1917 and the introduction of central planning in 1927, the occupational structure of Jewish communities changed drastically. Many Jews belonged to economic classes that were supposed to vanish in the transition to a socialist economy, and three types of solutions were foreseen. The first was agricultural resettlement of Jews. The second was migration out of the former Pale and into the interior of Russia. The third was concentration of Jews into the large towns and cities of the western Soviet Union where new industrial enterprises had developed along with a new Soviet bureaucracy and civil service. In practice, this third option dominated (Levin 1988).

The most important conclusion of this section for our research is that the distribution of the Jewish population in 1941 was largely the result of idiosyncratic historical circumstances coupled with the anti-Semitism of the Russian state that kept Jews confined to the Pale.[10]

II.B. The German Occupation and the Holocaust

On June 22, 1941, the German invasion of Russia, Operation Barbarossa began.[11] Units of the German army quickly penetrated deep into Soviet territory with Kiev captured by the end of September. At the time of the invasion there was no general order specifying that all Jews were to be murdered. The "Final Solution to the Jewish question" only emerged in October 1941 and began to be implemented in March 1942 (Browning 2004).[12] Indeed,

10. Other factors may also have had some effect. For instance, Hosking (1997, 33) argues that the origins of the Pale partially lay with Moscow merchants petitioning the state to be shielded from Jewish competition.

11. For a comprehensive account of the military campaigns fought in Russia between 1941 and 1945, see Erickson (1975, 1983). On German occupation in Russia, see Dallin (1981); in Ukraine, see Berkhoff (2004).

12. On the planning and implementation of the Holocaust, see Hilberg (2003). On the Holocaust in the Soviet Union, see Hilberg (2003, 271–390), Yahil (1990,

it was the ferocity of the murder of Jews in western Russia that appears to have convinced senior Nazis that the total annihilation of European Jews was feasible.

The main groups that emerged to head this mass murder were four *Einsatzgruppen*, which each consisted of 3,000 men who followed closely behind the army front lines and played a pivotal role in ensuring control over the newly won areas. The Einsatzgruppen were special units of the Security Police and the SD (*Sicherheitsdienst*) controlled by Reinhard Heydrich. Their orders were to eliminate all communist cadres, partisans, or others who threatened the goals of "pacification".[13] The Einsatzgruppen were the spearhead of a much larger contingent of SS. These included 21 battalions of Order Police and an SS Cavalry brigade, all of which were ultimately deeply implicated in the systematic murder of Russian Jews (though many citizens of the Soviet Republics also collaborated with the Nazis and were involved in the murder of Jews).

In practice, the mass murder of Jews began on day one of the invasion in Garsden in Lithuania on June 27. Shortly afterward, at least 2,000 Jews were killed in Bialystok by a Police Battalion associated with the *Wehrmacht*, apparently at the initiative of junior officers (Browning 2004, 255–256). The killing spread with extraordinary ferocity, a famous instance being the Babi Yar massacres where over 33,000 Jews were killed outside Kiev on September 29 and 30 (Bartov 2001). By the end of the July, the *Einsatzgruppen* reported to have killed 63,000 people, 90% of whom were Jews (Browning 2004, 260). As the invasion proceeded, the killing intensified with the move to murdering women and children, and finally the establishment of the idea that all Jews should be killed.

The territories conquered after June 1941 were administered in different ways. The Reich Minister for the Eastern Occupied Territories, Alfred Rosenberg, was in charge of the *Reichskommissariat Ostland* (eventually comprising Latvia, Lithuania, Estonia, and Belorussia), which was formed on July 25 with its capital at Riga as well as the *Reichskommissariat Ukraine,* formed on September 1 and eventually comprising roughly Soviet Ukraine

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253–305), and Ehrenburg and Grossman (2002); on the Holocaust in Ukraine, see Gesin (2006) and Lower (2005) .

13. A selection of reports of the Einsatzgruppen have been translated into English (Arad Krakowski and Spector 1989).

west of the River Dnieper, but excluding Transnistria in the southwest, which was administered by the Romanians. The two Reichskommissariate were in turn under Reichkommissars Heinrich Lohse and Erich Koch. Western Ukraine, which was part of Poland until September 1939, was administered by the Generalgouvernement of Poland, headed by Hans Frank (Gross 1979). Finally, the areas to the east of these zones in Russia were administered by the three army groups of the Wehrmacht.

The administration of these different entities varied considerably. In the civilian areas, nominally under the control of Rosenberg, Lohse and Koch operated with almost total autonomy (Dallin 1981, 123–127). For example, Nazi administrators generally frowned on indiscriminate looting of the possessions and property of Jews. However, as Hilberg (2003, 363) points out: "The civilian administration approached the confiscation problem with stubbornness in the Ostland and with remarkable laxity in Ukraine." In addition, "The administrative structure evolved by the Army differed significantly from that in the Reich Kommissariate" (Dallin 1981, 95). One specific example is the organization of economic exploitation, such as forced labor. In the civilian areas this followed the chain of command from Rosenberg though Koch and Lohse. In the areas controlled by the Wehrmacht, however, it was under the direct control of Göring (Hilberg 2003, 357).

The situation in Romanian-administered Transnistria also appears to have been very different. Though SS and Einsatzgruppen activities did penetrate into Transnistria and executions of many Jews took place, the consensus view is that the Romanian civil administration was much less eager to implement the persecution of Jews (Dallin 1981; Ofer 1993). Whereas in the German-held areas of Russia and Poland close to 100% of the Jews were murdered, only about 17% of Romanian Jews were killed during the war (Schmeltz and Della Pergola 2007, 557; see also Braham 1997).

The fact that Ukraine was administered in such a heterogeneous way by four different entities makes our empirical strategy more difficult to implement. We therefore focus on the Russian areas of our sample, which were administered only by the Wehrmacht, and only report some basic results using Ukrainian data.

In 1941 at the end of what Hilberg calls the "First Sweep," the German armies had stalled outside Moscow and Leningrad. Perhaps 800,000 Jews had been murdered—about 4,200 per day (Browning 2004, 244). As many as 1,500,000 Jews may have

escaped to the east (Altshuler 1993b; Hilberg 2003, 294–295).[14] Many of those remaining behind German lines were forced into nascent Jewish ghettos, where there were more systematic attempts to register Jews and press them into forced labor. The "Second Sweep" began in the spring of 1942 and went on throughout the year, ending in October 1942 with the destruction of the remaining ghettos in Ostland. Most Jews who were in the Soviet Union at the start of the conflict were killed in the Soviet Union by the end of 1942 and did not remain alive to be transported to the death camps (see Hilberg 2003, Table 9-8, 893–894).

The surrender of the remnants of the 6th Army at Stalingrad on January 31, 1943, marked the turning point of the German invasion. In the spring of 1943, the Russian army advanced in the south, and in July, it decisively defeated the German army at the Battle of Kursk. By the end of 1943, the Germans had been pushed back across the Dnieper and away from Leningrad. By April 1944, Soviet armies controlled nearly all of Ukraine except for the far west, and by December of that year, Germany had lost control of all of the Soviet Union, the Baltic states, and Poland east of Warsaw.

II.C. Soviet Development and Jewish Relations after the War

In the immediate postwar period there was something of a recrudescence of Jewish culture and identity in the Soviet Union, though this was in the context of the commitment of Stalin, not to distinguish between the suffering of Jews and other Soviet citizens in the Great Patriotic War. Though many war memorials were built, none specifically mentioned the Holocaust or the fact that Jews were singled out for extermination.

The situation changed dramatically in 1948, however, when Stalin launched an intensive anti-Jewish campaign—the Black Years (e.g., Pinkus 1984; Levin 1988). In January 1953 the government announced a plot by a group of prominent doctors to kill government leaders. Following these events, Jews were discriminated against extensively, removed from government and military positions, and quotas were applied to the entry of Jews into universities. This campaign only eased in intensity after Stalin's death in March 1953, but even after this date, it persisted

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14. Many Jews were evacuated because they played an important role in Soviet industry, which was moved east as the invasion began. See Barber and Harrison (1991) on the organization of the Soviet wartime economy.

to a significant extent. For example, the number of synagogues fell from 450 to 96 between 1956 and 1963 (Beizer and Romanowski 2007, 556). Possibly in response to this pressure, the number of Jews recorded in the 1970 census, 2,151,000, was less than in the 1959 census, 2,268,000. Census enumerators did not ask to see the passports of the individuals they recorded, and it is possible that in consequence the number of Jews was under-reported (see Beizer and Romanowski 2007, 555, on the distinction between "census Jews" and "passport Jews").[15] The period after 1948 therefore is characterized by quite systematic anti-Semitism in the Soviet Union. The absolute number of Jews continued to fall with each successive census, and by the late 1970s, there was a large increase in emigration, primarily to Israel.

III. The Data

The Soviet Union collected an extensive census in 1939, listing the distribution of Jews by oblast, their social status, and educational attainment. These data enable us to construct our ex ante measure of the potential impact of the Holocaust. We relate this impact of the Holocaust to contemporary political and economic outcomes, which are predominantly coded from official Russian statistics. The 1939 census, combined with information from post-World War II censuses, also allows us to examine the consequences for social structure.[16] The government classified the social status of individuals according to their profession (occupation), so we can construct a measure of the middle class without reference to individual or household income. The later Soviet censuses in 1959, 1970, 1979, and 1989 allow us to track the evolution of the Soviet social structure and education over time and to assess the

15. Interestingly, however, Altshuler (1987)'s surveys of Soviet immigrants to Israel on their behavior in interviews for the 1959 and 1970 censuses indicate that virtually all of the respondents answered the question about their religious identity truthfully and that they did not feel pressure to conceal their true identity.

16. Our main sample excludes the Baltics, Belarus, Ukraine, and the states of the Caucuses. The Baltic states of Latvia, Lithuania, and Estonia (as well as large parts of present-day Belarus and Ukraine) were not part of the Soviet Union between the two wars, so we cannot conduct a before/after comparison. We dropped Belarus and the Caucuses because of problems in getting comparable outcome data at a sufficient level of disaggregation for the period since the collapse of the Soviet Union. Throughout, we also drop Moscow and St. Petersburg, both because there have been major changes in their boundaries and also because political and economic development in these two cities may be difficult to compare with the rest of Russia. The oblast Moskowskaya does not include the city of Moscow.

persistence of the initial shock caused by the Holocaust. To the best of our knowledge, these data on social structure have never been collected or used systematically before.

III.A.   *Historical Data*

The Soviet "all union" population census of 1939 was completed immediately before the outbreak of World War II and is therefore well suited for the purposes of this study. It was declassified only during the 1990s and has not been studied extensively.[17] The detailed records contain information on the fraction of Jews and the social structure at the oblast level, which we coded from original archival material. The 1939 census has been surrounded by some controversy (Wheatcroft and Davies 1994). The previous census in 1937 had been interrupted and eventually abandoned while still preliminary and the responsible officials were arrested and subsequently executed by Stalin's personal order. The reason for this is that while the official population figure for 1933 was 165.7 million, the 1937 count suggested that total Soviet population was just 162 million. (One may suspect that this fall was a consequence of the death toll resulting from Stalin's collectivization policies earlier in the decade.) Stalin ordered another census, and the 1939 census returned a total population of 170.2 million.

Scholars differ on which census is more reliable, and we do not know whether a possible aggregate inflation in the 1939 census was distributed into the regional totals (as opposed to just inflating the headline total). Some argue for the relative accuracy of the 1939 census (e.g., Zhiromskaia 1992). Altshuler (1998) preforms additional consistency checks, focusing on the statistics for the Jewish population. In particular, he compares implied population growth rates between censuses and finds that the 1939 count of the Jewish population is indeed consistent. In our empirical analysis, we use the 1939 census. Table A.6 in the Online Appendix shows that our results are robust to using alternative data from the 1937 census when these are available. For the variables we focus on, there appear to be few differences between the censuses; for example, the correlation between the proportion of Jews in the population in 1937 and 1939 is 0.959.

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17. For coding our data we used one of two existing microfilm copies of the original archival material. It consists of over 300 reels of hand-written volumes that were originally used to compile the results of the census.

In total, we have data for 278 cities, 76 of which were occupied by the Germans. Our other main unit of observation is the oblast, of which there are 83 in Russia today.[18] We drop the Jewish Autonomous Oblast in the east of Siberia, which was created by Stalin in 1934 as part of his nationality policy (see Weinberg 1988). When we exclude oblasts for which we have no data on the percentage of Jews in 1939, we have a total of 48 oblasts, 11 of which were occupied. Oblasts are themselves embedded within larger administrative areas called districts.

We coded a dummy variable for whether a city or oblast was occupied by the Nazis using official Russian sources and detailed maps of the military conflict on Soviet soil between 1941 and 1945. We classified an oblast as occupied if the average urban citizen in our city-level data set lived under German occupation for at least 6 months. Our results are robust to various ways of coding this variable (see Table A.1 in the Online Appendix for details).

Our estimates of the Jewish population in Russian oblasts are constructed as follows. For 1939 we have the exact number of economically active Jews in each oblast. We obtain an estimate of the total number of Jews by assuming that Jews had the same participation rate in the labor force as the average population and then dividing the number of economically active individuals by the participation rate.

We have less detailed data for 1959 than for 1939. Specifically, the total population of a given ethnic group in 1959 is only published if the group is one of the most populous in the region. This means that we lack data on the Jewish population where there were relatively few Jews, and we have to make certain assumptions to estimate the change in the Jewish population between 1939 and 1959 attributable to the Holocaust. In particular, if no 1959 number is available, we use the number given in the 1970 census, adjusting for Jewish population growth within the district. If data on Jews are available in the 1939 census but neither in 1959 nor in 1970 and the oblast was invaded, we assume that the entire Jewish population fell victim to the Holocaust. Outside the occupied area, if no data are available after 1939, we assume that the Holocaust had no impact on the Jewish population.

18. In the following we refer to all types of "federal subjects" of Russia as oblasts. These include republics, autonomous oblasts, autonomous okrugs, and krais.

In the occupied oblasts, the Jewish population diminished by over 39% on average. The oblasts directly adjacent to those that were invaded, on the other hand, reported increases of Jewish population, albeit typically from a very low level. Table A.8 in the Online Appendix reports these estimates in detail. For Russian cities we have information on the percentage of Jewish population only for 1939, which is taken from Altshuler (1993a) .

Soviet censuses (1926, 1939, 1959, 1970, 1979, and 1989) also include oblast-level data on social status, which we use to investigate whether changes in social structure could be at the root of the long-run effects of the Holocaust. The Soviet Union classified all of its citizens into one of four categories: "blue-collar workers" (*Rabochie*), "white-collar workers" (*Sluzhashchie*), "collective farmers" (*Kolkhozniki*), and "private farmers" (*Krest'iane Edinolichniki*). This classification does not depend on the level of income but on the profession of the individual (the source of income). This enables us to construct the relative size of the middle class based on occupation rather than the level of wealth or income. For 1939 we also have information on the number of handicraftsmen and individuals in liberal professions, such as physicians and lawyers, which were considered to be subgroups of the white-collar workers category in later census years. The 1939 census also splits these categories up by industry, which enables us to work with a more precise notion of middle class in part of our empirical analysis by constructing a "core middle class" variable consisting of individuals in the liberal professions, handicraftsmen, and white-collar workers who work in the trade, education, and health care sectors.

According to the 1939 census, 14.99% of the Russian population held white-collar jobs, 2.85% were handicraftsmen, and 0.02% were members of the liberal professions. In addition, 31.62% were classified as workers and 50.51% derived their primary income from agriculture (see the right panel of Figure I). In the history of the Russian Empire, Jews were traditionally barred from direct involvement in agriculture. In the Jewish Pale, they therefore tended to provide services for the agricultural sector. During the modernization of the country, particularly after 1927, there were large changes in the occupational structure. Nevertheless, the Jewish population remained predominantly in white-collar occupations.[19] The left panel of Figure I depicts the social

19. Botticini and Eckstein (2005) and Eckstein (2005) argue that the occupational specialization of Jews stemmed not from formal restrictions but rather from

makeup of the Jewish population in 1939. The bias toward white-collar occupations is very strong: 66.81% of Jews held white-collar jobs, 8.51% were in handicrafts, and 0.20% in the liberal professions. On average, 2.81% of the Russian (core) middle class were Jewish. In oblasts such as Smolensk, Briansk, and Rostov, they made up 6–9% of the middle class (see Tables A.1 and A.2 in the Online Appendix for details).

We also used the Soviet censuses to construct data on educational attainment at each date. We did this by taking the total number of people who had graduated from high school and the total number who had graduated from university as our dependent variables (always controlling for total population). Jews also made up a sizable share of the emerging educated class, although they constituted only a relatively small share of the overall population.

III.B. Main Variables

Our first measure of how severely a city or an oblast was affected by the Holocaust is defined as

$$(1) \qquad P_i^{\text{ex ante}} = 100 \times N_i \frac{J_{39,i}}{L_{39,i}},$$

where N_i is the Nazi occupation dummy for city or oblast i, $J_{39,i}$ is the total number of Jews in 1939 in the city or oblast, and $L_{39,i}$ is the population in 1939. We refer to $P_i^{\text{ex ante}}$ as the *potential impact of the Holocaust*. The advantage of this measure is that it only uses information on the ex ante (before the Holocaust) distribution of Jews across cities or oblasts.

At the oblast level where we have detailed information on the social composition of the population as well as the number of Jews after World War II, we are able to construct more refined measures of the effect of the Holocaust on the size of the middle class. We discuss these in Section V.

III.C. Contemporary Outcomes and Control Variables

For our sample of 278 Russian cities, we have two economic outcomes: city population at various dates (from the Russian

the fact that their high levels of human capital, induced by the requirement that they could read the scriptures, gave them natural comparative advantages (in mercantile activities) and disadvantages (in farming). The exact cause of this specialization is not important for the interpretation of our results.

censuses) and average wages in 2002 (from the EastView Universal Database of Statistical Publications, an electronic resource that collects government statistics for the Commonwealth of Independent States countries). The only political outcome variable we have available at the city level is the percentage of votes for communist candidates in the 1999 Duma election. The Communist Party won 24.3% of the vote in this election and was the largest party in the Duma with 90 seats.[20] Here we only use data where the electoral district for the Duma coincides with a city and drop the 204 observations where cities were part of a larger electoral district.

For oblasts we are able to construct a richer set of contemporaneous outcomes. The economic outcomes we consider are GDP per capita and average wages from the Russian statistical office's yearly volumes on oblast-level indicators.[21] The first political outcome we consider is the share of votes in the 1991 referendum in favor of the preservation of the Soviet Union. The March 11, 1991, referendum was orchestrated by Mikhail Gorbachev in a last-minute attempt to stop the separatist movements in the Baltic and other member republics.[22] The results of this vote provide us with valuable data on the regional variation in support of political and economic reform (with those supporting reform voting against the referendum question). We also use data on the vote share for communist candidates in the 1999 Duma election at the oblast level, which is the same variable we use at the city level.

We further coded two variables that control for the relocation of defense-related industry during and immediately after World

20. The 1999 Duma election is the only national ballot for which we were able to obtain constituency-level data. We added to the votes of the main Communist Party the votes of a small splinter communist party called the Communists of the USSR. For this reason we refer to the "communist vote" or the votes for "communist candidates".

21. We obtained these numbers from the East View Universal Database (Series 10.1, 4.1, and 4.3, respectively in Regioni Rusii, 2003). We use the most recent available data, which are for 2002, and convert the ruble values into their PPP dollar equivalents.

22. The 1991 referendum question was: "Do you consider it necessary to preserve the USSR as a renewed federation of equal sovereign republics, in which human rights and the freedoms of all nationalities will be fully guaranteed?" Although 71% of Russian voters responded "yes" to this question, they did not stop the breakup of the Soviet Union. Although the campaigns for and against the preservation of the Soviet Union were not on equal footing, independent international observers deemed the ballot itself to be fair and found no evidence of tampering (Commission on Security and Cooperation in Europe 1991, 15).

War II. For this purpose we obtained a comprehensive database compiled by Dexter and Rodionov (2009), which lists 21,353 defense factories and research-related establishments that operated in the Soviet Union between 1918 and 1989. We are able to determine the present-day location of 17,914 establishments and of 1558 establishments which reportedly moved from one location to another at some point in their history. Based on this information we construct two control variables. The first is the growth in the total number of establishments in a given city or oblast between 1939 and 1959. The second variable measures the extent of defense industry relocation during World War II by taking the growth rate in the number of establishments that are reported to have been relocated at some time in their history. In each case we set the growth rate equal to 0 if the city or oblast hosts no establishments in the defense industry in both 1939 and 1959.

Finally, we use official data on the volume of oil and gas output in 2002 at the oblast level, which is available from the EastView database. We use this variable as a proxy for natural resources, which are likely to be an important contributor to regional economic performance in Russia, particularly since the collapse of the Soviet Union.

III.D. *Descriptive Statistics*

Table I provides descriptive statistics. The first three columns present data on cities and the last three on oblasts. In each case we separate the sample into all cities (or oblasts), those that were occupied by the Germans at any time, and those that were occupied and had a higher percentage of Jewish population in 1939 than the median occupied city or oblast. The first row of column 1 gives the mean and the standard deviation of city population in 1939, and the second column gives the mean and standard deviation of city population in areas that were occupied. One can see that cities in occupied areas were considerably smaller, though those shown in column 3, with a high Jewish population, are closer in size to the average city. Row 4 shows that occupied cities also had a greater fraction of Jewish population, while row 7 shows that these cities are considerably smaller today (in fact, the gap between all occupied cities and those with a high Jewish population has almost closed). Notably, occupied cities and particularly those with high Jewish population have lower average wages (row 10) and voted in greater numbers for communist candidates in 1999 (row 12).

TABLE I
DESCRIPTIVE STATISTICS

	(1)	(2) Cities	(3)	(4)	(5) Oblasts	(6)
	total	occupied	occ. & high Jewish Pop	total	occupied	occ. & high Jewish Pop
City Population 1939	55811 (80548)	42099 (52147)	49303 (61952)			
Percent Urbanization 1939				32.34 (16.80)	22.69 (10.15)	26.31 (10.62)
Percent Middle Class 1939				19.24 (7.30)	15.33 (5.83)	16.07 (5.41)
Percent Jewish Pop. 1939	0.88 (2.61)	2.01 (3.94)	4.01 (4.83)	0.55 (0.42)	0.65 (0.37)	0.89 (0.33)
Percent Middle Class 1959				20.83 (5.15)	17.48 (3.82)	18.15 (3.18)
Percent Middle Class 1989				30.97 (4.20)	28.47 (2.49)	28.80 (1.82)
City Population 1989	153002 (243417)	112693 (147677)	125386 (173047)			
Percent Urbanization 1989				70.92 (10.74)	66.46 (6.41)	67.41 (3.14)
GDP per Capita 2002				5854.67 (2904.60)	4554.80 (1060.67)	4659.15 (1201.43)
Average Wage 2002	447.80 (111.68)	411.43 (100.16)	388.40 (48.95)	466.78 (217.95)	360.16 (75.94)	361.17 (71.44)

TABLE I
(CONTINUED)

	(1)	(2) Cities	(3)	(4)	(5) Oblasts	(6)
	total	occupied	occ. & high Jewish Pop	total	occupied	occ. & high Jewish Pop
1991 Referendum				73.81	77.84	76.74
				(7.57)	(4.25)	(4.86)
Percent Communist Vote (1999 Duma)	27.99	32.82	33.49	26.62	29.42	31.50
	(7.18)	(6.63)	(7.99)	(7.83)	(9.18)	(10.39)
Establishments Defense Industry 1939	5.25	3.25	4.32	27.35	16.55	16.50
	(10.14)	(6.47)	(8.61)	(36.61)	(17.47)	(12.16)
Establishments Defense Industry 1945	7.75	3.61	4.66	41.40	17.82	16.67
	(16.97)	(6.92)	(9.09)	(58.20)	(17.54)	(10.98)
Establishments Defense Industry 1989	15.47	10.78	14.29	79.44	58.09	60.50
	(32.86)	(19.77)	(24.62)	(88.03)	(38.28)	(22.19)
N	278	76	38	44	11	6

Notes. Values are averages across Russian cities and oblasts with standard deviations in parentheses. Column 1 refers to the sample of Russian cities as used in Table II (note that the number of observations for Average Wage 2002 and Percent Communist Vote 1999 are only 88 and 74, respectively). Column 2 refers to the sample as in Table III Panel B, the subset of Russian cities which were occupied by German forces or their allies during World War II (note that the number of observations for Average Wage 2002 and Percent Communist Vote 1999 are only 23 and 18, respectively). Column 4 refers to the sample of occupied Russian oblasts as used in Table VI. Column 5 refers to the subset of oblasts that were wholly or to a large part occupied during World War II. Columns 3 and 6 refer to the subset of occupied Russian cities and oblasts which had a higher than the median percentage of Jewish population in 1939, respectively. All 1939 observations are transformed to match contemporary oblast boundaries using a weighing matrix constructed from highly disaggregated 1939 population data. Unless otherwise indicated all data are coded from the official USSR censuses of 1939, 1959, and 1989. City Population refers to the total number of residents in urban settlements for which data are available and Percent Urbanization refers to the percentage of oblast population dwelling in urban areas. Percent Middle Class is the percentage of oblast population that was classified as "white collar" according to the definition in the census years following 1939. GDP per Capita 2002 is the oblast-level "gross regional product" taken from contemporary official Russian statistics and converted to 2002 PPP equivalent dollars according to the Worldbank/ICP conversion factors. 1991 Referendum refers to the percentage votes in favor of preserving the Soviet Union in the 1991 all-union referendum. Percent Communist Vote 1999 refers to the percentage of votes cast in favor of communist parties in the 1999 Duma elections. Establishments Defense Industry is the number of factories research, and design establishments of the Soviet defense industry operated in the city/oblast in the year given, according to the Dexter and Rodionov (2009) database. See Online Appendix for details.

Looking at the sample of oblasts we see similar patterns. Occupied oblasts had lower levels of urbanization in 1939 and in 1989 and had lower GDP per capita in 2002. Occupied oblasts with higher Jewish population had somewhat higher urbanization and percent middle class than other occupied oblasts in 1939, but once again we see that the gap between all occupied oblasts and those with a high Jewish population has closed by 1989.

The last three lines of Table I give the average number of establishments in the defense industry for cities and oblasts in 1939, 1945, and 1989. The numbers suggest that there was a shift in the defense industry from occupied to nonoccupied cities and oblasts during World War II, but that this shift was not permanent, with occupied oblasts hosting 60% of the average oblast's number of defense establishments in 1939, 43% in 1945, and 73% in 1989.[23]

The fact that there seem to be significant differences in levels of urbanization and different social structures before the war between occupied and nonoccupied oblasts in Russia suggests that they may have been on differential political and economic trends. To deal with this possibility we use a variety of strategies. First, we attempt to control for prewar characteristics in our main specifications. Second, we exploit data from the 1926 census to check whether cities and oblasts that were more affected by the Holocaust exhibit differential growth between 1926 and 1939. Finally, we examine variation within occupied areas using our city-level data set (we cannot do this with oblast-level data because we only have data on 11 occupied oblasts).

IV. THE IMPACT OF THE HOLOCAUST ON CITIES

We first look at the potential effects of the Holocaust on city population and then turn to economic and political outcomes. Our econometric model is

$$(2) \qquad \log U_{t,i} = \beta_t P_i^{\text{ex ante}} + \rho_t \log U_{1939,i} + \mathbf{X}_i' \zeta_t + \upsilon_{t,i},$$

where $\log U_{t,i}$ denotes the logarithm of population of city i in postwar census year t, where $t \in \{1959, 1970, 1979, 1989\}$; $\mathbf{X}_i$ is a vector of city-level covariates, which always includes a constant, a

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23. This finding is in line with Rodgers (1974) who finds that by 1965 part of the shift in industrial activity was already reversed.

dummy for Nazi occupation, and the main effect of the fraction of the population of Jewish origin in 1939. The coefficient of interest is β_t and measures the potential impact of the Holocaust on the size of the city in year t (the variable $P_i^{\text{ex ante}}$ is computed as indicated in (1)). Since $\log U_{1939,i}$ is included on the right-hand side, (2) is similar to a fixed-effects model with a lagged dependent variable in a panel with two dates with the key right-hand-side variable being the interaction between $P_i^{\text{ex ante}}$ and a postyear dummy. The error term $\upsilon_{t,i}$ captures all omitted influences, including any deviations from linearity. Equation (2) will consistently estimate the effect of the potential impact of the Holocaust variable if $Cov\left(P_i^{\text{ex ante}}, \upsilon_{t,i}\right) = 0$. In what follows, we control for available city-level covariates to check that these are not responsible for the correlations we report.

IV.A. *The Effects on City Population*

We begin by examining the full sample of cities. Table II reports ordinary least squares (OLS) regressions of equation (2) for $t = 1989$. Throughout, all standard errors are robust against arbitrary heteroscedasticity. All columns except column 6 report unweighted results. In addition, all columns except column 5 use district fixed effects (we have data for cities in 7 out of 11 Russian districts), and column 4 uses oblast fixed effects (we have data for cities in 57 out of 83 Russian oblasts, which aggregate to districts). We focus on specifications with district fixed effects as one third of oblasts contain fewer than three observations.

Column 1 shows an estimated coefficient for the potential impact of the Holocaust of -0.077 (s.e. = 0.031). This suggests that cities which were potentially more affected by the Holocaust are significantly smaller 50 years later, in 1989. The coefficient estimate implies a potentially large effect of the severity of the Holocaust on city size.[24] In particular, according to this estimate, an occupied city with a 1% share of Jewish population in 1939 should be 7.7% smaller in 1989 than it would otherwise be. The share of the city population that is of Jewish origin is typically small (it is on average 2.01% for occupied cities and 0.45% for nonoccupied

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24. It should be noted that there is considerable colinearity between the potential impact of the Holocaust and percent Jewish population in 1939. If we run the same regression without including the main effect of the percent Jewish population in 1939, the impact of the Holocaust is estimated to be smaller, –0.032 (s.e. = 0.009).

TABLE II
GROWTH OF RUSSIAN CITIES 1939–1989

	(1)	(2)	(3)	(4)	(5)	(6)
			Log City Population 1989			
Percent Jewish Pop. '39 x Occupation	-0.077	-0.078	-0.068	-0.068	-0.048	-0.043
	(0.031)	(0.028)	(0.027)	(0.026)	(0.026)	(0.023)
German Occupation Dummy	0.327	0.200	0.151	0.022	0.162	0.075
	(0.105)	(0.113)	(0.113)	(0.147)	(0.100)	(0.111)
Percent Jewish Pop. '39	0.044	0.033	0.022	0.037	0.015	0.009
	(0.029)	(0.026)	(0.025)	(0.024)	(0.024)	(0.018)
Log City Pop. '39	1.039	1.033	0.960	0.992	0.960	0.994
	(0.030)	(0.030)	(0.031)	(0.035)	(0.031)	(0.025)
Degrees Latitude		-0.049	-0.049	-0.104	-0.008	-0.032
		(0.018)	(0.018)	(0.051)	(0.009)	(0.014)
Degrees Longitude		-0.021	-0.018	-0.014	0.001	-0.023
		(0.009)	(0.009)	(0.023)	(0.001)	(0.010)
Growth Defense Industry '39–'59			0.253	0.146	0.224	0.158
			(0.086)	(0.093)	(0.084)	(0.092)
Relocated Defense Industry '39–'59			0.231	0.195	0.270	0.477
			(0.076)	(0.075)	(0.077)	(0.091)
N	278	278	278	278	278	278
District F.E.	yes	yes	yes	yes	no	yes
Oblast F.E.	no	no	no	yes	no	no
Population Weights	no	no	no	no	no	yes

Notes. Ordinary least squares regressions with robust standard errors in parentheses. Specifications in all columns except column 5 contain district fixed effects. Column 4 also contains oblast fixed effects. The regression reported in column 6 is weighted with population in 1989. All other columns report unweighted regressions. Dependent variable in all columns is log city population 1989. Percent Jewish Pop. '39 x Occupation is the interaction between the percentage of the 1939 city population that was Jewish with a fixed effect for cities which were occupied during World War II (German Occupation Dummy). All specifications contain a constant term which is not reported. Growth Defense Industry is the growth rate of the number of defense factories, research and design establishments operated in the city between 1959 and 1939. Relocated Defense Industry is the same variable, restricted to counting only establishments that were relocated at some point in their history. See Online Appendix for details.

cities). In this light, perhaps a more informative way of expressing this quantitative magnitude is to note that the average occupied city should be about 15% smaller in 1989 than it would have been had it escaped German occupation. This is a sizable effect that cannot be accounted for by the direct impact of the Holocaust. One possible interpretation is that the Holocaust may have caused a divergence in the long-run economic and social development paths of the affected cities. In the next section we suggest a possible channel for such divergence, which relates to the significant weakening of the middle class in these areas. Naturally, the coefficient estimate might also partly reflect omitted factors, though controlling for the covariates we have available does not typically affect the magnitude by much.

Note also that column 1 includes district fixed effects and three basic covariates (which are included in all of our other specifications as well): a dummy variable indicating whether the city was occupied by the Germans, the percentage of the population that was Jewish in 1939, and the logarithm of city population in 1939. The first two of these are included to ensure that $P_i^{\text{ex ante}}$ does not capture the direct effects of German occupation or of having a larger Jewish population. The third, $\log U_{39,i}$, controls for historical differences in the size of the city dating back to before World War II. As expected, its coefficient is statistically indistinguishable from 1, which is consistent with the presence of permanent differences in size across cities. The coefficient on the German occupation dummy is positive and significant, which is contrary to expectations, but this result is not robust as shown by the other columns in the table.

Column 2 adds additional geographical variables, the latitude and longitude of the city. The coefficient on $P_i^{\text{ex ante}}$ hardly changes, but it becomes more precise, so that it is now statistically significant at 1%.

A potential concern is that the cities with a high Jewish population and occupied cities were also affected by Stalin's "scorched earth" policy, which destroyed the infrastructure in the areas about to fall into German hands. At the same time, war-related industries in these areas were relocated further to the east, thus potentially also affecting our "control" cities. To directly deal with this issue, in column 3 we control for growth of defense industry between 1939 and 1959 (as described) and also separately control for the relocation of defense industry between 1939 and 1959. Column 4 includes the same variables together with

oblast fixed effects. In both cases, the relocation variable is significant, but has little effect on our coefficient of interest. In particular, the coefficient on $P_i^{\text{ex ante}}$ is -0.068 and continues to be significant at 1% in both cases.

Column 5 repeats the same specifications as column 3, but now without the district fixed effects. The coefficient on $P_i^{\text{ex ante}}$ is slightly smaller, -0.048, but its standard error also falls and the estimate continues to be statistically significant at the 10% level.

Finally, column 6 reports a weighted regression (weights given by population in 1939). This is motivated by the fact that some of the cities experiencing significant changes in population were relatively small. The coefficient of interest is now somewhat smaller, -0.043, but the standard error declines further, so the potential impact of the Holocaust is still marginally significant at the 5% level.

The basic results from Table II column 3 are shown graphically in Figure II. The slope of the regression line in the left panel corresponds to the regression in column 3 of Table II. This
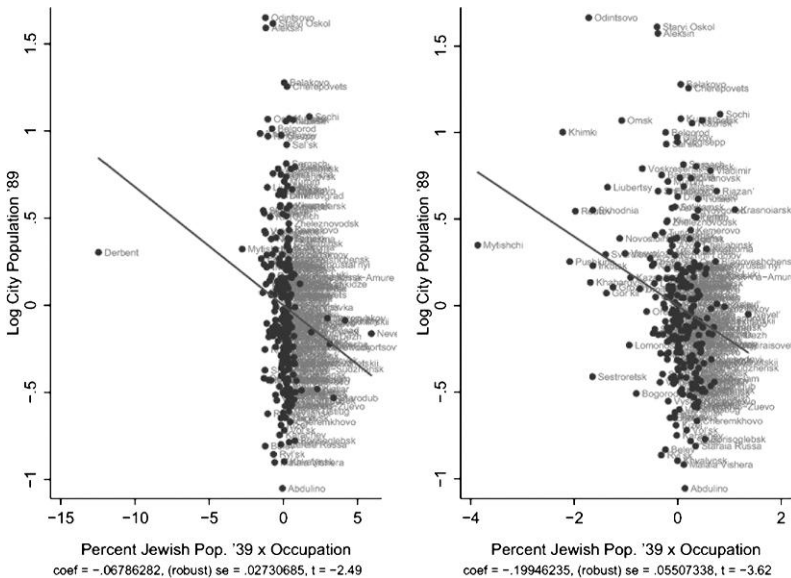
FIGURE II

Growth of Russian Cities 1939-1989 and Potential Impact of the Holocaust

Left Panel: Conditional scatterplot corresponding to Table II, Column 3. Right Panel: Conditional scatterplot when dropping Derbent. Robust regression: coef = $-.1847944$, se = $.0476301$.

figure also shows that one city, Derbent, appears as an outlier because it had a disproportionately large Jewish community before the war (22%) and was never occupied by the Germans. The specification in the right panel excludes Derbent and returns a larger coefficient of -0.199 (s.e. $= 0.055$).[25] As a more systematic check for the effect of outliers, we run a robust regression (according to terminology used by STATA) in which observations with a Cook's D value of more than 1 are dropped and weights are iteratively calculated based on the residuals of weighted least square regressions. The robust estimate is larger than the OLS estimate with a coefficient of -0.185 (s.e.=0.048).

Table III reports the results of a simple falsification exercise and investigates the timing and robustness of the effects reported in Table II. The same covariates as in column 3 of Table II are included throughout this table and in the following tables, but are not reported to save space. Column 1 in Panel A uses log city population in 1939 as the dependent variable and controls for log city population in 1926 on the right-hand side. The coefficient on the potential impact of the Holocaust variable, $P_i^{\text{ex ante}}$, is negative, though small relative to the estimates in Table II and far from statistically significant (-0.018, s.e. $= 0.040$). In Panel B, we perform the same falsification exercise in the subsample of occupied cities, and now the coefficient estimate is positive and again insignificant. This evidence reaffirms that there were no systematic or significant pretrends before German occupation.[26]

Columns 2–4 in Panel A use the basic model from column 3 of Table II and investigate the timing of the effect of $P_i^{\text{ex ante}}$ on city population (thus column 4 of this table is identical to column 3 of Table II). The results show that the effect is negative and significant in 1959 and that it grows over time. This pattern suggests that the Holocaust may have induced a long-lasting, divergent trend on the affected cities. It is also consistent with the fact that

25. Without Derbent, Mytishchi appears as an outlier. If both of them are dropped, the coefficient estimate is a little larger and still highly significant, -0.224 (s.e. $= 0.063$).

26. One may still be concerned that even though there is no statistically significant effect, the sign of the estimate is negative and its magnitude is about a third of our baseline estimate (column 3 in Table II or column 4 in this table). Nevertheless, this is not a consistent pattern. The sign is reversed in Panel B when we focus on occupied cities, and the sign also flips (while the estimate is always statistically insignificant) when we perform falsification exercises for oblasts in Section V.

TABLE III
GROWTH OF RUSSIAN CITIES SINCE 1926

	(1)	(2)	(3)	(4)	(5)
	Log City Population				
Year	*1939*	*1959*	*1970*	*1989*	*1989*
Estimator	*OLS*	*OLS*	*OLS*	*OLS*	*IV*
Panel A	*All Russian Cities*				
Percent Jewish Pop. '39 x Occupation	−0.018	−0.038	−0.050	−0.068	−0.067
	(0.040)	(0.016)	(0.023)	(0.027)	(0.028)
German Occupation Dummy	−0.199	0.045	0.071	0.151	0.143
	(0.098)	(0.080)	(0.094)	(0.113)	(0.116)
Percent Jewish Pop. '39	0.024	0.010	0.013	0.022	0.023
	(0.038)	(0.013)	(0.021)	(0.025)	(0.025)
Log City Pop. '26	0.787				
	(0.040)				
Log City Pop. '39		0.964	0.957	0.960	0.941
		(0.021)	(0.026)	(0.031)	(0.040)
N	278	278	278	278	278
Panel B	*Occupied Russian Cities*				
Percent Jewish Pop. '39 x Occupation	0.013	−0.007	−0.017	−0.025	−0.026
	(0.014)	(0.009)	(0.010)	(0.014)	(0.013)
Log City Pop. '26	0.777				
	(0.078)				
Log City Pop. '39		0.940	0.922	0.910	0.937
		(0.057)	(0.062)	(0.072)	(0.071)
N	76	76	76	76	76
Defense Industry Controls	yes	yes	yes	yes	yes
Geographic Controls	yes	yes	yes	yes	yes
District F.E.	yes	yes	yes	yes	yes

Notes. Columns 1–4 report ordinary least squares regressions. Column 5 reports instrumental variables regressions, instrumenting log city population 1939 with log city population 1926. Robust standard errors are given in parentheses. Dependent variable is log city population in the indicated year. Specifications in all columns contain district fixed effects, geographic controls (degrees longitude and degrees latitude), as well as controls for growth in the defense industry (Growth Defense Industry '39–'59 and Relocated Defense Industry '39–'59). Specifications in Panel A use the full sample of Russian cities; specifications in Panel B use the subset of cities which were occupied during World War II. Percent Jewish Pop. '39 x Occupation is the interaction between the percentage of the 1939 city population that was Jewish with a fixed effect for cities which were occupied during World War II (German Occupation Dummy). See Online Appendix for details.

the 1959 populations of occupied cities were likely affected directly by war and German occupation, thus the potential latent effects of the Holocaust may have only exhibited themselves over time. However, we cannot rule out the possibility that this pattern may also reflect other factors not captured by our covariates.

Column 5 reports the results from a version of our baseline model where the logarithm of city population in 1926 is used as an

instrument for the logarithm of city population in 1939. Since our model is similar to a fixed effects model with a lagged dependent variable, one might be concerned about the standard panel data bias (with lagged dependent variables) in the coefficient of interest. Instrumenting the lagged dependent variable with its own lag ensures consistency (Anderson and Hsiao 1982). The estimate in column 5 is, reassuringly, very similar to the OLS estimate (shown next to it in column 4).

Panel B reports estimates of equation (2) using only occupied cities.[27] This has the advantage of limiting the sample to a potentially more homogenous set of cities that have all suffered the destruction caused by German occupation. Column 4 in this panel corresponds to our baseline specification, but with the sample consisting of only occupied cities. The coefficient estimate on $P_i^{\text{ex ante}}$ is now smaller, but still marginally statistically significant at the 5% level, -0.025 (s.e.=0.014). This coefficient estimate implies that an occupied city with a 1% share of Jewish population in 1939 should be 2.5% smaller in 1989, which is about one third of the corresponding estimate, 7.7%, in the full sample of cities. Figure III shows this relationship graphically. While some cities are far from the regression line, none of these outliers seem to be driving the results. For example, dropping the outlier city Nevel' leads to a coefficient estimate of -0.024 (s.e.=0.014). Furthermore, the same robust regression procedure as above yields a similar, albeit statistically insignificant, coefficient of -0.023 (s.e. = 0.017).

IV.B. Political and Economic Outcomes

More central for our focus than the differential patterns of population growth across cities shown in Tables II and III are the potential effects of the Holocaust on political and economic variables. Our interpretation, which will be fleshed out further , is that in places where the Holocaust destroyed the Jewish middle class, social and economic development, even under communist rule, was considerably delayed; this should exhibit itself in terms of more adverse outcomes for economic development and less political development today. We proxy for political development with the support for noncommunist candidates in the 1999 Duma

27. Again all of the same covariates are included, but since the sample is limited to occupied cities, there is naturally no occupation dummy and no main effect of percent Jewish population in 1939.

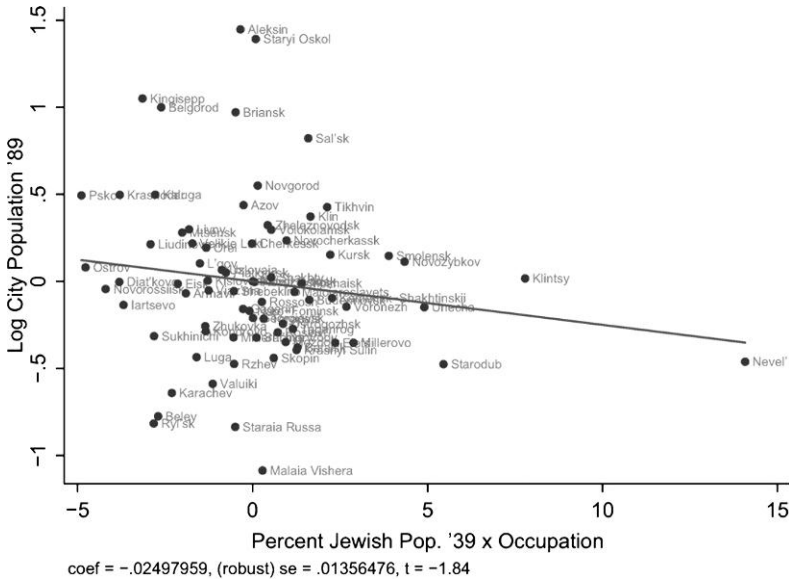coef = −.02497959, (robust) se = .01356476, t = −1.84

FIGURE III

Growth of Occupied Russian Cities 1939–1989 and Potential Impact of the
Holocaust

Conditional scatterplot corresponding to Table III, Panel B, Column 4. Robust
regression: coef = −.0226035, se = .0174826.

elections. While many Russian Jews and other intellectuals were
involved with the Communist Party at the early stages of the
Bolshevik Revolution, by the 1990s the middle class and intellec-
tuals were among the primary constituents of political and
economic reform.

Table IV investigates this relationship by looking at the
correlation between the potential impact of the Holocaust and the
share of votes for communist candidates in the 1999 Duma election
and average wages in 2002. Other variables we have at the oblast
level are not available at the city level. Moreover, we only have
these two variables for a sample of 74 and 88 cities, respectively.[28]
Panel A reports the results for the share of votes (in logs) and
Panel B for average wage in 2002 (also in logs). The regression
equations are the same as equation (2) except for the change in
the left-hand variable. In particular, all specifications control for

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28. When we repeat the regressions in Table II for this restricted sample, we
find a negative but statistically insignificant relationship.

TABLE IV
ELECTORAL AND ECONOMIC OUTCOMES IN RUSSIAN CITIES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A								
				Log % Communist Vote 1999				
Percent Jewish Pop. '39 x Occupation	0.110	0.122	0.158	0.084	0.110	0.123	0.044	0.054
	(0.025)	(0.025)	(0.026)	(0.032)	(0.026)	(0.034)	(0.013)	(0.021)
German Occupation Dummy	0.073	0.044	−0.078	0.115	0.109	0.043		
	(0.097)	(0.100)	(0.078)	(0.122)	(0.113)	(0.101)		
Percent Jewish Pop. '39	−0.083	−0.089	−0.113	−0.058	−0.082	−0.089		
	(0.021)	(0.020)	(0.023)	(0.028)	(0.022)	(0.020)		
Ex-post Pop. Change x Occupation					0.158			
					(0.144)			
Ex-post Pop. Change					0.104			
					(0.099)			
N	74	74	74	74	74	73	18	17

TABLE IV
(CONTINUED)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel B								
				Log Average Wage 2002				
Percent Jewish Pop. '39 x Occupation	−0.029	−0.042	−0.023	−0.044	−0.048	−0.062	−0.034	−0.056
	(0.025)	(0.021)	(0.019)	(0.028)	(0.022)	(0.024)	(0.024)	(0.029)
German Occupation Dummy	−0.013	0.017	0.100	0.077	0.133	0.032		
	(0.073)	(0.077)	(0.067)	(0.081)	(0.143)	(0.081)		
Percent Jewish Pop. '39	−0.004	0.007	0.007	0.022	0.010	0.007		
	(0.013)	(0.013)	(0.013)	(0.023)	(0.013)	(0.013)		
Ex-post Pop. Change x Occupation					0.192			
					(0.256)			
Ex-post Pop. Change					−0.164			
					(0.099)			
N	88	88	88	88	88	87	23	22
Geographic Controls	yes	yes	yes	yes	yes	yes	yes	yes
District F.E.	yes	yes	no	yes	yes	yes	no	no
Defense Industry Controls	no	yes	yes	yes	yes	yes	yes	yes
Population Weights	no	no	no	yes	no	no	no	no
Smolensk Excluded	no	no	no	no	no	yes	yes	yes

Notes. Ordinary least squares regressions with robust standard errors in parentheses. All specifications contain controls for growth in the defense industry (Growth Defense Industry '39–'59 and Relocated Defense Industry '39–'59), log population in 1939 and a constant term. Specifications in all columns except column 1 contain geographical controls (degrees longitude and latitude); and all specifications except columns 3, 7, and 8 contain district fixed effects. The regressions reported in column 4 are weighted with population in 1939. All other columns report unweighted regressions. Columns 1–5 report regressions using the full sample of Russian cities. Column 6 excludes Smolensk; column 7 reports regressions using only cities which were occupied during World War II and the specification in column 8 furthermore excludes Smolensk from this restricted sample. Dependent variable in Panel A is the log of the percentage of votes received by communist candidates in the 1999 Duma elections. Dependent variable in Panel B is the log of the average wage in 2002. Percent Jewish Pop. '39 x Occupation is the interaction between the percentage of the 1939 city population that was Jewish with a fixed effect for cities which were occupied during World War II. Ex-post Pop. Change x Occupation is the negative of population growth between 1939 and 1959 interacted with the German Occupation Dummy. See Online Appendix for details.

latitude and longitude, all specifications except those in column 1 also control for growth and relocation of the defense industry, and all specifications except those in columns 3, 7, and 8 contain district fixed effects.

Columns 1–4 of Panel A repeat the same specifications as in Table II columns 2, 3, 5, and 6 for the vote share of communist candidates. In all cases, the potential impact of the Holocaust has a positive and statistically significant effect (at less than 1%). For example, in column 1 the coefficient estimate is 0.110 (s.e. = 0.025). This implies that cities more severely affected by the Holocaust had significantly greater support for communist candidates and were more opposed to political reform more than 50 years after the end of the war. The estimate implies that a 1 percentage point higher share of Jewish population in 1939 in an occupied city is associated with an 11% increase in the vote share for communist candidates.

Column 5 includes the change in the population of the city between 1939 and 1959 and the interaction between this variable and the German occupation dummy as additional control variables. The change in population between these dates should be a good proxy for the severity of the general loss of life caused by Nazi occupation. Thus, this variable and its interaction with the occupation dummy constitute a useful control against the potential effects of other destructive implications of Nazi occupation. We did not include such controls in Tables II and III, since there the left-hand variable is also the change in city population (either at the same date or at subsequent dates). In Table IV, the inclusion of these controls has little effect on the coefficient estimate of our variable of interest, and interestingly, the change in population between 1939 and 1959 and its interaction with the occupation dummy are insignificant.[29] This pattern is consistent with the view that changes in the composition of the population, rather than the shock to the level of the population, may have played a more important role in the long-run development of these cities.

Column 6 reports the same regression as in column 3, except that it drops Smolensk, which is a significant cluster point

29. Naturally, since the total loss of life is also caused by German occupation, it is correlated with the Holocaust, and its inclusion may lead to an underestimate of the effect of the Holocaust. It is thus reassuring that its inclusion does not change the qualitative nature of our results.

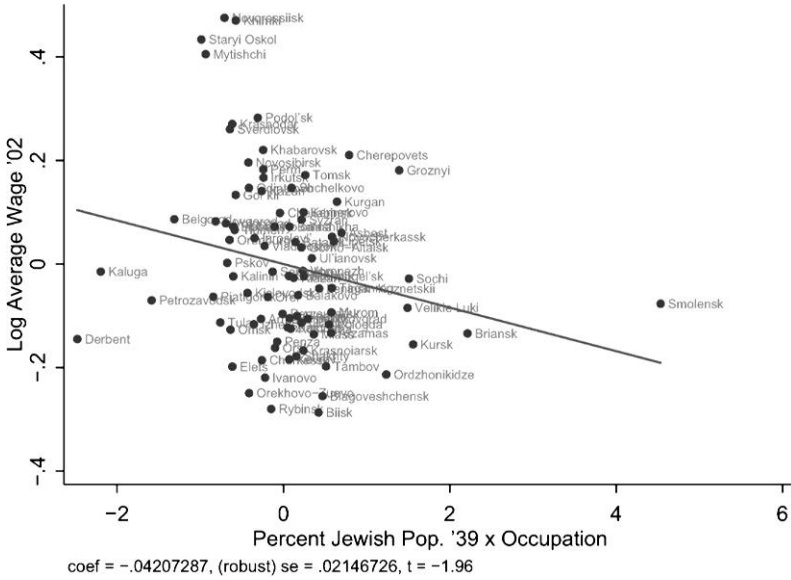coef = −.04207287, (robust) se = .02146726, t = −1.96

FIGURE IV
Average Wage 2002 and Potential Impact of the Holocaust
Conditional scatterplot corresponding to Table IV, Panel B, Column 2. Robust
regression: coef = − .1280612, se = .0258425.

(particularly in the average wage regressions reported in Panel B,
see Figure IV). In this case, the coefficient on the potential impact
of the Holocaust variable becomes larger and more significant.
Using the same robust regression procedure described above, the
estimated coefficient is 0.117 (s.e. = 0.036). Finally, columns 7 and
8 report regressions for the subsample of occupied cities (for which
we have data on the communist vote share), with and without
Smolensk. The sample sizes are only 18 and 17. Nevertheless, the
estimated effects are still significant, though considerably smaller.

Panel B reports the same regressions with average wage in
2002 as dependent variable. The coefficient estimates are uni-
formly negative, but not significant at the 5% level, except in
columns 5 and 6 (marginally so in columns 2 and 8). This means
that the potential impact of the Holocaust on average wages is
stronger and statistically significant when we control for the
ex post population changes and when we exclude Smolensk, which
is now a more significant outlier. When we implement the robust
regression procedure, the effect is statistically significant at less
than 1% with a coefficient estimate of 0.128 (s.e. = 0.026).

V. Impact of the Holocaust on Oblasts and the Middle Class

The evidence presented in the previous section shows historical correlations between the Holocaust on the one hand and long-run growth of city population and electoral outcomes on the other. In this section, we investigate the robustness of these relationships by looking at oblast-level data. At the oblast-level, we have access to additional outcome variables and covariates as well as to detailed information on industry and occupation of Jews and non-Jews before the German invasion, which will enable us to investigate some possible channels that may link the Holocaust to large and persistent differences in economic, social, and political outcomes.

V.A. *Jews and the Russian Social Structure before the War*

Table V provides a detailed account of the role of Jews in the Russian economy before the outbreak of World War II. It gives the percentage of the total workforce that was Jewish for each social group and industry in 1939. The first three lines of each panel give the percentages for occupations which are classified as "white collar" in the subsequent censuses: the liberal professions (this category includes individuals who are engaged in some form of intellectual activity, such as writers or physicians, who are not typically on the staff of any particular institution), handicraftsmen, and white-collar workers (employees who are not primarily engaged in physical labor). Columns 1–7 give the division by industry, and column 8 gives the total percentage of the workforce in each occupation that was Jewish. Panel A shows the average percentage for the six oblasts which were occupied by the Germans during World War II and had a higher Jewish population than the median occupied oblast. Jews made up a small minority of 0.89% of the population of these oblasts. Nevertheless, they played a central role in occupations that are classified as white collar in the censuses after 1939. For example, Jews constituted 11.2% of those working in liberal professions, 7.4% of the handicraftsmen, and 5.3% of the white-collar workers. The numbers are even more striking when we focus on the role of Jews in what we call the "core" middle class; those working in white-collar occupations within the trade, education, and health care sectors. In trade (column 1), Jews made up 26.7% of the handicraftsmen and 9.9% of the white-collar workers. A similar picture emerges for

TABLE V
JEWS AS A PERCENTAGE OF TOTAL WORKFORCE BY SOCIAL GROUP AND SECTOR, 1939

Social Group/Sector	(1) Trade	(2) Education	(3) Health	(4) Government	(5) Industry	(6) Agriculture	(7) Other	(8) Total
Panel A	*Occupied Oblasts with Percent Jewish Population 1939 ≥ Median*							
Liberal professions	0.0	6.2	68.2	12.9	0.0	0.0	0.0	11.2
Handicraftsmen	26.7	14.5	0.0	14.4	6.8	0.1	16.5	7.4
White-collar workers	9.9	4.1	10.0	4.2	4.4	2.2	4.0	5.3
Blue-collar workers	1.6	0.9	0.8	1.1	1.2	0.3	1.1	1.1
Farmers, Kolkhoz members	0.2	0.1	0.0	0.1	0.0	0.0	0.7	0.1
Total economically active	5.3	2.8	5.2	3.0	2.1	0.1	2.0	1.0
Panel B	*Occupied Oblasts*							
Liberal professions	0.0	3.6	41.7	9.0	0.0	0.0	0.0	6.8
Handicraftsmen	16.8	8.1	0.8	13.6	3.3	0.1	8.4	3.7
White-collar workers	5.6	2.7	6.8	2.6	2.9	1.4	2.7	3.3
Blue-collar workers	0.8	0.5	0.4	0.6	0.6	0.2	0.9	0.6
Farmers, Kolkhoz members	0.1	0.0	0.0	0.0	0.0	0.0	0.7	0.0
Total economically active	3.0	1.8	3.3	1.8	1.2	0.1	1.4	0.7

TABLE V
(CONTINUED)

	(1) Trade	(2) Education	(3) Health	(4) Government	(5) Industry	(6) Agriculture	(7) Other	(8) Total
Panel C								
				All Oblasts				
Liberal professions	0.0	2.7	26.8	5.8	0.0	0.0	0.3	4.5
Handicraftsmen	6.9	2.8	0.7	4.5	1.5	0.1	4.8	1.6
White-collar workers	3.0	2.1	4.5	1.8	2.0	0.9	2.5	2.2
Blue-collar workers	0.4	0.4	0.3	0.4	0.4	0.2	0.7	0.4
Farmers, Kolkhoz members	0.0	0.0	0.2	0.1	0.0	0.0	0.6	0.0
Total economically active	1.6	1.4	2.3	1.3	0.7	0.1	1.2	0.6

Notes. This table gives the average percentage of the workforce in Russian oblasts by industry and social group that was constituted by Jews in 1939. Panel A refers to the subset of oblasts which were occupied during World War II and had a higher than the median percentage of Jewish population in 1939. Panel B refers to all oblasts which were occupied during World War II; Panel C refers to all Russian oblasts in our sample. The classifications of industry and social groups are taken directly from the 1939 Soviet census. Columns 1–7 refer to individuals working in (1) trade; (2) education, science, art, and print; (3) health care; (4) government; (5) industry, building, and transport; (6) forestry and agriculture; and (7) housing and other industries; respectively. Column 8 gives the total percentage of each social group that was constituted by Jews in 1939. Liberal professions refers to "Persons in the liberal professions, including those engaged in some form of intellectual activity, such as writers or physicians, who are not on the staff of any institution or enterprise." See Table A.2 for the relative size of the total workforce in each industry and social group.

education and health care (columns 2 and 3). Most strikingly, in the health care sector, 68.2% of those in the liberal professions (presumably physicians) were Jewish. Moreover, Jews also played a central role in the government sector, where 12.9% of those working in liberal professions were Jewish. Given these findings, it seems plausible that the persecution and displacement of Jews during the Holocaust may have had long-lasting effects on the societies left behind; not because Jews constituted a large share of the population, but because they constituted a large share of key strata of society that are essential constituents of economic and political development.

Panel B shows the same set of results for all occupied oblasts, where Jews still constitute a large share of the middle-class occupations in trade, education, and health care, with 16.8% of the handicraftsmen in trade and 41.7% of those in the liberal professions in health care being Jewish. Panel C gives the oblast averages for all of Russia. The percentages given in this panel are uniformly much smaller, obviously reflecting the fact that most Jews lived in western parts of Russia before the outbreak of World War II. Table A.2 in the Online Appendix reports the percentage of the total workforce working in each occupation and industry for comparison.

V.B. The Impact on the Middle Class

We next investigate the relationship between the impact of the Holocaust and the size of the middle class across oblasts. More specifically, in Panels A and B of Table VI, we estimate the model

$$(3) \qquad \log M_{t,i} = \beta_t P_i + \rho_t \log M_{39,i} + \mathbf{X}_i' \zeta_t + \upsilon_{t,i},$$

where P_i denotes various different measures of the impact of the Holocaust (starting with $P_i^{\text{ex ante}}$), $\log M_{t,i}$ is the log of the number of middle-class individuals (those in white-collar occupations as defined by the censuses after 1939) in oblast i and year t. The covariate vector always contains log total population in the current year, log urban population in 1939, the dummy for German occupation, the main effect of the fraction of the population that was of Jewish origin in 1939, degrees longitude and latitude of the oblast capital, controls for defense industry growth and relocation, as well as our measure of oil and gas production in 2002, and a constant term. Controlling for current population is particularly important, because otherwise equation (3) would not be

TABLE VI

IMPACT OF THE HOLOCAUST ON RUSSIAN OBLASTS

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A			*Log Middle Class 1989*			
Percent Jewish Pop. '39 x Occupation	−0.224 (0.063)					
Percent Middle Class Jews '39 x Occupation		−0.050 (0.013)				
Ex-post Impact on Middle Class			−0.590 (0.227)	−0.499 (0.282)	−0.984 (0.292)	−0.611 (0.273)
Panel B			*Log Middle Class 1970*			
Percent Jewish Pop. '39 x Occupation	−0.185 (0.092)					
Percent Middle Class Jews '39 x Occupation		−0.046 (0.016)				
Ex-post Impact on Middle Class			−0.957 (0.213)	−0.979 (0.307)	−1.393 (0.296)	−0.765 (0.272)
Panel C			*1991 Referendum*			
Percent Jewish Pop. '39 x Occupation	0.140 (0.039)					
Percent Middle Class Jews '39 x Occupation		0.026 (0.008)				
Ex-post Impact on Middle Class			0.649 (0.179)	0.584 (0.194)	0.698 (0.199)	0.389 (0.203)

TABLE VI
(CONTINUED)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel D			*Log Average Wage 2002*			
Percent Jewish Pop. '39 x Occupation	−0.380 (0.099)					
Percent Middle Class Jews '39 x Occupation		−0.079 (0.017)				
Ex-post Impact on Middle Class			−1.075 (0.218)	−0.816 (0.370)	−1.473 (0.280)	−0.718 (0.296)
Panel E			*Log GDP p.c. 2002*			
Percent Jewish Pop. '39 x Occupation	−0.496 (0.120)					
Percent Middle Class Jews '39 x Occupation		−0.091 (0.032)				
Ex-post Impact on Middle Class			−1.528 (0.378)	−1.065 (0.543)	−1.724 (0.551)	−1.326 (0.495)
N	48	48	47	47	47	47
Pop. weights	yes	yes	yes	no	yes	yes

Notes. Ordinary least squares regressions with robust standard errors in parentheses. All columns except column 4 report regressions weighted with population in 1939. All specifications contain a constant term, the German Occupation Dummy, Percent Jewish Pop. '39, Log Middle Class 1939, as well as controls for log urban population 1939, the longitude and latitude of the oblast capital, controls for growth in the defense industry and for output of oil and gas 2002. The specification in column 2 also includes Percent Middle Class Jews '39 as a control. The specifications in columns 5 add the percentage of oblast population that was Jewish in 1989; column 6 reports specifications including the negative of population growth between 1939 and 1959 and the interaction of this variable with the German Occupation Dummy. Panels A and B: Dependent variable is log of middle-class population in the indicated year. The specifications in these panels also include log total population in the indicated year as an additional control. Panel C: Dependent variable is log percentage of votes in favor of preserving the Soviet Union in 1991; Panel D: Dependent variable is log average wage in 2002. Panel E: Dependent variable is log GDP per capita in 2002.

informative about the *relative* size of the middle class.[30] We take time period t to be 1989 (Panel A) and 1970 (Panel B). To save space, we only report the coefficient and the standard error on the measure of the impact of the Holocaust.

All specifications except the one in column 4 are weighted with population in 1939. At the oblast level, the weighted specifications are particularly useful for two reasons. First, because the 1939 data for smaller oblasts have more measurement error as we are able to reweight the 1939 oblast population to match contemporary boundaries using separate urban and rural weights in larger but not in many of the smaller oblasts (see the Online Appendix). Second, the western oblasts that were directly affected by the German invasion and had a relatively large fraction of Jews tended to be considerably larger than many of the sparsely populated eastern oblasts. Additional unweighted specifications reported in Table A.3 are very similar, albeit with slightly larger standard errors.

Column 1 of Panel A shows a negative correlation between our potential impact of the Holocaust variable, $P_i^{\text{ex ante}}$, and the size of the middle class in 1989. This correlation is statistically significant at the 1% level.

Column 2 repeats the same specification except that it uses a measure of the potential impact of the Holocaust on the middle class of occupied oblasts. It is defined as

$$P_i^{M,\text{ex ante}} = 100 \times N_i \times \frac{JM_{39,i}^C}{M_{39,i}^C},$$

where N_i is the Nazi occupation dummy in oblast i, $M_{39,i}^C$ is the total number working in the core middle-class professions in 1939, and $JM_{39,i}^C$ is the number of Jews in core middle-class professions.[31] Recall that we could not construct such a variable at the city level

30. An alternative strategy is to estimate an equation like (3) with share of the middle class as the dependent variable and share of the middle class in 1939 on the right-hand side. The disadvantage of this is that our estimates of rural population in different oblasts are less reliable than other data, thus having the share of the middle class in 1939 as the dependent variable would introduce additional measurement error on the right-hand side. In addition, including log population on the right-hand side directly allows for a more flexible relationship between the size of the middle class and total population.

31. The results are very similar if we use the same definition of middle-class as in the censuses after 1939 rather than our "core" middle-class measure. For example, the estimates in column 3 would be –0.254 (s.e. = 0.107) in Panel A and –0.440 (s.e. = 0.104) in Panel B. Since we have access to the detailed occupation

because we only have access to the detailed occupational structure data at the oblast level. All specifications in which we use $P_i^{M,\text{ex ante}}$ also include the main effect of the percentage of the 1939 middle class that was Jewish as an additional control. The coefficient estimate in column 2 is -0.050 (s.e. = 0.013). This implies that an oblast in which Jews constituted 1% of the (core) middle class in 1939 has 5% smaller (census) middle class in 1989 and that a 1 standard deviation rise in the percentage of 1939 middle class that was Jewish among occupied oblasts (2.33) is associated with an 11.7% decrease in the size of the middle class in 1989. This is, once again, a sizable effect, and seems to reflect more than the direct influence of the Holocaust on the middle class. The magnitude of the effect may be related to the fact that the disappearance of the largely Jewish middle class in certain oblasts may have changed the overall economic and social development path of the area and led to an occupational structure that has many fewer middle-class occupations today.

The specifications in columns 3–6 are similar, except that they use an ex post measure of the impact of the Holocaust on the size of middle class. This measure is defined as

$$(4) \qquad P_i^{M,\text{ ex post}} = 100 \times \left(\frac{M_{39,i}^C}{L_{39,i}} - \frac{M_{39,i}^C - \Delta_{39,59} J_i \times \frac{JM_{39,i}^C}{J_{39,i}}}{L_{39,i} - \Delta_{39,59} J_i} \right).$$

It proxies for the ex post change in the size of the middle class, which is attributable to the change in Jewish population between 1939 and 1959. The first term in $P_i^{M,\text{ ex post}}$ is the fraction of the population that is middle class in 1939, the second term is the estimated fraction of population that is middle class after the change in Jewish population, where $\Delta_{39,59} J_i$ is the estimated change in the total number of Jews in the oblast between 1939 and 1959 that is attributable to the Holocaust. Note that this measure identifies the impact of the Holocaust using both the loss of Jewish population in the occupied oblasts and the (slight) rise in Jewish population in oblasts behind the front lines (see Table A.8 in the Online Appendix).

The coefficient in column 3, with an identical set of covariates to column 1, is -0.590 (s.e. = 0.227), which is statistically significant at the 5% level. The specification in column 4, where we do

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and industry data, we choose to exploit this information to focus on what appears to be most relevant for our "social structure" hypothesis.

not use population weights, yields a very similar coefficient, which is statistically significant only at 10%. The magnitude of the latter coefficient (-0.499, s.e. = 0.282) implies that a one standard deviation rise in the ex post impact on the middle class (0.084) is associated with a 4.2% lower middle class in 1989. Column 5 includes the percent Jewish population in 1989 to check whether part of the effect could be related to the contemporaneous impact of (or the lack of) Jewish presence in the oblast. The coefficient of $P_i^{M,\,\text{ex post}}$ increases to -0.984 (s.e. = 0.292). Although this sizable change in the coefficient is concerning, it does not take place in the other specifications shown in this table and when we use our other measures of the impact of the Holocaust.[32]

Column 6 includes the ex post change in total population, both by itself and also interacted with the German occupation dummy, as in Table IV. These variables should capture any heterogeneities in the direct effect of the destruction and loss of life caused by the war. They are themselves not statistically significant (not reported), though they reduce the statistical significance of the coefficient of $P_i^{M,\,\text{ex post}}$ slightly.

Panel B reports similar results to those in Panel A, but for the middle class variable in 1970. The general picture is similar to that in Panel A, though many of the estimates using the ex post measure $P_i^{M,\,\text{ex post}}$ as well as those that control for the direct effect of the war are now more precisely estimated.

Both diagrammatic analysis of outliers and more formal tests did not show any evidence that outliers are responsible for these results. For example, the robust regression estimate (again using the procedure described) corresponding to the baseline specification in column 3 is -0.577 (s.e. = 0.190) in Panel A and -0.876 (s.e. = 0.205) in Panel B.

Finally, we also performed two falsification exercises, similar to those for cities in Table III, except that we can now use information on percent Jewish population in the oblast in 1926 (which we do not have available for cities). We have data for 31 of our 48 oblasts; the same results in Panels A–C go through with this

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32. For example, when the percent of Jewish population in 1989 is included together with $P_i^{\text{ex ante}}$, the coefficient estimate is -0.225 (s.e. = 0.065) and when included with $P_i^{M,\text{ex ante}}$, the coefficient estimate is -0.053 (s.e. = 0.013); see Table A.3 in the Online Appendix. The percent Jewish population in 1989 itself is insignificant in these regressions, and its quantitative effect is small relative to the variables measuring the impact of the Holocaust, though it is statistically significant and has a larger quantitative impact in the specification in column 5.

subsample. In a specification identical to column 1 (i.e., with the same set of covariates and with population weights, but with log middle class in 1939 as the dependent variable), the coefficient estimate is 0.109 (s.e. = 0.267). Instead, when we do not use population weights, the coefficient is 0.204 (s.e. = 0.334). The results thus show no evidence of statistically significant pretrends at the oblast level.[33]

V.C.   *Holocaust and Education*

Another potential channel for the impact of the Holocaust might be through a persistent effect on educational attainment. Our oblast-level data enable us to investigate this possibility. The results are shown in Table A.5 in the Online Appendix, using the log of the total number of individuals that graduated from university; we also looked at the fraction of the population with various years of schooling. Though we could tell a similar story in which the Holocaust had a persistent effect on the political and economic equilibrium in Russian oblasts, because it targeted a stratum of highly educated individuals, the results are significantly weaker for education than those reported for the size of the middle class.

V.D.   *Political and Economic Outcomes*

We next examine the relationship between the Holocaust and political and economic outcomes at the oblast level. The results are reported in Panels C–E of Table VI. The set of covariates is the same as in Panels A and B, except that total population in the current year is no longer included on the right-hand side because the dependent variables are given in percentages or on a per capita basis. In Panel C of Table VI the dependent variable is the percentage of votes in favor of the preservation of the Soviet Union in the 1991 referendum.

The estimated coefficients in Panel C are positive and statistically significant in all columns. The pattern suggests that the

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33. We do not perform falsification exercises with the other measures because these would be mechanically correlated with log middle class in 1939. For example, in column 2, we would have the size of the middle class on the left-hand side and the size of the Jewish middle class, a significant proportion of the overall middle class, on the right-hand side. In columns 3–6, we would have the size of the middle class in 1939 on the left-hand side and an estimate of the change in the size of the middle class between 1926 and 1939 on the right-hand side (we do not have this problem in the other panels, since we are using 1959 numbers in constructing the ex post change and outcome variables for 1970, 1979, and 1989).

oblasts that experienced the Holocaust more severely were politically more opposed to reform in 1991. For example, the coefficient in column 3 (0.649, s.e. = 0.179) implies that a 1 standard deviation rise in the ex post impact on the middle class (0.084) is associated with a 5.5% rise in the vote share in favor of preserving the Soviet Union. Consistent with the hypothesis that the channel of influence may be through social structure, the estimates are much more precise in columns 3–6, when we use $P_i^{M, \text{ ex post}}$. Columns 5 and 6 also show that the results are robust to controlling for percent Jewish population in 1989 and for our proxies of the direct effects of the destruction and loss of life in World War II. When we control for the latter, the coefficient drops significantly, but remains marginally significant. The fact that the estimated effect of the Holocaust is somewhat attenuated in this specification is not entirely surprising since, as noted in note 29, the loss of life during World War II may itself be endogenous to the Holocaust.

Figure V shows the conditional relationship between $P_i^{M, \text{ ex post}}$ and the 1991 referendum vote visually (the figure corresponds to

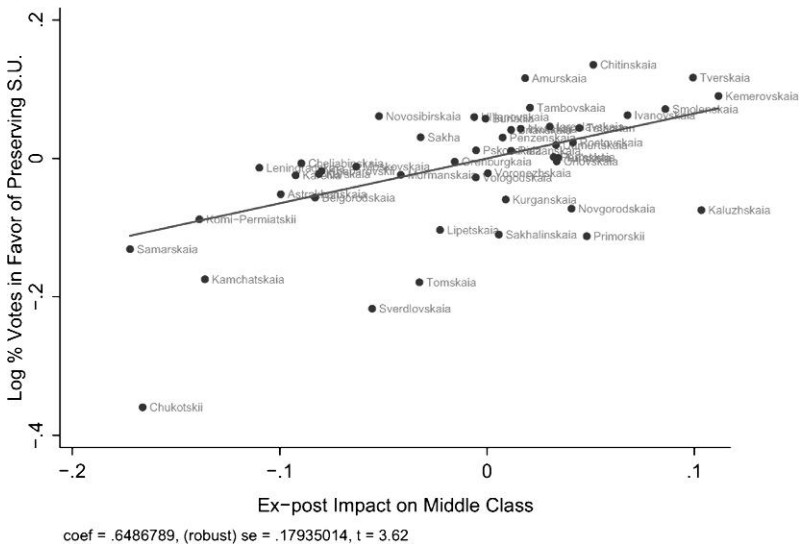coef = .6486789, (robust) se = .17935014, t = 3.62

FIGURE V

Impact of the Holocaust on 1991 Referendum

Conditional scatterplot corresponding to Table VI, Panel A, Column 3. Robust regression: coef = .4826513, se = .1785229.

the specification in column 3). The robust regression coefficient (again see foregoing discussion) corresponding to this specification is 0.483 (s.e. = 0.179).[34]

Panels D and E report the relationship between the potential impact of the Holocaust and our two economic outcome variables, average wage and GDP per capita at the oblast level. Panel D shows a negative association between the various measures of the severity of the Holocaust and log average wages in 2002. This association is statistically significant at 5% in all columns. The quantitative effects implied by the estimates in Panel D are large. For example, the estimate in column 3 (−1.075, s.e. = 0.218) suggests that a 1 standard deviation rise in the ex post impact on the middle class is associated with a 9.0% fall in average wages in 2002.

Panel E of Table VII reports similar results using log GDP per capita in 2002. The overall pattern is similar, and the coefficients on the variables measuring the impact of the Holocaust are statistically significant in all of the specifications.

VI. ROBUSTNESS CHECKS AND FURTHER RESULTS

We performed a number of other robustness checks. The results are presented in the Online Appendix. Table A.6 shows that our results are similar if we use data from the 1937 census instead of the 1939 census.

Table A.7 repeats some of the specifications from Tables II–IV for Ukrainian cities. One difficulty in this case is that, as discussed in Section II, there was much greater heterogeneity in the German administration of Ukraine during World War II. For example, the persecution of Jews was, according to the historical literature, much more severe in parts of the Ukraine that were under the control of the SS, than in the areas administered by the Romanian government (Dallin 1981; Ofer 1993). Nevertheless, there is still a negative relationship between the ex ante measure of the impact of the Holocaust, $P_i^{\text{ex ante}}$, and growth of city population.

Throughout the article we focused on the effect of the persecution and displacement of Jews during the Holocaust on the

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34. Table A.4 examines the vote share of communist candidates in the Duma elections of 1999, the variable used in our city-level analysis. The overall pattern is similar to that in Panel A.

long-run economic and political development of the affected societies. We have intentionally refrained from making any claims regarding the number of Jews that were murdered in any particular area, both because this is a contentious issue to which we have nothing to add and because the exact numbers are not central to our argument. Nevertheless, we can use historical sources on the number of individuals murdered to get some idea about how the severity of the Holocaust varied across areas and as an alternative validation of the source of variation we are exploiting. In particular, we coded detailed reports sent to Berlin by the four Einsatzgruppen that moved into the areas occupied by the Wehrmacht.[35]

Altogether, the Einsatzgruppen report 216 incidents. For 175 of these incidents the reports give a specific number of victims, totalling 156,401. Of these, 86% are reported to be Jews (which by all accounts is a small subset of the total number of Jewish victims of the German occupation). We matched the town names given in the Einsatzgruppen reports to an extended sample of Russian, Ukrainian, and Belarussian cities. In total, we are able to identify 42 towns for which we have information on the number of Jews in 1939, 8 of which are in Russia, the remainder in Ukraine and Belarus. Figure VI gives a scatterplot of the number of Jews reportedly killed as a percentage of the 1939 population over the percentage of Jewish population in 1939.

The regression line given shows a weak positive relationship between the two variables 0.102 (s.e. = 0.074). For the subset of eight Russian observations the association is much stronger with a coefficient of 0.206 (s.e. = 0.035). For the subset of Ukrainian observations the relationship is weakest with a coefficient of 0.050 (s.e. = 0.068), which gives some support to our conjecture that the severity of the Holocaust was much more uniform in Russia than in the Ukraine.

We also looked at the number of Jews killed by the Einsatzgruppen (again as a percentage of the 1939 population) as an alternative measure for the severity of the Holocaust, though we are aware that this is a highly noisy measure and the results should be interpreted with great caution. In particular, in a sample consisting of 42 occupied cities with Einsatzgruppen data and all unoccupied cities, we regressed log city population in 1989 on this measure, while controlling for the percentage of 1939 population

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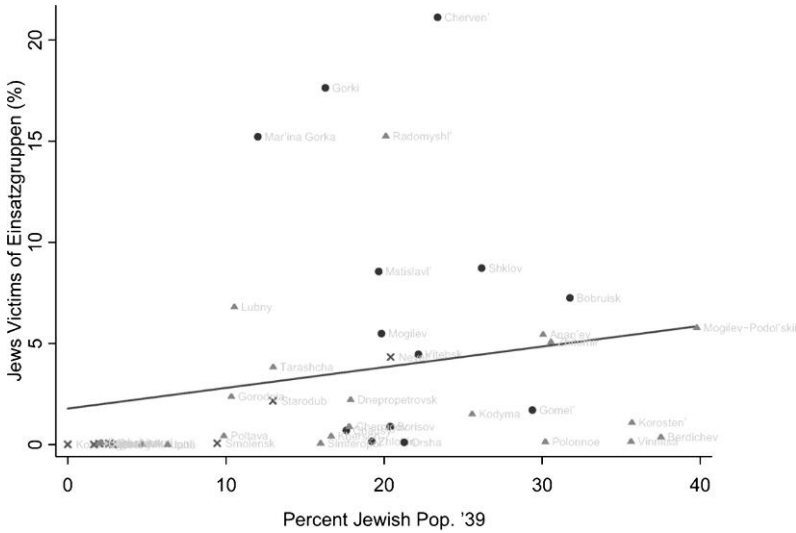35. We thank an anonymous referee for suggesting this source.

FIGURE VI
Einsatzgruppen Data

Jews reportedly killed by Einsatzgruppen as a percentage of 1939 population over Percent Jewish Population 1939. Russian observations are marked with an x, Ukraine: triangles, Belarus: circles. The slope of the regression line shown is 0.102 (s.e. = 0.074). Russian observations alone: coef. = 0.206 (s.e. = 0.035).

that was Jewish, the German occupation dummy, log city population in 1939, and country fixed effects. We found a negative association between this measure of the severity of the Holocaust and city growth, with a coefficient of −0.016 (s.e. = 0.009). This negative association persists when we limit the sample to the 42 cities for which we have Einsatzgruppen reports (coef. = − 0.010, s.e. = 0.009) and is stronger when we use only the 21 Ukrainian cities in the extended sample (coef. −0.023, s.e. = 0.011).

VII. CONCLUSION

In this article, we documented a statistical association between the severity of the Holocaust and long-run economic and political outcomes within Russia. Cities that experienced the Holocaust most intensely have grown less and administrative districts (oblasts) where the Holocaust had the largest impact have lower GDP per capita and lower average wages today. In addition, these same cities and oblasts exhibit a higher vote share for communist candidates since the collapse of the Soviet Union.

Although we cannot rule out the possibility that these statistical relationships are caused by other factors, the overall patterns appear to be robust to several plausible variations. We conjecture that the Holocaust's impact on social structure, in particular on the size of the middle class, across different regions of Russia, may be partly responsible for its persistent effects. Before World War II, Russian Jews were predominantly in white-collar (middle-class) occupations, and the Holocaust appears to have had a direct negative effect on the size of the middle class after the war.

Overall, the pattern of historical correlations presented here is consistent with possible adverse long-run economic and political effects of major shocks to the social structure. Nevertheless, we have also emphasized that considerable caution is necessary in interpreting these results. It is possible that Russian cities and regions with large fractions of Jewish populations were systematically different from others, and that these differences translated into differential paths of economic and political development. In addition, the magnitude of some of the effects we report are large and can only be rationalized if the Holocaust unleashed a process of divergent economic, political, and social development. Finally, Russian society has suffered various other shocks and hardships during the past 90 years, and these experiences may be confounding our empirical analysis of the implications of the Holocaust (though controlling for proxies for some of these shocks does not affect our results).

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