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Highway to Hitler

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HIGHWAY TO HITLER*

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Abstract: Can infrastructure investment win "hearts and minds"? We analyze a famous case in the early stages of dictatorship – the building of the motorway network in Nazi Germany. The *Autobahn* was one of the most important projects of the Hitler government. It was intended to reduce unemployment, and was widely used for propaganda purposes. We examine its role in increasing support for the NS regime by analyzing new data on motorway construction and the 1934 plebiscite, which gave Hitler greater powers as head of state. Our results suggest that road building was highly effective, reducing opposition to the nascent Nazi regime.

Keywords: political economy, infrastructure spending, establishment of dictatorships, pork-barrel politics, Nazi regime

JEL Classification: H54, P16, N44, N94

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I. Introduction

The idea that political support can effectively be bought has a long lineage – from the days of the Roman emperors to modern democracies, `bread and games' have been used to boost the popularity of politicians. A large literature in economics argues more generally that political outcomes respond to economic incentives. For example, the threat of revolution declines when franchise extensions commit the elite to future redistribution (Acemoglu and Robinson 2000). [1] In addition, "political budget cycles" are common (Drazen 2001); their existence is predicated on the assumption that electoral support can effectively be "bought" by politicians (Drazen and Eslava 2010).

The evidence on whether political support can be purchased through government spending is mixed. Several studies in democracies have shown that government programs and income transfers can increase electoral support (Levitt and Snyder 1997; Manacorda, Miguel, and Vigorito 2011; Litschig and Morrison 2010). [2] Furthermore, there is some evidence that large-scale infrastructure spending targeted at rebel areas reduced violence during the Iraq occupation (Berman, Shapiro, and Felter 2011).[3] Overall, however, there is no consensus that pork-barrel spending in general works (Stein and Bickers 1994; Feldman and Jondrow 1984) – not least because identification problems are serious. Also, deficit spending before elections is not reliably associated with electoral success (Brender and Drazen 2008; Brender and Drazen 2005). Crucially, there is no compelling evidence that large-scale infrastructure spending can create important shifts in voting behavior. In addition, little is known about pocket book voting and regime popularity in non-democratic countries. Dictatorships, when they hold elections, typically seek to showcase their popularity. Can large spending on infrastructure projects raise a regime's popularity in non-democratic settings? And can it win over previously opposed groups, thereby helping to strengthen an emerging dictatorship?

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[1] This line of research suggests that, as the threat of revolution increases, democratization becomes more attractive for the ruling elite (see also Aidt and Franck 2013). Conversely, rebellions are more common when income falls and the opportunity cost of rebellion declines (Brückner and Ciccone 2011; Miguel, Satyanath, and Sergenti 2004).

[2] In line with this, the empirical evidence shows that government spending is focused on the more informed and politically active parts of the electorate (Strömberg 2004; Besley and Burgess 2002).

[3] Beath et al. (2011) show that support for the government in Afghanistan also increased alongside local welfare spending – but violence did not decline.

In this paper, we analyze the political benefits of building the world's first nation-wide highway network, the *Autobahn*, in Germany after 1933 – one of the canonical cases of government infrastructure investment. We show that building the *Autobahn* was highly effective in reducing opposition to the Hitler regime. To measure popular support, we use local election results from the November 1933 parliamentary election and the August 1934 referendum – both took place after the Nazi party had seized power. This information is then combined with detailed historical data on the geography of Germany's growing highway network. According to our estimates, one in every ten persons previously opposed to the regime voted in favor of the Hitler regime in areas that saw new highway construction during the 9 months in between the two elections. Our findings show that infrastructure spending can effectively enhance the political entrenchment of a dictatorship – and the Nazi Regime's early rise in popularity matters because it effectively laid the foundations for the later war and genocide.

The 1934 plebiscite was called after the death of the President, Field Marshal Paul von Hindenburg. The population was asked to approve the proposition that Adolf Hitler would henceforth be both Chancellor and President of Germany, giving him vastly greater powers.[4] Support for the 1934 referendum was high overall – some 89.9 percent of Germans voted in favor. Importantly, there was substantial regional and local variation. Some towns and cities gave almost unanimous support; in others, fewer than two votes out of three were supported the regime. For example, in Garrel, Lower Saxony, only 60 percent of voters said yes. At the other end of the spectrum, Wendlingen (in the South-West of Germany) recorded support of 99.9 percent.[5]

Of course, election results after 1933 cannot be taken at face value – storm troopers were present at many polling stations, there was pressure to vote publicly, and non-voters faced intimidation (Evans 2006). We do not assume that the share of yes-votes cast is an unbiased indicator of support for the regime. Instead, we focus on changes over time in the local level of dissent – the share of votes cast against the Nazi Regime. Specifically, we examine differences in the share of "no" votes between November 1933 and August 1934. In a non-democratic setting, this is a more appropriate outcome variable than the share of voters saying "yes" – we cannot be certain that those voting "yes" were in favor of the regime, but given how potentially costly voting "no" was, these votes are clearly a sign of opposition.

[4] Hindenburg died on August 2nd; the plebiscite was held on August 19th.

[5] Even large cities recorded substantial differences: In Aachen, for example, 24% voted "no"; in Nuremberg, on the other hand, only 4.6% voted against the government proposition.

Many dictatorships stage elections, and aim to demonstrate "Soviet-style" levels of support of 99% or more (Jessen and Richter 2011). The public spectacle of generalized affirmation may serve as a public signal that helps to align privately-held beliefs (Acemoglu and Jackson 2011), and thus strengthening a dictatorship (Smith 2006).[6]

Figure 1 illustrates our main finding. It shows how much the building of the new highways changed election results in each district, by plotting the distribution of changes in the share of voters *opposed* to the Nazi regime between November 1933 and August 1934. There is a clear shift towards lower values – a faster decline in opposition – for areas traversed by the new motorways. In an average district, votes against the regime declined by 1.6 percentage points over this 9-month period (starting from already low levels).[7] In precincts where the *Autobahn* runs, the decline was 1.5-times faster, amounting to an extra percentage point reduction in opposition.[8] Since there was intimidation and pressure on the population to vote openly, biasing recorded support upwards, we consider this result a lower bound on the true size of the highway effect. If we focus on a longer span of time, the same pattern emerges: Between the last semi-free election (March 1933) and August 1934, opposition against the regime fell by 15% in areas untouched by the Autobahn – but by 25% where it was being constructed. [9]

[6] One interpretation emphasizes benefits through sapping the morale of potential opponents – public acts of preference falsification make it harder to convince others that there are doubts about the leadership, and that opposition is politically feasible (Kuran 1995).

[7] Note that we use electoral results at the district level as our unit of observation. Nation-wide, the share of yes-votes declined (with increases in many small districts and reductions in large cities).

[8] These results still hold if we control for a wide range of other variables and the selection of precincts during which the highway ran, see Section 4.

[9] To derive these figures, we take the 1934 "no" vote in each precinct, and compare it to votes for parties other than the NSDAP in the March 1933 election. The comparison is imperfect since voting for other parties in March 1933 is different from voting "no" in later elections and plebiscites. That is why we focus on the comparison for the period November 1933-August 1934.

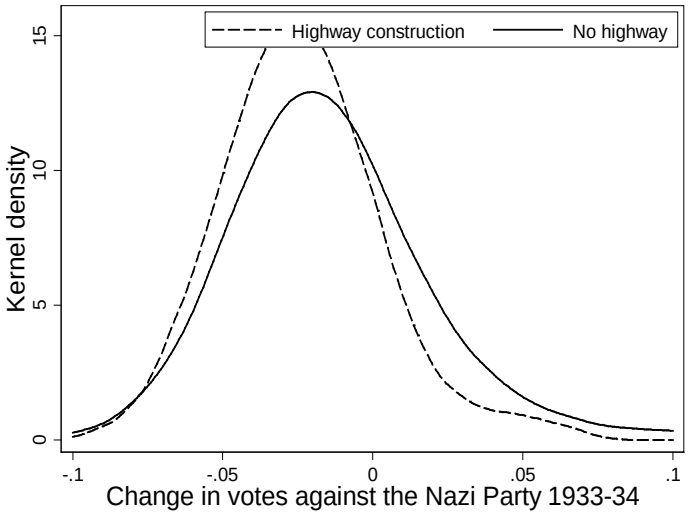

Figure 1**:** Change in votes against the Nazi Regime, November 1933- August 34, conditional on Autobahn connection

To show that the effect of *Autobahn* building is probably causal, we use a measure of highway suitability that is unrelated to political considerations. In the 1920s, a private research association, the STUFA, drew up detailed plans for a German motorway network (see Figure A1 in the Appendix). Road planning was determined by potential economic benefits and construction costs, reflecting geographical features of the terrain. It is notable for its economically sensible layout of the road network, based on "rational planning criteria … the STUFA identified economic areas that produced agricultural and industrial products… the planning, thus, was based on the expected economic traffic of goods and individuals" (Vahrenkamp 2010). The think tank's plan thus identifies a set of locations that were a-priori similarly suited for highway construction, providing a control group for our analysis.

Electoral districts traversed by the Autobahn (but not by the STUFA plans) show a marked decline in opposition. This decline is similar in magnitude to the one in areas where the STUFA planned to build and the Nazis actually carried out road works. Districts only traversed according to the STUFA plans (but never built) register no additional decline in opposition to the regime. This makes it unlikely that omitted variables such as structural characteristics associated with road-building were responsible for the change in electoral results. In combination, these findings strongly suggest that *Autobahn* building reduced opposition to the Hitler Regime. Effects were large and materialized quickly.

Also, one important advantage of our setting is that we can measure changes in voting over a short period of time – between November 1933 and August 1934. It is exactly during this interval that the first sections of the *Autobahn* were built. In this sense, our results come from a difference-in-difference setting, where we observe the differential swing in support for the Nazi regime over a 9-month period, conditional on highway building.

Our paper is related to a large body of work that examines the effects of government spending on political support. Electoral outcomes appear to be little affected by federal spending (Rundquist and Griffith 1976; Ray 1980; Stein and Bickers 1994; Green 2005). For example, one survey of the US evidence concludes that "whether pork-barrel benefits confer an electoral advantage is a matter of scholarly controversy" (Evans 2004). Endogeneity of treatment may be responsible for weak results – incumbents may lobby harder for their constituents if facing a serious challenger. Sidestepping these issues typically strengthens results. For example, by instrumenting outlays with spending at higher levels of geographical aggregation, Levitt and Snyder (1997) find positive effects of federal spending on re-election prospects. Similarly, Manacorda et al. (2011) and Litschig and Morrison (2012) use regression discontinuity designs to show that income support measures and local government spending can substantially increase support for the government. [10]

One key difference between our setting and standard elections lies in the electoral group targeted by government spending. In democratic elections, swing voters typically receive a high priority – for every dollar spent, there are more votes to be gained where many potential voters' preferences are relatively close to those of the government. In Nazi Germany, the opposite was true – to show very high levels of support, the government had to convince groups previously strictly opposed to the regime, especially left-leaning voters in industrial districts. In this sense, winning further votes was harder for the Nazi government than in most democracies.

Relative to the existing literature, we make a number of contributions: First, we show that infrastructure projects can turn opposition voters into supporters of the

[10] We also relate to the voluminous literature that examines the effects on infrastructure building, focusing on economic effects. The classic papers in this literature are Fogel (1964) and Fishlow (1965). For a critique, cf. David (1969). Recent work uses micro-level variation and seeks to exploit exogenous variation in trajectories (Banerjee, Duflo, and Qian 2012; Donaldson 2014; Donaldson and Hornbeck 2013).

regime. The fact that government spending can win over votes from the opposition suggests that its effect must be substantial: in theory, changing voting behavior will be harder the more remote voter's tastes are from a given party's program (Lindbeck and Weibull, 1987). Second, while previous studies have focused on elections in democracies, our results emerge in the context of a nascent dictatorship: The construction of the German highway system helped to entrench Hitler's regime. We thus also contribute to a rich literature that studies regime change in general and the rise of the Nazis in Germany more specifically (King et al. 2008; Bracher 1978).

The paper proceeds as follows. We first explain the historical background and context of motorway building in section II, and summarize key facts about elections under the Nazi regime. We then describe our data in section III before presenting our main empirical results (section IV). Next, we test the robustness of our findings (section V). Section VI concludes.

II. Historical Background

In this section, we briefly describe motivations behind the building of the *Autobahn* network and its antecedents. We also discuss the nature of our election data.

Motorway building under the Nazis

The Hitler government pursued two aims with the building of the motorway network. First, it aimed for a propaganda success, demonstrating its competence by "getting things done". This aim was pursued vigorously and with success – many elderly Germans still point to the motorway network to argue that the Nazi regime had some positive sides, too. Second, the government sought to create employment.

The first sod of earth for building the *Autobahn* was turned by Adolf Hitler himself, in September 1933. The weekly news reel shows him addressing a huge crowd of workers, proclaiming that the "gigantic undertaking" was to bear witness to the regime's resolve and vision. He then told his audience to "get to work". Together with rearmament, the *Autobahn* is widely seen as a key part of Keynesian demand-stimulus by the Hitler government. In line with the regime's propaganda, many observers took it for granted that building the new highway network reduced unemployment substantially. Quantitative research has since established that neither military spending nor highway construction were important in explaining

Germany's nascent recovery after 1933. Initially planned to employ up to 600,000 workers, motorway building never came close to creating such a number of jobs. At its peak, some 125,000 Germans were working in highway construction.[11] Instead, the rapid rise in output under Hitler is typically explained by the strength of a cyclical upswing, helped by an end to deflation and declining uncertainty over the economy (Ritschl 1998).

Long before the Nazi government began to build highways, a private think tank, the so-called STUFA, developed detailed plans for a comprehensive motorway network in Germany. At the time, Italy had already completed the first high-speed roads reserved for car traffic.[12] In 1926, STUFA published its general plan for a highway network – a planned network that was actually larger than Germany's motorway network today (Vahrenkamp 2010).

Immediately after coming to power, the Nazi government began to push for new road building projects. At the Berlin Motor Show – only 11 days after coming to power – Hitler proposed far-reaching plans on how to 'motorize' the German people, providing not just roads but cheaper, compact cars. By the summer of 1933, a new publicly-owned company had been founded to build and operate the new motorways. The network was planned with the help of a network of local enthusiasts (Vahrenkamp 2010). The exact trajectory in several cases was decided by Hitler himself, who insisted on scenic routes.

To maximize work creation and to demonstrate that the government was serious about road building, construction began at many points simultaneously. Figure 2 shows the 1934 highway network. Black segments were under construction; broad white segments were approved for construction, but not yet begun; and dashed lines indicate planned segments not yet approved for construction. In 11 parts of the country, construction was under way less than a year after the start of the project. Among the first segments to be built were the link from Frankfurt to Darmstadt and on to Stuttgart, from Berlin to Hannover, the connection Bremen-Hamburg-Lübeck, Leipzig towards Munich, and Munich-Stuttgart.

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[11] This should be compared with a decline in unemployment from 6 million in January 1933 to 2.5 million in the summer of 1934.

[12] In the Rhineland, another – unrelated – project connected Bonn and Cologne. It was pushed by Konrad Adenauer, later Chancellor of the Federal Republic of Germany, and was intended to reduce unemployment. It opened in 1932 (Vahrenkamp 2001).

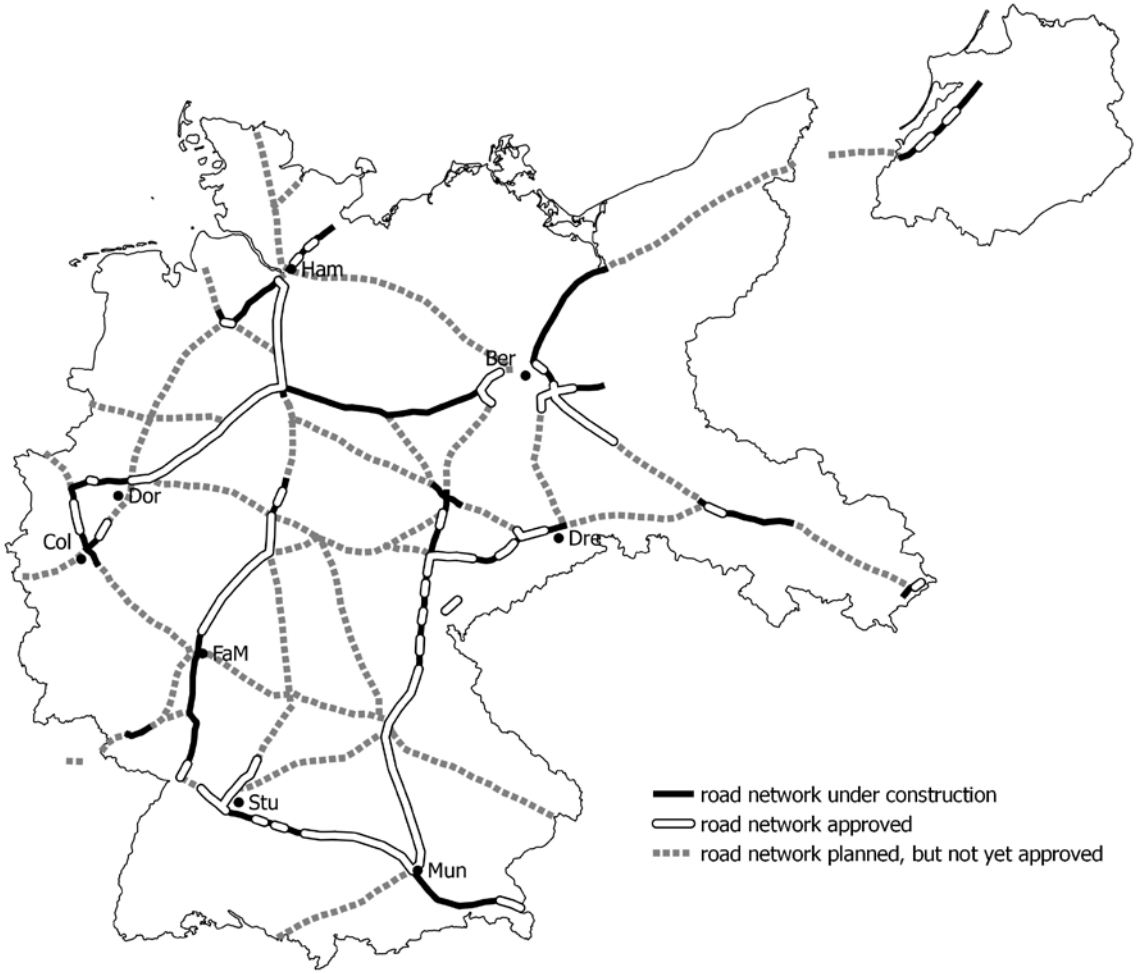

Figure 2: German Highway Network by 1934

From the very beginning, the NS regime used the motorway building project for propaganda purposes. In the first month of the newly-founded Autobahn company's existence, the *Völkischer Beobachter* – the leading NS paper – made construction progress front-page news no fewer than four times. At the behest of Propaganda Minister Josef Goebbels, time tables were coordinated to ensure that work started simultaneously at 22 locations in March 1934. Instead of building entire stretches of motorway first, construction took place all over the country in a bid to showcase NS economic policy. Speeches and news coverage emphasized economic benefits, especially the reduction in unemployment.

As new stretches of motorway opened to the public, the regime celebrated its successes. The first segment was finished in May 1935. Some 90,000 supporters lined the road as Hitler was driven from Frankfurt to Darmstadt. By 1936, some

1,000 km of road (out of 9,000 planned) had been finished; the simultaneous opening of 17 segments of motorway was used for ceremonies all over Germany. Again, these events were used to high effect by the NS regime's propaganda machine. In addition, the *Autobahn* was also celebrated as an aesthetic innovation. The *Autobahn* company commissioned a number of artists to produce paintings of road segments, bridges, ramps, and construction work. A book containing reproductions of these paintings was sold over 50,000 times.

Interestingly, motorway workers themselves were typically skeptical of the NS regime – a fact that works against our finding. Recruited from the unemployed, many were unskilled. A substantial share sympathized with the Social Democratic Party or the Communist movement. While supporters of highway construction had expected workers to be recruited locally, they were instead often drafted from among the unemployed to work far from their homes, often living in barracks, where they were subjected to harsh discipline, and received only a minimal wage. They frequently expressed dissatisfaction with working conditions, pay, and harsh discipline. Disaffected workers painted anti-Nazi slogans on lorries used for motorway construction (Vahrenkamp, 2001). In one incident, workers demanded pay supplements. When their demands were not met, they went on strike, singing "The International" – the anthem of the socialist and communist workers' movements. Work only resumed after the ringleaders were sent to Dachau concentration camp.

The direct economic benefits of new roads were limited. Car ownership rates in Germany in 1933 were low – approximately one quarter of those in England or France. Most transport of goods and people took place via rail. The new regime intended to boost the German car industry by all means possible, and not simply via road-building. Hitler had high hopes for the automobile industry as a future source of employment, and because its factories could easily be converted to war production. A tax exemption for the purchase of new automobiles from March 1933 onwards boosted car production, and accelerated the recovery of private car purchases (which had begun to rise in the fall of 1932). Between 1932 and 1938, the total number of cars, motorcycles and trucks on German roads doubled (Evans 2006).

The military advantages of road-building were relatively unimportant. While the invasion of Austria used the Autobahn for moving tanks, almost all troop and supply movements before and during World War II took place by rail. Since the Hitler government planned wars of aggression which would take troops far beyond the borders of the Reich, the importance of internal communications was

limited. If there was an aspect of road building that mattered militarily, it was motor vehicle production. Boosting the mobility of army units was a general aim of most armed forces after 1920. Increasing car ownership and the number of trucks in Germany was considered desirable because private vehicles could be confiscated in wartime. Indeed, the invasion of France used some 15,000 trucks requisitioned from private industry (Vahrenkamp 2010).

1933 Elections and the 1934 Plebiscite

We use two principal measures of opposition -- votes against the NSDAP in November 1933, and the share of no-votes in the plebiscite in 1934. In addition, we use data from the March 1933 election for robustness checks, and to gauge plausible magnitudes of actual vote shifts (since the later elections only provide inflated measures of support) Figure 3 illustrates the timeline of elections and highway building.

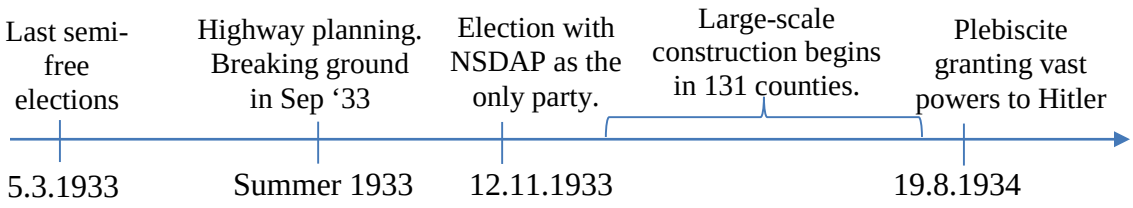

Figure 3: Timeline of events

When Germans went to the polls in March 1933, the Hitler government had already been in power for over a month. Nonetheless, elections were still relatively fair, with intimidation at the polls limited compared to what happened on later occasions. Except for the Communist Party, which had been banned, all parties that had competed during the last free election in November 1932 were still on the ballot paper. Despite a massive propaganda campaign, the NSDAP failed to win an absolute majority, receiving 44 percent of the total vote.

In November 1933, the regime held new elections. Over the summer, all parties except the NSDAP had been banned. In addition to Nazi MPs, the NS list before the voters also contained 22 "guests" – mostly prominent members of the right-wing elite who were largely aligned with the party's aims, and were asked to participate to give the new parliament marginally broader representation. [13] On

[13] In parallel to the parliamentary elections, voters were also asked to approve Germany's leaving the League of Nations. This proposal was wildly popular since the League of Nations was closely

average, the Nazi Party won 90 percent of the popular vote – an increase of 48 percent from March.[14]

Voting in November 1933 was not free and fair; storm troopers collected many voters at home if they had failed to show up, and they stood guard at the voting booths. Ther, citizens were strongly "encouraged" to vote publicly so that everyone could witness a voter's support of the NS regime. Evans (2006), commenting on elections under the Nazis, observes that

> Intimidation was particularly evident during the national plebiscites and elections that Hitler held from time to time… Under the Third Reich, plebiscites and elections became propaganda exercises in which the regime mobilized the electorate, by all means at its disposal, to provide the appearance of popular legitimacy for controversial measures.

Despite these intimidation measures, opposition was not zero. On average, one out of every ten Germans voted against the NS list. In some areas, there was massive opposition – in the old Hanseatic city of Lübeck, for example, 40,824 voters opposed the NSDAP list, out of 111,911 votes cast – a proportion of 36.5 percent. Hamburg and Berlin registered similar levels of dissent, with 27 and 26 percent of voters saying "no" to the Nazi list. At the opposite end of the spectrum, in Pirmasens, only 218 out of 31,371 votes were against the Nazi list – equivalent to 0.7%.[15]

The plebiscite in August 1934 was already described in the introduction. The death of President Hindenburg – whose mental and physical health had long been poor – in August 1934 gave the regime the opportunity to demonstrate its popularity. The official union of the offices of President and Chancellor removed the last de facto checks and balances that the Nazi state had inherited from the Weimar constitution.

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associated in the minds of Germans with the harsh Versailles Treaty that had ended World War I (and saddled Germany with a massive reparations bill). The referendum received 95% support.

[14] Total votes in the country as a whole against the regime slightly increased. If we analyze results district by district, we find the opposite – the average district had slightly fewer votes against the regime, because we count all districts as equally-important units of observation. Weighted by population, we also find a slight decline in regime support, driven by voting in a few, large cities.

[15] There are also several smaller towns where support reached 100%.

III. Data

We have voting records for 901 counties, covering the entire country. These data are combined with information from the 1925 and 1933 censuses. To this, we add geographical information from maps of the German road network in the interwar period. We digitized separately the 1920s plans for the STUFA network, and the various stages of expansion of the actual motorway network built after the summer of 1933. In addition, we use information on pre-existing transport infrastructure in the form of rail and waterway links.

As shown in Table 1, of the 901 counties in our sample, 408 were scheduled to be traversed by the *Autobahn* according to the general plan (shown in Figure 2), while more than half – 493 – would not be touched by the new roads. Out of the 408 districts scheduled to be part of the network, there was construction by 1934 in 131 – roughly a third of the planned total.

Table 1: Number of Electoral Districts in Sample, Conditional on Highway Construction

		Highway under construction in 1934		
Part of National Highway plan?		No	Yes	Total
	No	493	0	493
	Yes	277	131	408
	Total	770	131	901

Since elections after 1933 were no longer fair and free, the support for the regime as expressed at the polls surged. As the share of "yes" votes in many districts approaches 100%, differences in the level of support naturally decline. Figure 4 plots the level of support in the three elections we analyze – the March 33 election, the November 33 election, and the August 34 plebiscite.[16] While votes for the NSDAP follow a normal distribution in March 1933, the distributions are dramatically shifted to the right for the later votes. The dispersion of votes also declined, as the regime used intimidation and other forms of pressure to reduce measured opposition; the upper bound of 100% approval in areas of very high levels of general support also becomes binding.

[16] We use the electoral support for the NSDAP in November 1933, and not the plebiscite about leaving the League of Nations, which was held in parallel. Membership in the latter was hugely unpopular as it was seen as an integral element of the Versailles settlement (Evans 2006).

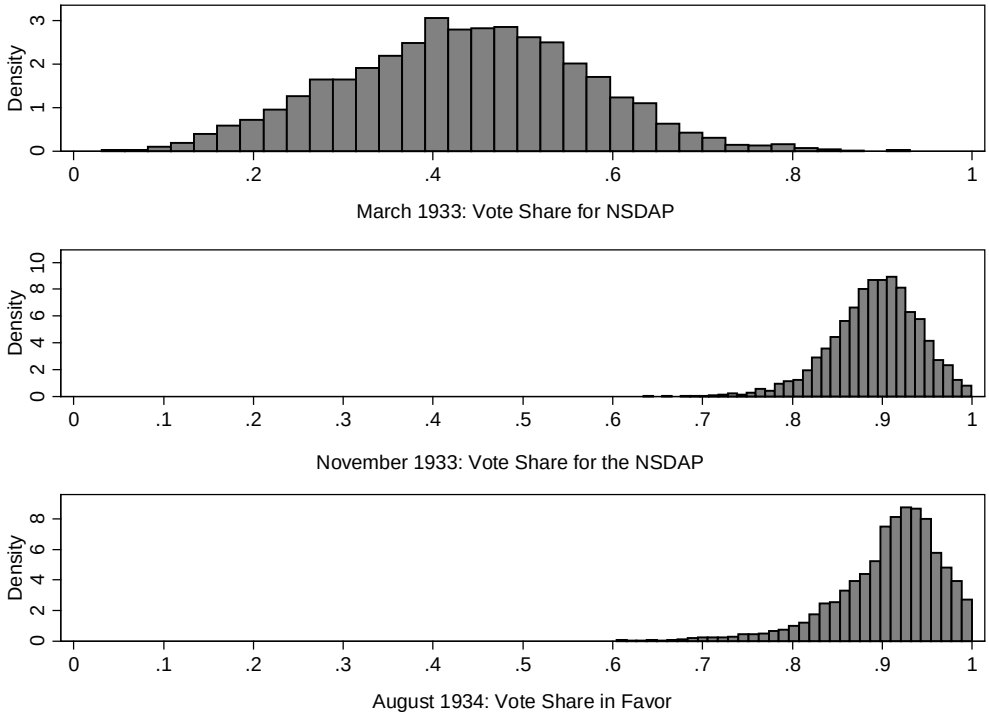

Figure 4: Support for the Nazi Regime, 1933-34

Table 2 gives an overview of the data and the key similarities and differences between areas with and without (planned) motorway construction. Economic structure and religious composition are broadly similar in the `treated' and `untreated' share of our sample. Districts without a planned highway are more populous than the rest, and the blue-collar share is higher. Also, the unemployment rate in 1933 is above the rate in the rest of the sample – 17% in the districts where building commenced first, with 15% on average in all districts where a motorway was planned (and 14% overall). Note that all these differences are relatively small. Areas of highway construction were less Catholic than the sample overall, and they had fewer people employed in agriculture. Conversely, the share of industrial employment was somewhat higher. Importantly, votes against to the Nazi regime in March 1933 (1 minus votes for the NSDAP) were nearly identical in areas with and without road building – 53.8% vs. 53.3%. This suggests that there are no important pre-existing differences in ideological outlook. Our analysis focuses on the change in the share of votes against the NS regime between the November 1933 election and the 1934 plebiscite:

$\Delta NSopp = NSopp(8/34) - NSopp(11/33)$

where *NSopp(8/34)* is the share of "no"-votes in August 1934, and *NSopp(11/33)* is the share of opposition in November 1933 as measured by 1 minus the vote share in favor of the NSDAP. The average shift between both elections is probably not informative of the level of support in the country as a whole, since the nature of the election and the question put differed. Instead, we argue that location-specific differences in the size of the "swing" in favor of the Nazi regime can be used as a measure of changes in its *relative* popularity. When we examine changes in opposition in the sample as a whole, and in areas of motorway construction, we find a striking pattern: in areas that saw highway-building in 1933/34, opposition to the Nazi Party was higher to start (Nov. 33); but by August 1934, opposition had fallen substantially. In the sample as a whole, average opposition declined by 1.6%; where the roads were built, it fell by 2.4%. Put another way, on average, opposition declined by 1/6; in areas with road-building, it declined by one quarter.

Table 2: Balancedness: Controls and Voting Results,
Districts With and Without Highways

	Full	Highway planned		
Variable	sample	All	not built	built
ln Population size 1933	10.793	10.955	10.829	11.226
Blue collar share 1933	0.313	0.322	0.305	0.357
Unemployment rate 1933	0.139	0.150	0.141	0.170
Share Catholic	0.366	0.324	0.369	0.231
Share Industrial Employment	0.260	0.274	0.260	0.304
NSopp(03/33)	0.533	0.539	0.540	0.538
NSopp(11/33)	0.097	0.101	0.099	0.107
NSopp(08/34)	0.081	0.085	0.086	0.083
ΔNSopp (11/33 – 8/34)	-0.016	-0.016	-0.012	-0.024
N	901	408	277	131

Under "Highway planned", "All" comprise all roads that were planned or built according to the highway network in Figure 2. *NSopp(03/33)* denotes opposition to the Nazi party (in 03/1933, calculated as 1 minus NSDAP votes).

IV. Main Empirical Results

In this section, we show that opposition to the Nazi regime shrank systematically more quickly where the new motorways were being built.

Baseline results

We first illustrate our finding geographically. In Figure 5, we classify towns by tercile of the relative (log) change in "yes" votes for the regime between November 1933 and August 1934. As the enlarged section of the map shows, counties where the motorway was being constructed belong predominantly to the highest tercile of vote changes in favor of the regime. There are also some other areas with a high "swing" towards the regime that are not touched by the Autobahn. Areas with a small (or negative) shift are overwhelmingly unaffected by motorway construction, and further away from the trajectory of the new roads. Note that the results are strongest for the areas where actual construction was taking place – where the roads were approved for building, but no construction was taking place, results are mixed (some districts are in the highest tercile, others in the lowest tercile).

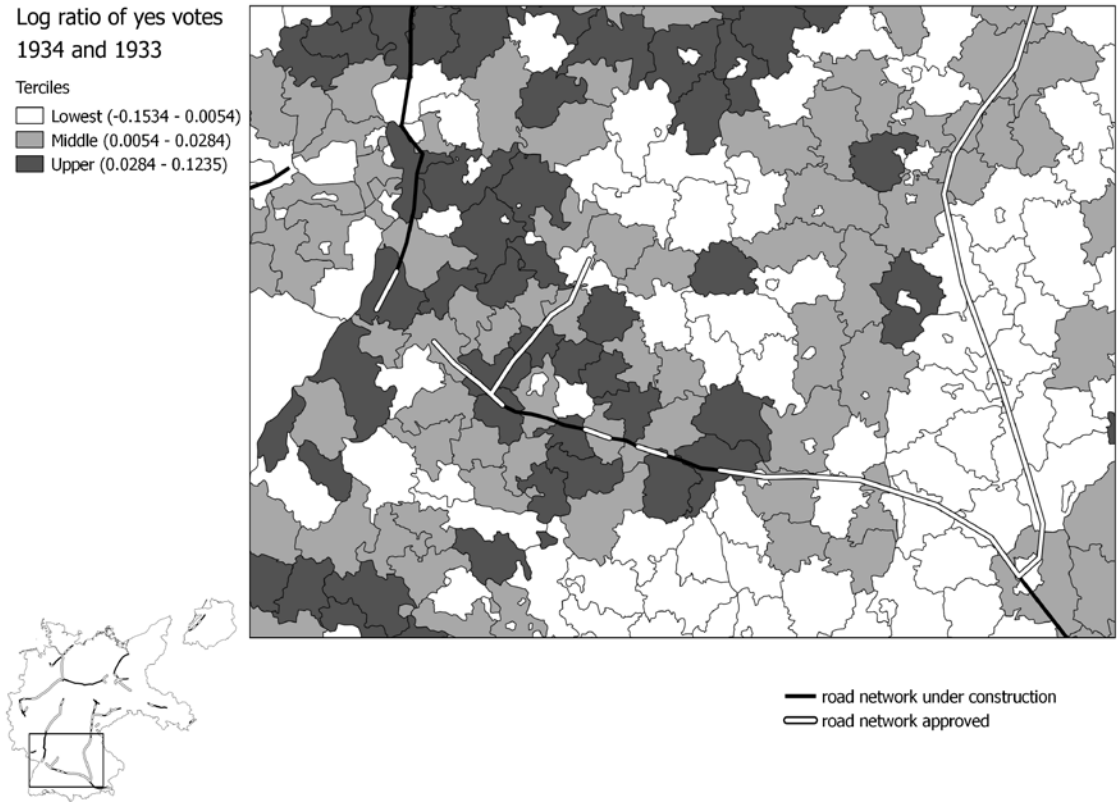

Figure 5: Shift in Favor of the NS Regime between Nov. 33 and Aug. 34

To establish econometrically if motorway building was associated with significantly higher support for the Nazi regime, we first compare vote shifts in areas traversed by the new highways with the rest. We then estimate regressions of the form:

$$\Delta NSopp = \alpha A + \beta X + \varepsilon$$

where ΔNSopp is the change in votes against the Nazi regime, A is a dummy variable for whether the *Autobahn* transects a county, X is a vector of controls, and ε is the error term. Figure A2 in the Appendix illustrates the geography of treatment. In our baseline regressions we compare the traversed counties (dark grey) with all others; in a subset of statistical results, we restrict the comparison group to all those districts included in the national highway plan (dark grey and light grey districts).

Table 3 presents our baseline results. In an average electoral district not traversed by the Autobahn, opposition to the regime between November 1933 and August 1934 declined by 1.5 percentage points; where the new motorways were being built, opposition declined by an additional 0.92 percentage points (col 1). In relative terms, this is a large effect – highway building reduced opposition by an additional 60 percent, relative to the baseline decline. In col 2, we add a dummy variable for districts where highways – according to the general plan – were going to be built in the future, but were not under construction in 1934. We find no significant effect in districts where road-building was merely planned. This finding is important because it reduces the likelihood that some unobserved factor that made road-building feasible or desirable is responsible for the shift in voting patterns.

In cols 3-5, we focus on only those districts that were scheduled to become part of the German highway network – roughly half of our sample. We also include socioeconomic controls from the 1920s and 30s. The decline in opposition was smaller in Catholic areas and in large cities, as implied by the positive coefficients on these variables in cols 4 and 5. Where unemployment was high in 1933, opposition to the Nazis fell more strongly until August 1934 (col 5). Industrial employment shares and the proportion of blue collar workers, on the other hand, are not significantly associated with changes in opposition. In the restricted sample in cols 3-5, we find that building the *Autobahn* reduced opposition by 0.85 to 1.1 percentage points. The result holds independent of the socioeconomic characteristics that we add as controls. In terms of magnitude, the effect of highway construction is substantial when compared to other socioeconomic controls: a one standard deviation increase in Catholic population raised opposition by 1.3 percentage points, and a one standard deviation increase in initial unemployment lowered votes against the Nazis by 0.5 p.p. Below, we discuss the size of these effects at greater length.

Table 3: Highways and Percentage Change in Votes against the Nazis
(Dependent variable: percentage change in votes against the Nazis, Nov 1933- Aug 1934)

	(1)	(2)	(3)	(4)	(5)
	All districts		Only districts with planned highway		
Highway built	-0.918***	-0.800***	-1.129***	-1.001***	-0.887***
	(0.232)	(0.247)	(0.279)	(0.274)	(0.301)
Highway planned		0.330			
		(0.242)			
Share Catholic				3.854***	3.646***
				(0.475)	(0.474)
Share Jewish				-17.37	-9.701
				(29.75)	(35.11)
log(population)				0.587***	0.863***
				(0.191)	(0.236)
Share blue collar					-1.851
					(2.532)
Share industrial					0.470
					(1.767)
Unemployment					-6.249**
					(2.770)
Constant	-1.459***	-1.578***	-1.248***	-8.817***	-10.44***
	(0.116)	(0.145)	(0.194)	(2.053)	(2.474)
N	898	898	407	380	380
adj. R^2	0.010	0.011	0.029	0.233	0.246

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Sample size in columns (3)-(5) is lower because we exclude districts not included in the general highway plan of 1933. Sample size falls for columns (4) and (5) because controls are not available for all districts.

Results by distance

If a "demonstration effect" of government competence is responsible for the shift we document, then it should peter out with distance from the locus of road building. The same is true of the economic benefits, which probably declined with the distance to the new roads. Figure 6 plots the marginal effects by distance of a county's centroid from the motorway. This measure reflects how strong the exposure to the highway construction was – the larger the distance from the centroid, the more peripheral the highway cut through the county; for larger distances, it did not run through the county at all. The figure shows that the more

an electoral district was exposed to *Autobahn* construction, the stronger was the decline in votes against the regime.

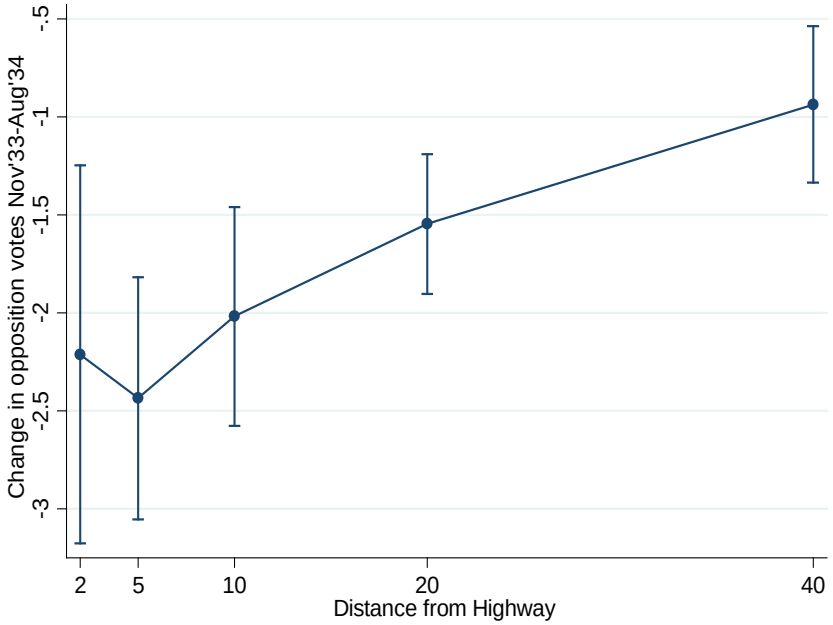

Figure 6: Marginal Effect of Highway Construction, by Distance

Next, we test the link between opposition and distance to the highway econometrically (Table 4). Col 1 shows that there was a tendency towards increasing opposition in counties with greater distance to the newly-constructed highways. In col 2-4, we show that within the part of the sample where highways were planned, shorter distance from actual construction is associated with a stronger decline in opposition. Our results suggest that for every doubling of the distance, relative opposition increased by approximately one third (relative to a baseline reduction in opposition of 1.6 percentage points).

Table 4: Distance to Highways
(Dependent variable: percentage change in votes against the Nazis, Nov 1933-Aug 1934)

	(1)	(2)	(3)	(4)
	All counties	Only counties with planned highway		
log(distance to HW)	0.212**	0.407***	0.342***	0.240*
	(0.0946)	(0.120)	(0.118)	(0.127)
Share Catholic			3.898***	3.753***
			(0.478)	(0.478)
Share Jewish			-15.70	0.364
			(29.68)	(36.40)

log(population)			0.591***	0.784***
			(0.195)	(0.237)
Share blue collar				-3.237
				(2.484)
Share industrial				3.335**
				(1.662)
Unemployment				4.014*
				(2.302)
Constant	-2.348***	-2.904***	-10.30***	-13.39***
	(0.331)	(0.364)	(2.259)	(2.907)
N	898	407	380	380
adj. R^2	0.003	0.021	0.225	0.246

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Sample size in columns (2)-(4) is lower because we exclude districts not included in the general highway plan of 1933. Sample size falls for columns (3) and (4) because controls are not available for all districts.

1926 Highway Plans and Actual Road-Building

Our results could be affected by endogeneity bias if the Nazis targeted areas that were more likely to increase their support for the regime even in the absence of highway construction. For example, the Nazis may have planned and built highways to reward loyal districts, or in an attempt to "bribe" areas that were particularly prone to be influenced by the regime's policies. One way to deal with potential endogeneity of road trajectories is to exploit the road network planned by the STUFA described above. Figure A1 in the Appendix gives an overview of this 1926 plan for a road network.

In Figure 7 we use the STUFA plans to visualize the effect of highway construction in different subsamples. First, we show our main result – in the overall sample, votes against the NSDAP fell by an additional percentage point (between Nov 1933 and Aug 1934) in counties that saw highway construction. Second, we restrict attention to the 400 counties that were traversed by motorways in the STUFA plan.[17] This excludes those districts that may have been added to the network for political reasons. We find that within this sample, the effect of highway construction is very similar: those segments that were planned by the STUFA but not built saw a decline in opposition by 1.2 p.p., as compared to a decline by 2.3

[17] There were several plans drawn up by STUFA, calling for expansion of the motorway network in different stages (Vahrenkamp 2010). We digitize both the 1925 and 1926 plans, and code a district as included if it is traversed by major roads in both versions of the network scheme.

p.p. in counties were highways were planned by the STUFA and also built by the Nazis prior to August 1934. This difference is statistically highly significant. Finally, we show that results also look similar when we analyze the 498 counties where the STUFA did *not* plan motorways. The data thus suggest that there is no systematic difference in the effect of highways, whether planned by the STUFA and built, or not planned by the STUFA and built. Thus, our results in the full sample are unlikely to be affected by strategic highway construction under the Nazis.

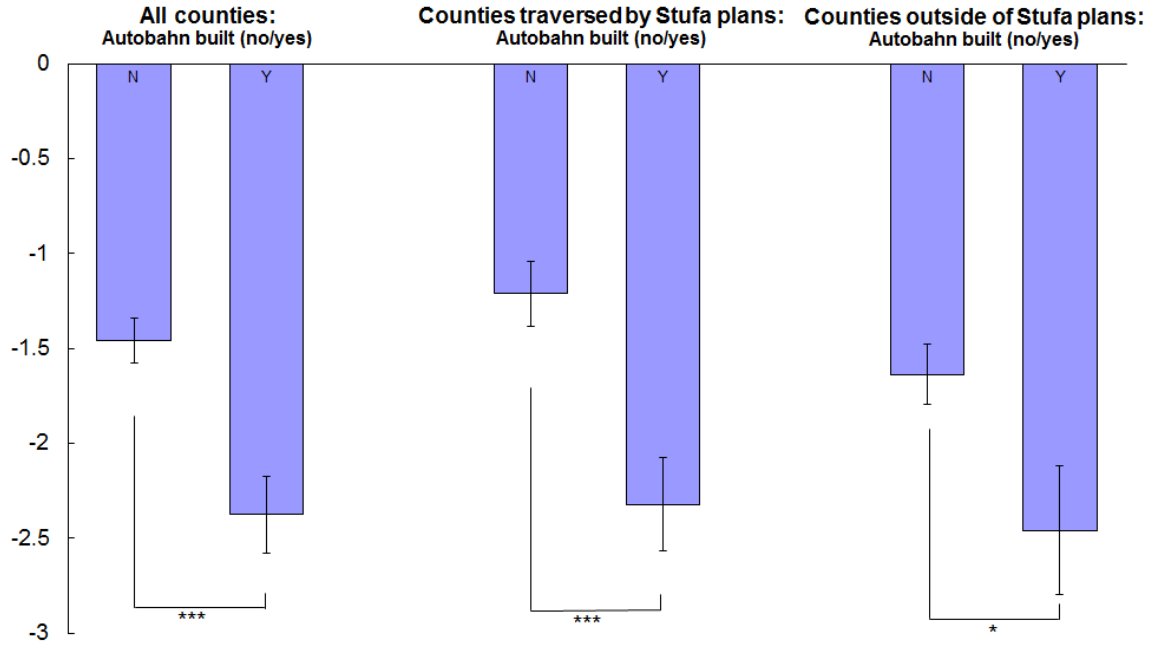

Figure 7: Effect of Highway Construction in Different Samples

In Table 5, we explore the STUFA results further and show that they hold after including controls. Col 1 shows that those counties where the STUFA had planned motorways actually saw a smaller decline in opposition when compared to all other counties. Thus, if anything, it is harder to find declining opposition in counties where motorway construction was planned in 1926. Nevertheless, within the subset of counties where highways were actually built under the Nazis, there was a significant decline in opposition (col 2). Next, in col 3 we restrict attention to those counties where the STUFA had planned highways, and in col 4, to those traversed by both STUFA plans and the Nazi plans shown in Figure 2. Within both subsamples we find a significant decline in opposition where construction had begun prior to the August 1934 referendum. Finally, in col 5 we confirm that our results also hold for those counties that were not traversed by STUFA plans.

Table 5: Stufa Plans and the Effects of Road-Building

Sample	(1) All counties	(2) All counties	(3) Planned by Stufa	(4) Planned by Stufa+Nazis	(5) Not planned by Stufa
Stufa plan	0.385**	0.509**			
	(0.193)	(0.206)			
Stufa plan + built		-0.720**	-0.582**	-0.712**	
		(0.296)	(0.296)	(0.321)	
Built, but no Stufa plan					-0.737**
					(0.366)
Constant	-6.755***	-7.164***	-3.151	-1.460	-9.801***
	(1.621)	(1.645)	(2.428)	(2.832)	(2.319)
Baseline controls	yes	yes	yes	yes	yes
N	851	851	368	211	483
adj. R^2	0.197	0.199	0.223	0.272	0.186

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Sample size in columns (3)-(5) is lower as we stratify the sample according to inclusion in the STUFA plans.

V. Robustness and Discussion

In this section, we show that our results hold across a wide range of subsamples. We also present results from a number of placebo tests, use matching estimation, and present an analysis of voting results in levels. The latter addresses the question whether highways were built where electoral support for the Nazis was already strong. Finally, we investigate the possibility of electoral fraud.

Sample splits

Table 2 showed that counties with and without highway construction differed along four dimensions: population, unemployment, industrial employment, and the share of Catholics. Could our result be driven by these differences? To address this issue, we divide the sample along the four dimensions, into above- and below-median segments. In Table 6, we compare the size and significance of the motorway effect for these subsamples. The first row gives the results for the dummy variable of motorway construction. We find an additional reduction in opposition of 1.1 p.p. in more populous districts (col 1) if traversed by a highway

under construction, and of 0.7 p.p. in the smaller towns and cities (col 2). Both effects are statistically significant. Where unemployment was above the median (col 3), the reduction in opposition was 2/3 of a percentage point; elsewhere, it was 1.3 p.p. (col 4). This suggests that motorway construction did not "work" by targeting depressed areas and offering support for the unemployed. Along similar lines, higher industrial employment is also associated with smaller reductions in opposition. Finally, the highway construction is associated with a reduction in opposition in both Catholic and Protestant counties (cols 7,8). The effect is somewhat smaller in pre-dominantly Protestant areas, where the Nazi party received higher levels of support during its rise to power (Falter 1991). The stronger effect in Catholic areas suggests that highway construction was particularly powerful in overcoming opposition in areas that had earlier been less receptive to the Nazi program and propaganda.

Table 6: Sample Splits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Population		Unemployment		Industry Emp.		Share Catholic	
Rel. to median	Above	Below	Above	Below	Above	Below	Above	Below
HW built	-1.130***	-0.742*	-0.667*	- 1.274***	- 0.675**	- 1.230***	- 1.816***	-0.479*
	(0.343)	(0.426)	(0.343)	(0.413)	(0.341)	(0.464)	(0.546)	(0.250)
HW planned	0.947***	0.342	0.359	0.849***	0.294	0.857***	0.635*	0.570**
	(0.335)	(0.277)	(0.310)	(0.313)	(0.329)	(0.292)	(0.358)	(0.231)
Baseline Controls	yes	yes	yes	yes	yes	yes	yes	yes
N	420	431	427	424	427	424	431	420
adj. R^2	0.319	0.135	0.174	0.246	0.175	0.218	0.074	0.007

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Baseline controls include the share of Catholics, share of Jews (both in 1925), and log county population in 1933.

Earlier electoral support for the NSDAP and road-building

Next, we examine the relationship between road-building and (i) NSDAP votes in March 1933, and (ii) the change in votes against the NSDAP between March and November.

Table 7 gives the results. In Panel A we find that there is no significant association between election results in March 1933 and inclusion in the planned highway network (cols 1-2); nor is the actual building of the *Autobahn* associated with the NSDAP's electoral success in the last semi-free election in March 1933 (cols 3-6). If we restrict the analysis to areas included in the 1934 plan, we find small and insignificant positive coefficients. In Panel B we analyze the decline in votes against the Nazis between March and November 1933, i.e., before most of the building had started, but when the routes were known. Overall, votes against the NSDAP fell by 43 p.p. – from 53% to 10%.[18] Our results in cols 1 and 2 suggest that this decline in opposition was marginally stronger in counties that were included in the Reich's Autobahn-network. This suggests that anticipated building had a (limited) effect on votes in the expected direction. However, highway building itself did not change opposition to the Nazis between March and November 1933. This is close to a placebo check of our results: because actual building began in earnest after the fall of 1933, we should expect small or no effects of building on votes.

[18] As we mentioned above, the levels of the two election results cannot be readily compared. However, the differential decline of opposition in the cross-section is probably informative of the *relative* changes in support in different counties.

Table 7: Nazi Votes in March 1933 and Highway Construction

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	All districts				Only districts with planned HW	
PANEL A: Dependent variable: NSDAP votes in March 1933						
Highway planned	-1.202	-0.809				
	(0.819)	(0.541)				
Highway built			-0.660	-0.128	0.129	0.676
			(0.912)	(0.713)	(1.104)	(0.805)
Constant	47.29***	84.21***	46.83***	84.90***	46.04***	90.43***
	(0.575)	(4.040)	(0.462)	(4.127)	(0.773)	(5.961)
Controls	no	yes	no	yes	no	yes
N	879	848	848	403	380	380
adj. R^2	0.001	0.624	0.623	-0.002	0.613	0.612
PANEL B: Dependent variable: Change in votes against NSDAP, March-Nov 1933						
Highway planned	-0.510	-1.131**				
	(0.756)	(0.523)				
Highway built			0.507	-0.540	1.043	0.136
			(0.787)	(0.628)	(0.980)	(0.739)
Constant	-43.31***	-19.57***	-43.62***	-19.02***	-44.15***	-20.69***
	(0.533)	(3.733)	(0.430)	(3.760)	(0.724)	(5.622)
Controls	no	yes	no	yes	no	yes
N	877	848	877	848	402	380
adj. R^2	-0.001	0.585	-0.001	0.583	-0.000	0.574

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Controls include the share of Catholics, share of Jews (both in 1925), and log county population in 1933.

There is also no evidence that other pre-trends affect our statistical results (Table A.1 in the Appendix).

Placebo tests

To ensure that our regressions do not pick up the effect of geographical features associated with transport infrastructure, we also perform placebo regressions (Table 8). Here, we use three other forms of transport in exactly the same way as the Autobahn – canals, rivers, and railways.[19] For each district, we code up a

[19] We take data on historical trajectories of canals and railways from HGIS – the historical information system for Germany.

dummy variable to see if it is traversed by one of these forms of transportation. All dummies generate a negative coefficient, but they are small (between half and 1/10th of the estimate for the Autobahn), and insignificant. Once we control for socio-economic characteristics, one of the coefficients becomes positive (but they still all remain insignificant). These results suggest that there is no particular link between locations suitable for transport links and the decline in opposition to the regime – as would be the case if, say, the nascent economic recovery in Germany after 1933 had increased support more in areas with good transportation infrastructure.

Table 8: Placebo Regressions
(Dependent variable: percentage change in votes against the Nazis, Nov 1933- Aug 1934)

	(1)	(2)	(3)	(4)	(5)	(6)
Canal	-0.155			0.426		
	(0.413)			(0.406)		
River		-0.0150			-0.252	
		(0.211)			(0.192)	
Railway			-0.531			-0.0764
			(0.418)			(0.451)
Socioeconomic controls	N	N	N	Y	Y	Y
N	898	898	898	851	851	851
adj. R^2	-0.001	-0.001	0.000	0.223	0.222	0.221

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Socioeconomic controls include the share of Catholics, share of Jews (both in 1925), log county population in 1933, and a constant term.

Level results

Our results so far establish that the swing in favor of the Nazi regime between 1933 and 1934 was greater in areas where the Autobahn was built. This swing can be high because initial voting results for the Nazis were poor (and 1934 results just normal), or because the no-vote in 1934 was markedly smaller.

Table 9 performs such a disaggregation. We use the dummy variable of whether a county is (going to be) traversed by the new motorways by 1934 as a regressor. In col 1, we examine if these areas saw a higher level of opposition in 1933. The coefficient on whether a county sees road building is small and positive, but insignificant. This suggests that (non-)Nazi votes did not differ in areas that would

see the construction of highways a year later. Beginning in col 2, we use votes against the Nazis in August 1934 as dependent variable. For this election, which occurred after highway building had started, we find a significantly lower level of opposition. This is also true if we control for the level of votes against the Nazis in March 1933 (col 3). Also, the positive coefficient on votes against the Nazis in March 1933 implies that local opposition is persistent – areas that opposed the Nazi in March 1933 did so again in 1934 to a significant extent. In col 4, we add information on motorways planned, but not yet built. These themselves do not create significant shifts in levels, but they also do not affect the size or significance of our main finding. Finally, in col 5 we control for the vote shares for other parties in March 1933 – the Communists, the Social Democrats, and the Centre Party. Our main result is unchanged – highway building led to a significant reduction in opposition to the NS regime between November 1933 and August 1934.

Table 9: *Level* of Votes Against the Nazi Regime and Highway Construction
Dep. Var.: Share of "no" votes in August 1934

Dep. Var.	(1) non-NSDAP 03/33	(2) "no" 08/34	(3) "no" 08/34	(4) "no" 08/34	(5) "no" 08/34
Highway built	0.128	-0.867**	-0.896**	-0.849**	-0.825**
	(0.770)	(0.382)	(0.349)	(0.359)	(0.375)
non-NSDAP 03/33			16.10***	16.06***	
			(1.766)	(1.765)	
Road planned				0.118	
				(0.295)	
Socioeconomic controls	Y	Y	Y	Y	Y
Other party vote shares*	N	N	N	N	Y
N	848	851	848	848	848
adj. R^2	0.623	0.311	0.381	0.381	0.349

* Other parties include the votes shares in March 1933 for the Communist Party (KPD), the Centre Party (Zentrum), and the Social Democratic Party (SPD). non-NSDAP 03/33 is 1-voteshare of the NSDAP in the March 1933 election; "no" 08/34 is the share of no-votes in the August 1934 plebiscite.

Matching results

To demonstrate that our results are not driven by violations of the linearity assumption, or by unobserved heterogeneity, we also perform nearest-neighbor matching. We match by three types of variables – population characteristics, socio-economic characteristics, and location. Table 10 gives the results. If we match counties by population size, we obtain a highly significant highway effect of 1.5 percentage points. Controlling for socioeconomic characteristics – the share of Catholics, of Jews, and blue-collar workers, as well as unemployment in each precinct, we obtain an average treatment effect on the treated of 0.43 percentage points, which is marginally below standard significance levels. Combinations of matching on population and socio-economic characteristics, and on population and location, also yield strongly significant results.

Table 10: Matching Results

matching variables	**SATT**	**Z-score**	**p-value**
Population	-1.454	3.55	0.0001
Socio-economic	-0.43	1.61	0.107
Population + socio-economic	-0.52	2.08	0.038
Population + location	-0.76	2.83	0.005

Note: SATT – treatment effect for the treated. We use the nnmatch routine from Abadie et al. (2004), with nearest neighbor matching for the three nearest matches. Matching on location is based on the latitude and longitude of the centroid of each county.

The size of effects and the timing of gains

Interpretation of the electoral results is complicated by the fact that after the "seizure of power", elections were designed and expected to yield a very high level of support. Like most undemocratic regimes, the Hitler government sought to impress observers abroad by demonstrating how popular its policies were. As intimidation and pressure increased, fewer and fewer Germans were willing to vote against the party. This means that even relatively minor differences in the level of measured opposition – a few percent of additional voters saying "no" – reflect a high level of distaste for the regime, and substantial courage.

In the following, we examine the *relative* change $ln(\frac{NSopp_{08/34}}{NSopp_{11/33}})$. This allows us to sidestep the issue that opposition is bounded below by zero. In effect, we are focusing on the relative change in opposition, where a decline from 20 to 16% – such that $ln(\frac{NSopp_{08/34}}{NSopp_{11/33}})$=-0.22 – is counted the same as a decline from 5 to 4%. While we cannot recover an estimate of the actual size of the opposition that would have been observed without intimidation and threats, we can assess the relative

magnitude in the shift away from the opposition more accurately.

Table 11: Magnitude: Highways and Relative Change in Votes against the Nazi Regime
(Dependent variable: log-change in votes against the Nazis, Nov '33 – Aug '34)

	(1)	(2)	(3)	(4)	(5)
		All counties		Only with planned highway	
Highway built	-0.107***	-0.0932**	-0.0729**	-0.130***	-0.115***
	(0.0355)	(0.0373)	(0.0368)	(0.0400)	(0.0407)
HW planned, not built		0.0369			
		(0.0296)			
Controls			Yes		Yes
Constant	-0.238***	-0.251***	-1.123***	-0.214***	-1.666***
	(0.0144)	(0.0183)	(0.216)	(0.0232)	(0.283)
N	898	898	851	407	380
adj. R^2	0.008	0.008	0.216	0.023	0.238

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Controls include the share of Catholics, share of Jews (both in 1925); log county population in 1933, and a constant term.

The results in Table 11 show that in areas without a motorway, opposition between November 1933 and August 1934 declined by approximately 24%. Where the new motorways were being built, it fell by an additional 7-11% (col 1-3). Within the subset of districts on the planned motorway network, the effect is somewhat larger – a 12-13% reduction (col 4 and 5). This suggests that the relative speed of the shift away from the opposition was 1.5 times higher in *Autobahn* districts.

Focusing on relative shifts also allows us to compare effects across multiple elections. Table 12 compares relative changes in vote shares between March and November 1933, and March 1933 to August 1934.

Table 12: Vote Change Relative to March 1933 Election
Dep. var.: log-change in votes against the Nazis over the indicated period

	(1)	(2)	(3)	(4)	(5)	(6)
	Mar 1933-Nov 1933			Mar 1933-Aug 1934		
	All	Highway planned		All	Highway planned	
Highway built	-0.0367	-0.0238	-0.0545	-0.123*	-0.157**	-0.171**
	(0.0412)	(0.0488)	(0.0429)	(0.0634)	(0.0723)	(0.0664)
Baseline controls	yes	yes	yes	yes	yes	yes
Additional controls			yes			yes
N	848	380	380	848	380	380
adj. R^2	0.108	0.172	0.304	0.061	0.135	0.225

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Baseline controls include the share of Catholics, share of Jews (both in 1925), and log county population in 1933. Additional controls include the share blue collar workers, the share of industrial employment, and unemployment in 1933.

We find that the decline of opposition before November 1933 was small – and it is not tightly estimated (cols 1-3). Announcement effects of highway construction may have played a role, but they were clearly minor. We can also rule out that the regime decided to reward districts where its support had grown the most between March and November 1933 with highway projects. Vote gains are only visible for the period after November – and the effect for the period as a whole (col 4-6) is mostly explained by the shift during the period after November.

VI. Conclusions

We examine if a major, nationwide infrastructure project can boost electoral support for a dictatorship. We turn to one of the most famous examples of road-building in history – the construction of the high-speed road network in Germany after 1933. Construction began in the early days of the Nazi regime, shortly after the "seizure of power".

While "only" 43% of Germans voted for the NSDAP in March 1933, support for the regime increased quickly thereafter – to about 90% in November of the same year (Evans 2006). Of course, the share of yes-votes in the frequent plebiscites cannot be taken as a direct measure of overall support for the Hitler government. Instead, we argue that cross-sectional differences are informative. In particular, we

examine the size of the electoral swing in favor of the regime during a relatively short period of time – between November 1933 and August 1934. While the layout of the road network was largely determined by the fall of 1933, spending on road building only reached significant levels by the spring of 1934. We find that electoral opposition to the nascent dictatorship declined significantly in districts traversed by the Autobahn. This effect is much bigger after November 1933 than before, in line with spending patterns over time. There is a clear gradient to the collapse in opposition – the further away from the highways a district was, the smaller the reduction in opposition.

The effects are both large and likely to be causal. We find that the decline in opposition was about 50% faster in districts with an *Autobahn* connection than in the rest. By comparing changes in districts that would have been traversed by the motorways planned in 1926 with those in areas that actually saw construction, we also establish that roads added or altered by the Nazi planners are not responsible for the additional vote shifts we document – the decline in opposition was identical in Autobahn districts included in early plans and those added after 1933. This rules out that the revised 1933 plans "chased" growing support in some districts.

Why did motorway building reduce opposition to the regime? We cannot directly establish the channels through which the Autobahn helped to win the "hearts and minds" of Germans. The Nazi regime prioritized road-building as an economic stimulus measure. Original plans were for 600,000 workers to be employed; the actual maximum was 125,000. Recent analysis suggests that economic effects in the aggregate were modest (Ritschl 1998). The benefits in terms of transport were also minimal – Germany had one of the lowest rates of car ownership in Europe (Evans 2006).

Nonetheless, it is possible that local effects were much larger. Workers were initially housed in private homes in the villages and towns where the roads were being built; barracks were only built later. Those employed in building the road also spent money in inns and shops; construction crews organized film showings, and construction sites became minor local attractions – a popular destination for weekend trips (Eichner-Ramm 2008).

An alternative channel is that the Autobahn demonstrated the new government's determination and competence in a convincing fashion. Voters may have perceived motorway construction as a sign of "competence", along the lines of Rogoff (1990). Similarly, the *Autobahn* served as a convincing proof of Nazi Germany's ability to get things done – a project to showcase the ruthless energy

and organizational capabilities of the new regime, as Hitler promised in his speech inaugurating the project. Emphasized as a key factor for economic revival, the rapid fall in unemployment after 1933 convinced many that road-building had "worked". After the perceived incompetence and gridlock of Weimar politics, many Germans were undoubtedly impressed by the rapid progress in road-building. The propaganda machine took particular care to connect the roads in the public imagination with Adolf Hitler himself – the motorways were called "roads of the Führer," piggybacking off the leader's popularity and enhancing his image still further. While these effects would have affected voting in the country as a whole, it is plausible that the regime's accomplishments in building the Autobahn were more salient for voters in districts where the new roads were taking shape (Gennaioli and Shleifer 2010).

Our results suggest that infrastructure spending can indeed create electoral support for a nascent dictatorship – it can win the "hearts and minds" of the populace. In the case of Germany, direct economic benefits of pork-barrel spending in affected districts may have played a role. In addition, in the hands of Goebbel's propaganda, the "Führer's highways" became the seemingly incontrovertible, concrete proof of the regime's claim that it had the, organizational ability to overcome Weimar Germany's constant gridlock (Vahrenkamp 2010).

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Appendix: Additional Figures and Tables

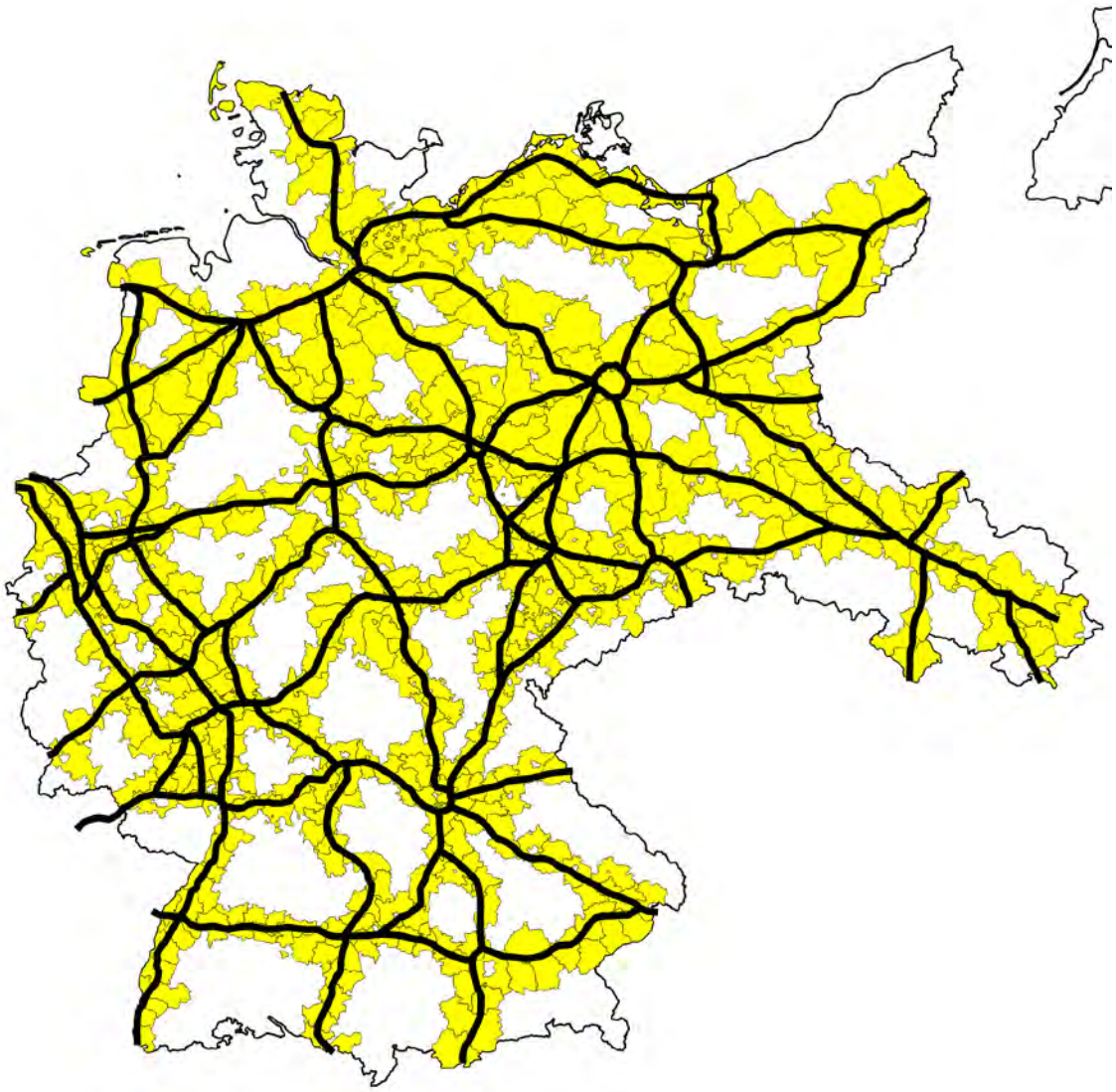

Figure A1: STUFA plans for a German highway network (1926).

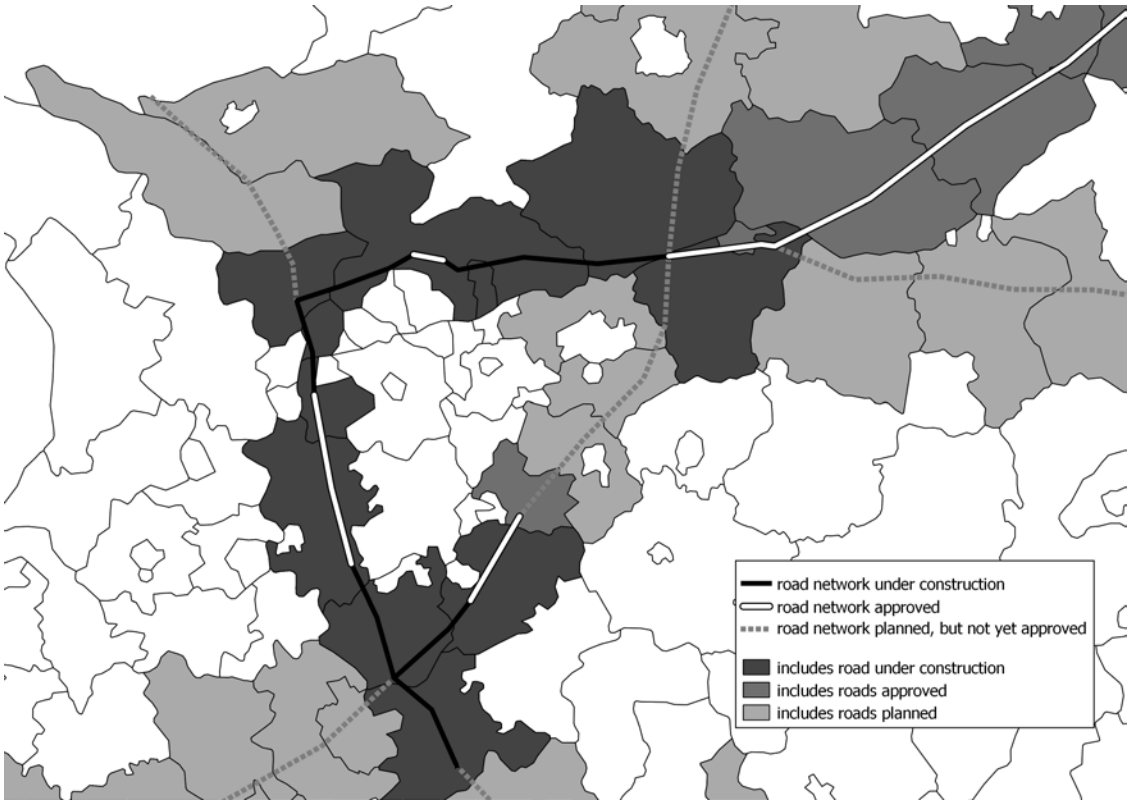

Figure A2: Treatment groups in our sample

Table A.1: Controlling for pre-Trend in Opposition Decline

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.:	Pretrends in votes against NSDAP		Decline in Nazi opposition, 11/33-08/34			
	09/30-03/33	03/33-11/33	All counties		Highway planned	
cutroad1	-0.403	-0.540	-0.490*	-0.506**	-0.898***	-0.879***
	(0.579)	(0.628)	(0.252)	(0.250)	(0.304)	(0.300)
ΔNSopp$_{30\text{-}33}$			0.0237		0.0118	
			(0.0158)		(0.0223)	
ΔNSopp$_{03\text{-}11'33}$				-0.0801***		-0.0601***
				(0.0146)		(0.0207)
Controls	yes	yes	yes	yes	yes	yes
_cons	-44.78***	-19.02***	-7.045***	-9.646***	-9.826***	-11.68***
	(3.445)	(3.760)	(1.922)	(1.814)	(2.673)	(2.565)
N	840	848	840	848	378	380
adj. R^2	0.424	0.583	0.214	0.248	0.246	0.265

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$