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"Carrots and Sticks: Targeting the Opposition in an Autocratic Regime"

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Carrots and Sticks: Targeting the Opposition in an Autocratic Regime [*]

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Abstract

Autocratic regimes can use carrots and/or sticks to ensure that they are not overthrown by their opposition in the population. Carrots, i.e. allocation of resources, increase the popularity of the regime, but can induce moral hazard if the opposition learns that protesting is rewarded. Sticks, i.e. repression, decrease the likelihood that protests are successful, but decrease popularity. This paper looks at the joint allocation of resources and repression by considering the case of residential construction and military presence in former East Germany after an Uprising in 1953. Using a difference-in-differences approach, I show that after 1953 both construction and military presence increased in protest compared to non-protest municipalities. This result cannot be explained by pre-existing differences, need for construction, or external warfare considerations. I examine the timing of construction and show that construction in municipalities increases after military units are assigned to them, indicating that the regime deliberately used carrots to alleviate the negative effect of sticks on popularity. Last, I study support for the regime after its demise in 1990. I find that the decrease in support was smaller in areas that received more construction and higher in areas with more military units. This paper thus provides empirical evidence that targeting the opposition with both carrots and sticks can be an effective strategy for autocratic regimes.

Keywords: non-democracies, political economy, resource allocation, repression

[O]ne ought to be both feared and loved.

Machiavelli (1513)

1   Introduction

More than half of the world's population lives in autocracies (The Economist Intelligence Unit, 2018). Many autocratic regimes – past and present – survive over long periods, even though some of their subjects oppose them (De Mesquita et al., 2005; Gandhi and Przeworski, 2007; Gates et al., 2006). To stay in power, autocratic regimes need to prevent this opposition from overthrowing them. While we generally associate autocracies with the use of sticks, i.e. repression, against their opposition, they can potentially also target it with carrots, i.e. resources. Both tools are, however, associated with trade-offs. Targeting the opposition with sticks allows the regime to crush protests before it can be overthrown. At the same time, the threat of violent sticks might increase the opposition's dissatisfaction with the regime even more, so that they are more willing to protest against it. Autocrats might thus have incentives to use carrots to buy off the opposition and decrease their likelihood of protesting. However, providing the opposition with carrots can potentially increase incentives to protest to signal opposition and attract even more carrots. Theoretically, it is not clear which tools autocrats use to target their opposition and how these tools affect stability. Empirically, we know little about the actual use of these tools as trustworthy data on autocracies' use of policies and political support are often unavailable.

This paper studies one particular autocratic regime, the German Democratic Republic (GDR). The GDR targeted its opposition with both carrots *and* sticks. To identify locations opposing the regime, I exploit a historical event, the failed Uprising of June 1953. I collected a novel dataset covering housing construction and the presence of military units at the municipality-year level to measure carrots and sticks. Arguably, housing and military units are among the most salient and visible forms of carrots and sticks for the local population.

I find that, first, opposition municipalities experience an increase in construction and receive more military units. I argue that by using carrots and sticks as complements, the regime was able to avoid the trade-offs that these policy tools involve if used on their own. Second, I evaluate the effectiveness of these tools. After the end of the German Democratic Republic free elections took place in December 1990. Municipalities with more residential construction see a lower decrease in popularity of the regime party and municipalities with more military units stationed in their vicinity exhibit a higher decrease in popularity of the regime party. Carrots and sticks thus had an effect on the popularity of the regime.

Figure 1 shows the first key finding: After one group of municipalities revealed their opposition

to the regime in 1953 by protesting, residential construction increased in these locations.[1] Protest municipalities experience on average an additional construction of 0.878 flats per 1,000 inhabitants and year, which is around a third of average yearly construction after 1953. Construction in opposition and non-opposition municipalities might differ after 1953 because it already followed differential trends beforehand. However, Figure 1 clearly shows that construction levels and trends were identical in the two groups of municipalities before 1953.

These findings are best interpreted as a deliberate political response to the manifestation of opposition, rather than to other correlated factors. As a placebo exercise, I compare private and public construction. Although the GDR was a socialist country, private construction existed. An increase in state-led construction indicated that the government played a direct role in providing this increase, while this is less clear for private construction. I show that only state-led but not private construction increased in opposition municipalities after the Uprising of 1953. Second, the increase in construction might simply address a higher demand for more housing that existed in the aftermath of the destruction that occurred during World War II. Using several measures of housing demand, I show that results are not driven by differences in demand for additional housing. An alternative explanation would be that construction might have increased because protest municipalities were administered by higher quality bureaucrats, who were better able to provide construction. I find no evidence that the quality of or incentives for bureaucrats who made decisions on housing construction differed after 1953 for areas with more or less opposition. Lastly, the findings are not restricted to construction but also to at least one other carrot. There was also an increase in the availability of stores that sold consumption goods in protest municipalities after 1953, indicating that the increase in construction was part of a broader strategy of targeting the opposition with carrots.

The regime also targeted protest municipalities with sticks. The regime regarded the military as a tool that could be used against the opposition. As military units are mobile (in contrast to housing), I consider all military units within a 30 km radius around the center of municipalities. Figure 2 shows that after 1953 the number of military units stationed in and around protest municipalities increased compared to the number of units stationed around non-protest municipalities. Using a difference-in-difference model, I find that around 0.271 additional units were stationed close to protest compared to non-protest municipalities since 1953, which is around 7 percent of the average number of military units stationed around municipalities after 1953. This cannot be explained by pre-existing differences: Figure 2 shows that prior to 1953, protest and non-protest municipalities had the same number of military units stationed around them. Even though the military was seen as a tool to tackle internal conflict, it might be the case that protest municipalities

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[1]I restrict the analysis to municipalities that had between 2,000 and 10,000 inhabitants in 1950, to exclude any differences that might be result of larger municipalities being more likely to protest. For the graph with all municipalities see Figure A1.

were targeted with military units because of considerations on external warfare. To alleviate this concern, I exploit the changing importance of external warfare considerations over time. After the construction of the Berlin Wall in 1961 and rising tensions between East and West Germany, protest municipalities are no longer more likely to receive more military units. Protest municipalities also have more establishments of the secret police, the Stasi, at the end of the GDR, suggesting that the increase in sticks in opposition municipalities might be part of a broader policy or targeting the opposition with sticks.

After the fall of the GDR, there were free, fair and secret elections in December 1990. Since the successor party of the GDR regime also stood in these elections, I am able to provide some evidence on the effectiveness and trade-offs of these tools. Figure 3 shows that areas that received more construction see smaller decreases in popularity of the regime than places that received less construction. Estimating a cross-sectional model, I find that while construction increases popularity of the regime, military units decrease popularity. This relationship between carrots and sticks and popularity holds for protest and non protest municipalities.

Autocratic rulers want to stay in power. To prevent that they are overthrown by their opposition in the population, they need to target it. A common view is that autocrats use sticks to secure their rule (Acemoglu et al., 2018; Davenport, 2007a,b; Escribà-Folch, 2013; Gregory et al., 2011; Wintrobe, 1990). Targeting the opposition with sticks decreases its ability to overthrow the regime, but at the same time decreases its acceptance of the regime. Autocratic rulers can also use carrots to secure their power (Desai et al., 2009; Gandhi and Przeworski, 2006; Gandhi, 2008). Targeting the opposition with carrots increases its acceptance of the regime (Voigtländer and Voth, 2019, provide an example how the allocation of resources in a non-democratic setting can shape attitudes towards the regime), but can lead to moral hazard: If the opposition is bought off with carrots, citizens have incentives to signal opposition to attract more resources (Lorentzen, 2013, provides evidence of protests as signals to the regime).[2] To solve this dilemma, autocrats can target the opposition with both carrots and sticks (Frantz and Kendall-Taylor, 2014). By combining these tools, regimes are able to overcome the problems that would be associated with using only one of the tools: Either the opposition would not accept them because of their use of sticks or there would be moral hazard because of their use of carrots. If the opposition is targeted with both tools, acceptance of the regime will be higher than in the case with no carrots and incentives to signal opposition will be lower than in the case with no sticks.

The GDR offers an ideal setting to study the allocation decisions of autocratic regimes for three main reasons: First, new residential housing and the allocation of military units are good measures of the allocation of carrots and sticks in the context of the GDR. Lack of adequate housing

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[2]This is similar to the Samaritan's Dilemma (Buchanan, 1975) according to which allocations of resources can lead to the receiver becoming dependent on these allocations.

was one of the main complaints of citizens to the government throughout the GDR's existence, and its allocation was thus highly welfare relevant. Furthermore, the availability of stores at the municipality level provide a second important measure of carrots. The military is one of the most extreme measures of repression governments can turn to and the government regarded the National People's Army (NPA), the GDR's military, as a force that could be used against citizens. A potential concern is that military units were carrots, because of spillovers on employment and the economy in the surrounding region. This is not a concern in this setting: The GDR's planned, socialist economy guaranteed full employment throughout the country, and military units did not increase local living standards. Thus, the allocation of military units provides a measure of where the government targeted potentially violent means against its citizens. Complementing this with information on the location of the Stasi at the end of the GDR also provides insights into a second important stick in the context of the GDR.

Second, the history of the GDR provides us with a wave of protests during an Uprising in 1953 which revealed the location of the opposition to the government (and the empirical researcher). In the setting of authoritarian states, where people usually hide their opposition to the government in fear of retaliation, protests can be seen as an information signal on local discontent (see Lorentzen, 2013, for the case of China). The uprising thus presented a signal about the spatial location of opposition to the government.

The third reason relates to data availability and trustworthiness. Autocracies often do not publish reliable information on themselves (Hollyer et al., 2011; Magee and Doces, 2015). I overcome this problem here with a novel, extensive dataset at the municipality level that I collected from numerous sources. The underlying information are either from declassified internal government sources that were only available to a selected group of bureaucrats during the time of the GDR,[3] or from sources that were collected after the fall of the regime.

This paper relates to the theoretical and empirical literature on what drives the allocation of resources in autocratic regimes.[4] Empirical studies for autocratic settings are rare due to the data concerns discussed above. Lazarev and Gregory (2003) analyze the allocation of vehicles in Soviet Russia in the 1930s and find evidence in line with a political gift exchange model. Closest to the analysis in this paper is Thomson (2017), who also looks at the reactions of the GDR government to the Uprising of 1953. Thomson's paper focuses on the power struggle between hard and soft-

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[3]Most of the statistical material collected in the GDR was never published. Consensus is that data intended for internal use are of high quality, as it formed the basis of policy decisions (Statistisches Bundesamt, 1999, p. 28).

[4]There is a much larger literature on the allocation of resources in democracies. This literature focuses on how governments try to increase their chances of reelection and their vote shares. It is not clear from a theoretical viewpoint whether democratic politicians want to target supporters or swing voters. Empirically, there is also no unequivocal evidence. Some papers find that swing voters receive larger allocations (Johansson, 2003; Dahlberg and Johansson, 2002), others that loyal voters or regions receive larger allocations (Ansolabehere and Snyder, 2006; Solé-Ollé and Sorribas-Navarro, 2008), others both (Case, 2001). Golden and Min (2013) provide a more detailed survey of the literature.

liners within the ruling elite. He finds that there is no correlation between protest activity and food allocation afterwards at the level of counties (*Kreise*), but protest counties seem to receive more unofficial Stasi informants after 1953. Thomson (2017) and my paper differ in their methodology and focus. My paper studies allocation at a much finer level, municipalities instead of counties, extends from 1946 until 1989, and covers the whole area of the GDR. Housing, in contrast to food, was scarce in the GDR, and citizens regularly complained about the housing situation. Looking at the location of military units measures a more extreme form of a stick. This stick could be used to stop any potential future protests that threaten the regime. The Uprising of 1953 was violently stopped by Soviet military units, and made it apparent to the GDR government that without control over military units they might be overthrown.[5] There also exists a literature that examines how ethnic or hometown favoritism affects allocation decisions in autocratic regimes (Arriola, 2009; Do et al., 2017; i Miquel Padró, 2007). I do not find evidence for this in the context of the allocation of construction in the GDR.

This paper also links to the mostly theoretical literature on the political economy of autocracies. Wintrobe (1990, 1998) models the behavior of dictators according to a rational choice model. He argues that dictators can use repression and loyalty to ensure that they stay in power, and choose the optimal mix of these two approaches based on the trade-offs they face.[6] Gershenson and Grossman (2001) examine how a carrot – cooptation into the ruling party – in the Soviet union reacts to external and internal threats. Guriev and Treisman (2019) explore on how autocracies can survive without the use of mass repression. Lorentzen (2013) provides a model and empirical evidence for the case of China to show how autocratic regimes can allow protests to occur – as long as these protests do not threaten the regime – to get information on grievances held by the the population and on the performance of lower level bureaucrats. My paper adds to the understanding in this literature by demonstrating how carrots and sticks can be used simultaneously in an autocratic regime, and who is targeted by these.

Last, this paper adds to the literature that exploits the GDR as a natural experiment. This literature ranges from macroeconomics (Alesina and Fuchs-Schündeln, 2007; Fuchs-Schündeln and Schündeln, 2005), the role of media (Bursztyn and Cantoni, 2016; Kern and Hainmueller, 2009), to the determinants and effects of social ties (Burchardi and Hassan, 2013; Crabtree et al., 2015; Lichter et al., 2016; Stegmann, 2018). This paper uses a novel dataset that sheds more light at local variation in the provision of carrots and sticks during the time of the GDR, and how this affected popularity of the regime.

The remainder of the paper is structured as follows: Section 2 gives a short overview over the historical background of construction activity, the military, and protests in the GDR. Section

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[5]Information on the allocation of food and the location of Stasi informants is not available at the municipality level.

[6]Other influential papers modelling the behavior of autocrats include, but are not limited to, Acemoglu and Robinson (2005), Olson (1993), Bueno de Mesquita et al. (2003).

3 introduces the data employed in the empirical analysis and their sources. Section 4 explains the empirical framework, and the results first for carrots, i.e. construction and stores, and then sticks, i.e. military and Stasi presence, followed by their interaction. In section 5, the change in popularity of the regime as measured by voting results in reaction to carrots and sticks is discussed. Section 6 concludes.

2   Historical Background

The German Democratic Republic (GDR) was founded in the Soviet occupation zone in Germany after World War II. Formally it was founded in 1949, and it existed until 1989/90, spanning the eastern part of Germany except for West Berlin. The GDR was an authoritarian, socialist country with a centrally planned economy. The ruling party was the Socialist Unity Party of Germany, called SED. The administration of the GDR was organized hierarchically. The smallest administrative unit were municipalities (*Gemeinden*) that were administered by municipality councils, which were in turn subordinate to counties (*Kreise*) that were administered by county councils, which were subordinate to regional districts (*Bezirke*) that were administered by district councils. District councils were subordinated to central organs, such as the council of ministers and ministries. In 1953, there were 9,767 municipalities, 195 counties, and 15 regional districts.

2.1   Uprising of 1953 and Policy Responses

In June 1953, protests spread across the entire GDR. The so-called Uprising of 1953 began in Berlin on June 16th with a strike against an increase in working hours. While the rise in working hours was taken back on the same day, people engaged in protests in more than 700 municipalities over the next days (see Figure 4). Around 700,000 people or 10 percent of the working population took part (Koop, 2003, p. 349f). The ensuing protests were no longer linked to working hours, instead protesters had a variety of demands, such as reunification, democracy, and higher living standards (Kowalczuk, 2003). On the 17th of June and the following days, Soviet troops and tanks tried to stop protests, and there were at least 55 casualties.

   The Uprising had a long lasting impact on the subsequent history of the GDR. Ruling SED elites were completely taken by surprise by these events (Kopstein, 2000, p. 36f). They were especially shocked that many (industrial) workers – i.e. those people that the government claimed it was representing – had shown their discontent with the government. After the protests, the government began to follow a carrot and stick approach to prevent a second uprising (Diedrich et al., 1998, p. 202; Port, 2007, p. 85). It began to focus on raising living standards, for example by increasing residential construction, while at the same timing also building up an extensive security apparatus,

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for example by founding the National People's Army or increasing the size of the secret police. Until 1989, there were no other large scale, countrywide protests in the GDR. The events of 1953, nevertheless, continued to play an important role in the minds of the GDR regime until its end. In August 1989 in light of an unprecedented exodus of GDR citizens to the West via Hungary, the Minister for State Security asked "Is it sure that June 17th will erupt tomorrow?" to which a colonel answered "It won't happen tomorrow, it won't happen, that's what we are here for" (Mitter and Wolle, 1990, p. 125).

2.2   Housing in the GDR

After World War II, around 10 percent of the housing stock in the GDR was destroyed. In the first post-war years there was only little (re-)construction, instead the government expropriated home owners to assign new residents to their houses and tried to (provisionally) repair destroyed flats. Authorities could ban migration to municipalities in which housing was too scarce, but even in other areas each change of flats within or across municipalities required state approval. Since 1949 the Ministry for Reconstruction (*Ministerium für Aufbau*) was in charge of planning, running and controlling residential construction, which included the construction material industry and construction companies. In 1952, the Ministry also took over leadership over the local construction authorities of the Regional District Councils (*Räte der Bezirke*). After the Uprising of 1953, the Regional District Councils were in charge of drafting plans on residential housing investment and construction decisions, while the economic leadership in East Berlin decided which of these plans to implement. All decisions on the allocation of housing were made at the local level, i.e. at the level of counties and municipalities. The government also started to promote individual, private construction via subsidies around this time, but most government support went into state-led construction by cooparatives of workers, employees, and farmers (Melzer and Steinbeck, 1993, p. 16). Because state-led construction had priority over the renovation of existing buildings and private construction, there was a further deterioration of the housing stock which made the scarcity of housing and the emerging low living standards even worse (Melzer and Steinbeck, 1993, p. 11, Bouvier, 2002, p. 158).

Over time, local institutions were equipped with more decision-making power. Local building authorities were established in 1958. The central government set overall target numbers of construction and decided on centers of construction, and local administrative organs then planned and oversaw residential construction programs on a day-to-day basis. Counties decided on how to allocate the construction targets across municipalities within their county (for more information see Melzer and Steinbeck, 1993; Buck, 2004).[7]

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[7]This division of responsibilities was enforced in reality. Materials for construction were only given out by districts and counties, not by central authorities. In a meeting of functionaries involved in rural construction the provision of

Figure A2 in the Appendix shows aggregate flat construction from 1946 to 1989 based on the data used in this paper. After the end of World War II, construction of flats increased until 1950, dropped and then remained relatively constant until 1958. In 1951, the first five year plan of the GDR was implemented, which laid out target construction levels until 1956. Aggregate construction could thus not be raised directly after the Uprising of 1953. Construction levels increased in 1958, when the second five year plan was introduced with some delay. After 1961, the year in which the Berlin Wall was erected, flat construction declined until 1970. In 1970, the government launched a comprehensive housing construction program to solve the problem of housing shortages until 1990. Construction of flats increased until 1981, after which a new five year plan began to prioritize exports. Consequently, all domestic investments, including those in housing, were cut. In 1989, shortly before the breakdown of the GDR, officials admitted that the GDR would not be able to solve the housing crisis by 1990, which had been the official policy goal, as construction lagged behind official plans.

The lack of construction had large effects on people's satisfaction with the regime: Throughout the existence of the GDR, the largest share of citizens' petitions (around one third) to the government related to the housing situation (Buck, 2004, p. 258f). The government was acutely aware that the lack of (adequate) housing influenced people's opinion of the government.[8]

2.3 The National People's Army

After World War II, East Germany was demilitarized and initially banned from establishing an army. Re-militarization first started indirectly in 1949 with the establishment of police units that secretly had a military character, and that were transformed into so-called barracked police units (*Kasernierte Volkspolizei*) in 1952. These were highly armed police units that was stationed in barracks and that only differed from "real" army units through their label. When the National People's Army (NPA) was officially founded in 1956, these barracked police units were immediately renamed and incorporated into the NPA.

The experience of the Uprising of 1953 shaped the development of the armed forces in the GDR. The military was seen as part of the security apparatus that could be targeted against the population. As a reaction to the events in 1953, the regime assigned more resources to the para-military

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building materials by central institutions instead of local ones is rejected: *"Regional districts and counties decide on the way of allocating construction materials. [...] Therefore we adhere to our principle that the allocation of construction material is not made by the Ministry for Reconstruction, but only by the regional districts and counties. The authority of the regional organs must not be undermined, but has to be raised systematically."* (Ministerium für Aufbau, 1957, p. 17f, own translation).

[8]An internal report of the Secret Police, the Stasi, commented that after the discontinuation of a local construction project in 1962 that *"people had lost confidence in the workers' and farmers' state"* and that as a result some people wanted to leave for West Germany as there they *"would be able to build"* (see Ministerium für Staatssicherheit, 1962, p. 3, own translation).

barracked police units to increase their size and effectiveness. In January 1954, the politburo decided on measures against the population that armed forces should take in case of internal unrest (reprinted in Glaser, 2009, p. 97f). The pattern of introducing structures for the use of armed forces against GDR citizens continued with the official foundation of the military in 1956.[9] A resolution on "measures for the oppression of counterrevolutionary actions" from the end of 1956, stated that the NPA would be responsible to "solve the task" if police units, armed forces of state security and strike forces had failed to stop an unrest (reprinted in Glaser, 2009, p. 103f), and in 1958 a directive named "Employment of the NPA in the case of a counterrevolutionary coup attempt within the GDR and plan of action for the armed forces of the GDR to assure national security" (reprinted in Glaser, 2009, p. 111f) was decided upon. The Minister of National Defence, Willi Stoph, stated in an interview that the NPA together with other armed organs had the task to "secure peace internally and externally, that means to enable units of the National People's Army to prevent or defeat potential counterrevolutionary provocations on the territory of the GDR" (cited in Glaser, 2009, p. 26).

Especially until the 1960s, the NPA focused much more on internal – as opposed to external – threats (Diedrich et al., 1998). Even when considerations on external warfare received more attention, the military remained an important stick that could be used against the population. For example, when protest activities in 1989 began to spread across the country, the government discussed the potential involvement of military troops (ultimately deciding against it).

Unlike in other settings, regions in the GDR were not keen to attract army facilities. During the entire existence of the GDR, not a single municipality or city ever tried to attract military establishments. There were only very few people who benefited from military establishments economically, while for most people they just provided an economic and social burden (Kersten et al., 2011, p. 36). In addition, citizens were very likely aware that the government saw the military as a potential tool against its citizens.

3 Data

Data on authoritarian regimes are often unavailable or not trustworthy, which makes it very difficult to study authoritarian regimes empirically.[10] These concerns also apply to the GDR, where for example official residential construction statistics counted every space in a nursing and elderly home as a flat (see Statistisches Bundesamt, 1993, p. 6). If the spread between actual and recorded construction differs in protest and non-protest municipalities, because the regime wanted to pretend

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[9] For a more detailed dicussion on the Uprising of 1953 and its effects on the military refer to Diedrich et al. (1998).

[10] Hollyer et al. (2011) for example find that non-democracies are less likely to disclose policy-relevant data and Magee and Doces (2015) provide evidence that they overstate their growth rates.

that it was increasing living standards in these areas, this is problematic for the empirical analysis. To overcome this challenge, I rely on data that were collected retrospectively after the fall of the GDR, such as housing statistics, and data that were collected for internal purposes only, such as population figures.

Residential Construction and Housing Demand

Data on residential construction are from the building and flat census of 1995 (*Gebäude- und Wohnungszählung*), which was conducted by the Statistical Offices of the German Federal States in former East Germany. The census includes every flat existing in 1994.[11] A flat is defined as any number of co-joined rooms used as living space, which have their own entrance (Statistisches Bundesamt, 2016), and should be thought of as a residential unit. A single family house would map into one residential unit, labeled as one flat. In this paper I refer to living units when using the word flat. Flat data include information on the construction year, ownership structure in 1990, the heating system, the number of rooms and information on the size of flats. Using the information on the year of construction, I am able to create a panel of construction activity at the municipality-year level. I classify all flats that were labeled as being privately owned in 1990 as private, and all flats that were labeled as either municipal, public property, belonging to workers' and charitable socialist building cooperative societies, agricultural production cooperatives or were state-owned as state flats.

I normalize construction levels by population size measured in thousands to make the number of flats comparable across municipalities. My dataset includes population data for 1946, 1950, 1964, and 1971. 1946 population data are from Falter (1999) and 1964 population data are from publications of official GDR statistics (Staatliche Zentralverwaltung für Statistik, 1966). Population data from 1950 and 1971 are from archived internal records of the Statistical Office, which I digitized.[12] Based on the available years, I interpolate and extrapolate population years linearly for all other years.[13]

I also collected measures of housing demand at the municipality level around 1953: war destruction in Saxony (one region of the GDR) in 1945,[14] the number of available flats and the number of

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[11]We might be worried that between 1990 and 1994 demolitions occurred. Available statistics on aggregate demolitions show that demolition levels were low before 1997 (see Figure A3 in the Appendix). In addition, demolitions would only bias my results if they happened at a different rate in protest and non-protest municipalities.

[12]These records are available at the Bundesarchiv Berlin-Lichterfelde. The population census 1950 can be found in the records DE/2/22320-DE/2/33232 and the 1971 population census in the records DE/2/33057-DE/2/33062.

[13]Population data for 1990 are also available at the municipality level. However, these numbers show population after the introduction of freedom of movement. If people from areas with and without opposition left the area of the former GDR at different rates, this would then bias the interpolated population estimates after 1971. If the extrapolation of population generates a negative population value, I set this to 0 and exclude the municipality.

[14]From the record DH/1/45781 at the Bundesarchiv Berlin-Lichtenfelde.

households looking for flats from the flat demand census in January 1954,[15] and the number or air strikes that were targeted during a municipality during World War II from Robertson et al. (2013).

Stores

The number of stores in a municipality is an additional outcome to proxy for the availability of consumption goods. I look at *Konsum* stores, a cooperative retail chain, and *Handelsorganisation (HO)* stores, a national retail business owned by the state. These stores sold consumption goods, such as groceries or clothing, to private individuals. Data on these stores were collected from local phone books for the according years.[16] I only include municipalities in the analysis in which the local administration had a phone number, to control for the fact that some municipalities in the beginning did not have access to the phone network yet.[17] I have information on these stores for 1947, 1950 and 1955, 1957/8 in the greater area of Dresden. Figure A4 in the Appendix provides a map with the location of municipalities included in the analysis.

Military Units and Stasi Presence

Information on military units in the GDR comes from Kersten et al. (2011), who provide information on the history of military establishments in East Germany. From this, I extracted information on the location, foundation and closing year of National People's Army units, the presence of barracked police establishments and Soviet military troops, as well as the historic presence of Wehrmacht establishments. I exclude all border units.[18] I turn to the count of military units to get a proxy for the size of the military stationed in a municipality. Military units could for example be motor rifle troops or missile brigades. I supplement this with information from an historical account on the barracked police (Diedrich and Wenzke, 2001), a location database on the National People's Army and the Soviet forces by the Military History Research Institute (*Militärgeschichtliches Forschungsamt*),[19] and the online catalog of the Military Archive in Germany.[20]

As a second measure of a stick in the GDR, I turn to the presence of the secret police of the GDR, known as the Stasi. Detailed information on Stasi activity over time at the municipality level

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[15]The survey provides a snapshot of the situation on January 31st, 1954, i.e. around half a year after protests took place. The records are available at the Bundesarchiv Berlin-Lichterfelde DE/2/1-13.

[16]The phone books are available at the library of the Deutsches Museum in Munich ZB 1622.

[17]It could also be the case that not all stores have a phone number. If the probability that a store is listed in the phone book does not differ for stores in protest and non-protest municipalities, this will only affect the precision of estimates.

[18]The foundation year is not included for every military unit, and I exclude such units from the analysis.

[19]The database can be accessed under `http://www.mgfa.de/html/standorte_einleitung.php` (last visited January 23, 2018).

[20]The catalog can be accessed under `https://invenio.bundesarchiv.de/basys2-invenio/login.xhtml` (last visited January 23, 2018).

is not available.[21] I use data on the presence of Stasi objects at the municipality level in 1989 as a proxy for overall Stasi presence from a list of all former Stasi objects that were dissolved in 1990 that was published in a German newspaper in June 1990 (taz, 1990). To the best of my knowledge, this data has so far not been used for empirical analysis. Objects can be differentiated according to whether they were public, such as office buildings that were known to belong to the Stasi, or disguised, e.g. in the case of flats that were used for clandestine meetings.

Protest Data

I interpret the incidence of protest activity as a signal that some opposition against the regime existed within a municipality.[22] Data on protests in 1953 are from Kowalczuk (2003), who provides a list of 698 places for which either a protest, demonstration, strike, or violence against individual persons or institutions between the 16th and 21st of June 1953 is documented. Based on this, I generate a dummy variable that takes the value 1 if some event occurred within a municipality. Kowalzcuk notes that while it is likely that all places with at least 10,000 inhabitants which experienced some form of protest are included, the same cannot be said for places with a lower number of inhabitants. This exclusion of smaller municipalities is likely to be random, and will therefore lead to attenuation bias. Figure 4 presents the location of all protests that I could match distinctly to a municipality. Overall, I can match protests to 494 municipalities according to 1997 boundaries (see more on borders below).

Other variables

Additional variables are the voting shares for different parties in 1946, the last free election in the area of the GDR until 1990, from Falter (1999). I collected the share of people working in manufacturing and in construction at the municipality level from occupational censuses for the years 1950 and 1971 from archival records.[23] In addition, I collected information on the names and years in office of chairmen of the county councils by contacting all relevant county archives,[24] and enhancing this with information from historical literature, historical newspapers, and Wikipedia articles. Voting results in 1990 are from Falck et al. (2014).

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[21]Lichter et al. (2016) use information on Stasi activity at the county level.

[22]This is similar to Lichter et al. (2016), where differences in riot intensity in the GDR at the county level are used as a proxy for the strength of the opposition, or Lorentzen (2013) where the Chinese government uses local protest activity as an information signal about which social groups oppose the government.

[23]Data of the job census 1950 do not span the entire GDR, as some of the archival records were of such bad quality that they could not be accessed. For some municipalities it was also not possible to get information on all sectors for the same reason. It can be assumed that this is random.

[24]Of 69 contacted county archives, 57 replied.

Municipality Borders

The empirical analysis is conducted at the municipality level according to the municipality borders in 1997.[25] Using information provided by the National Statistical Office (Statistisches Bundesamt, 1995) and the Statistical Offices of the Federal States,[26] all municipalities were aggregated according to their 1997 boundaries.[27] Overall, I have information on approximately 5,000 municipalities out of 5,792 municipalities that existed in East Germany in 1997.

Summary Statistics

Table 1 presents summary statistics for municipalities that had between 2,000 and 10,000 inhabitants in 1950. In my empirical analysis, I restrict the sample to these municipalities as this makes the treatment and control group more comparable. Around 200 municipalities in this restricted dataset experience a protest, slightly more than 750 do not experience a protest.[28] Protest and non-protest municipalities differ in their observables. Protest municipalities have a larger population in 1946, 1950, 1964 and 1971 – even after restricting the sample to municipalities between 2,000 and 10,000 inhabitants. In 1950, protest municipalities had on average 4,915 inhabitants and non-protest municipalities had 3,943 inhabitants. The working population in 1950 was larger in protest compared to non-protest municipalities. The share of votes for the SED in 1946 was larger in non-protest municipalities (0.461 compared to 0.444). Around 2 percent of the population in protest municipalities was looking for a flat in 1954, compared to 1.8 percent in non-protest municipalities. Protest municipalities were also around 30 km closer to Berlin, but 12 km further away from any external border of the GDR. The shares of construction workers and industry workers in 1950 do not differ in a statistically significant way across the two groups. The differences pointed out here will be accounted for in the empirical strategy and the robustness checks.

Before 1953, construction and military presence does not differ in protest and non-protest municipalities. Each year around 1.4 flats were built in protest municipalities and around 1.3 flats in non-protest municipalities. Private and state construction does not differ in protest and non-protest municipalities before 1953. There are also no statistically significant differences in military presence: Before protests occurred, protest and non-protest municipalities had around 1 military

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[25]1997 is the first year for which official geocoded maps with municipality borders exist.

[26]Anna Gumpert and Nadja Dwenger kindly shared this information with me.

[27]I exclude all municipalities which had given up some parts of their area between 1948 and 1997 when I could not precisely identify which areas this included. I also exclude the municipalities that received this land. This affects mostly large municipalities and cities.

[28]Figure A5 shows the share of municipalities that are protest and non-protest municipalities within different population bins. By focusing on municipalities between 2,000 and 10,000 inhabitants, I am able to balance sample size and comparability. When looking at all municipalities, there are around 500 protest municipalities and 4,550 non-protest municipalities.

unit located within a 30 km radius around them. After 1953, overall and state-led construction is higher in protest than in non-protest municipalities; overall construction is 3.3 flats per 1,000 inhabitants in protest municipalities, compared to 2.4 flats in non-protest municipalities, state-led construction accounts to 3.1 flats per 1,000 inhabitants in protest municipalities and 2.4 flats per 1,000 inhabitants in non-protest municipalities. Protest municipalities now have nearly 4 military units stationed in their vicinity, non-protest municipalities have 3.6 military units stationed within 30 km of their center each year.

Determinants of Protests

The summary statistics suggest that protest activity did not occur randomly within the GDR. To test more formally which variables predict protest activity, I estimate the simple linear OLS model

$$Protest_m = \beta_1 Population_{1953,m} + \beta_2 Controls_m + \alpha_c + \varepsilon_m, \tag{1}$$

where $Protest_m$ is a dummy variable that indicates whether any protest activity occurred in municipality m in 1953, $Population_{1953,m}$ is population in the year 1953 in m and $Controls_m$ are different controls accounting for potential differences in location, political preferences, population growth, industry structure, housing demand or military presence between protest and non-protest municipalities. α_c are county fixed effects according to county borders in 1953. Standard errors are clustered at the county level. I run this analysis with all available data, and do not limit the dataset to municipalities that had between 2,000 and 10,000 inhabitants in 1950. By doing so I want to ensure that I do not exclude any potential driver for protests due to a lack of precision of the estimates. Results are less precise but qualitatively similar when focussing on municipalities with 2,000 to 10,000 inhabitants (see Table A1 in the Appendix).

Table 2 presents the results of this linear probability model. All regressions control for population in 1953 – which is correlated with protests at the 1 percent level in all specifications – and county fixed effects. In column 1, I examine the location of protests. Municipalities that are closer to Berlin are more likely to have protests in 1953 (significant at the 10 percent level). As protest activity started in Berlin and spread from there, this is not surprising. County capitals are also more likely to have protests in 1953 (significant at 1 percent level), this might be explained by the fact that county capitals were the center of state activity. They thus provided protesters with the opportunity to protest visibly for representatives of the regime they were protesting against. If protesters from surrounding municipalities traveled to county capitals to protest there, we would expect that distance to county cities positively predicts the existence of protests, because most likely people from closer municipalities would be more likely to travel to county capitals instead of protesting in their home municipality. This is not the case; there is no statistically significant relationship be-

tween distance to county capitals and protests at the municipality level. Distance to the West border (excluding the border to West-Berlin) also does not explain where protests take place. In column 2, I look at the role of political preferences of the local population. In 1946, the only democratic election until 1990 took place in the GDR. Municipalities with a higher share of votes for the SED were more likely (1 percent significance level) and places with a higher turnout were less likely (5 percent significance level) to protest. This suggests that protests in 1953 provided the government with new information on the existence of the opposition, which they could not infer from the election in 1946. Column 3 looks at population growth. If some municipalities grew faster after World War II, for example because they received more refugees, this might have led to discontent among the population. While population in 1953 predicts protests, protest municipalities did not have a different population growth path from 1946 to 1953. The role of different economic sectors is examined in column 4. Protest municipalities have a higher share of industrial workers (significant at the 1 percent level), but do not differ with respect to the share of people working in construction.

An important concern is whether municipalities with a higher demand for housing were more likely to protest. In columns 5 to 7, I examine to what extent housing demands are correlated with protests. I first use information on the share of people searching for a flat in 1954. In municipalities in which a larger share of the population was searching for a flat, protests in 1953 were more likely, and this is significant at the 1 percent significance level (column 5). As a second measure of housing demand, I look at the share of war destruction in municipalities. This measure is only available for one region within the GDR, Saxony, and thus the number of observations drops in column 6. There is a positive relationship that is significant at the 1 percent level between war destruction and protests. As a third measure, I control for the number of air strikes that targeted a municipality during World War II. This does not predict where protests occur, the coefficient is close to 0 and precisely estimated (column 7). These results thus provide evidence that demand for residential construction drove protest activity. However, the explanatory power of these coefficients as measured by the R^2 is comparable to that of the other potential explanatory variables.

Last, I look at the effect of having had some unit or establishment associated with the barracked police in 1952 in column 8. This would be problematic if the existence of the barracked police makes protests less likely, and after 1953 places that did not have any military yet received military units after the introduction of the NPA. There is no statistical significant relationship between them. In column 9, I look at all potential correlates simultaneously (excluding war destruction in Saxony). Political preferences and distance to Berlin are no longer statistically significantly correlated with protests in 1953, whereas distance to the West border excluding Berlin and the existence of barracked police units negatively predicts protests.

These results inform us on important control variables for the main analysis of this paper. I will

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examine whether county capitals,[29] the share of workers in industry, demand for housing, and the existence of barracked police units in 1952 drive the the effect of protests on housing and military presence.

4   Empirical Framework and Results

4.1   Carrots: More Residential Construction in Protest Municipalities

To understand how construction per capita changed in opposition compared to non-opposition municipalities after protests in 1953, I employ a difference-in-differences approach. This approach compares the differences between the two groups of municipalities, before and after the Uprising. I estimate the following simple difference-in-differences model

$$Construction_{mt} = \beta Protest_m \times Post1952_t + \alpha_m + \alpha_t + \varepsilon_{mt}, \tag{2}$$

where $Construction_{mt}$ measures the number of new living units per 1,000 inhabitants in municipality m and year t. $Protest_m$ is a dummy variable that takes the value 1 if a protest occurred in municipality m in 1953. $Post1952_t$ is a dummy for all years after 1952. As protests occurred in June 1953, construction might already have increased in the second half of the year 1953. To address this possibility, I include the year 1953 in the treatment group. It could be the case that protest municipalities over the entire time of analysis exhibit higher levels of construction or that the increase in construction in protest municipalities after 1952 is just part of a general increase in construction across the GDR. By including municipality, α_m, and time fixed effects, α_t, I exclude all level differences between protest and non-protest municipalities that are constant over time and all increases in construction that occur for all municipalities. β measures the difference between protest and non-protest municipalities after 1952, i.e. after protests took place, excluding all differences that already existed before 1952. ε_{mt} is the error term which is clustered at the municipality level. This accounts for correlation of error terms over time within municipalities. I restrict the analysis to municipalities that had between 2,000 and 10,000 inhabitants in 1950 to make control and treatment groups more comparable. In addition, this also reduces problems of spatial correlations between error terms in difference-in-difference settings (Ferman, 2019). This approach will lead to unbiased estimates if the common trends assumption holds, i.e. if protest and non-protest municipalities would have developed in a parallel fashion if protests had not occurred. Figure 1 shows that before 1953, both protest and non-protest municipalities with 2,000 to 10,000 inhabitants had as good as identical construction levels per 1,000 inhabitants, which strengthens

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[29]Especially during the early years of the GDR there were many county reforms, so that the effect of being a county capital is not captured by municipality fixed effects.

the credibility of the common trend assumption.

Table 3 presents the results of the simple difference-in-difference estimator outlined in equation 2.[30] In column 1, I first exclude municipality and year fixed effects to examine how protst and non-protest municipalities differed from each other before 1953 and how construction changed for all municipalities after 1952. Protest and non-protest municipalities on average do not have different construction levels before 1953; the coefficient of *Protest1953* is small and not significantly different from 0, in line with the pattern observed in Figure 1. The coefficient of *Post1952* is 1.030 (significant at 1 percent level), which means that after 1952 yearly construction was 1 living unit per 1,000 inhabitants higher than before 1952. There is an additional increase in construction of 0.878 flats per capita in protest municipalities after 1952, as the coefficient of $Protest_m \times Post1952_t$ reveals (significant at 1 percent level, all coefficients column 1). The increase in construction after the Uprising is thus nearly 95 percent larger in protest compared to non-protest municipalities.

Residuals are likely to be serially correlated over time and therefore likely to be biased downwards, which is why I cluster standard errors at the municipality level. Another way to account for serial correlation is to collapse construction per 1,000 inhabitants to a pre and a post period and thus to remove the time series dimension of the data, as suggested by Bertrand et al. (2004). When I do so, coefficients remain unchanged (as is expected) and results continue to be significant at the 1 percent level (column 2). I will continue to use clustered standard errors in all following regressions.[31] Including year and municipality fixed effects does not affect the coefficient; 0.878 additional flats per 1,000 inhabitants are built in protest compared to non-protest municipalities in each year after 1952 (significant at 1 percent level, column 3).[32] Results are also statistically significant at the 1 percent level when using Conley standard errors that take spatial variation of error terms into account (see Table A3 in the Appendix).[33]

If construction patterns between protest and non-protest municipalities already diverged before the Uprising of 1953, this cannot be a reaction to protest activity. Figure 5 thus provides more detailed evidence on the timing of the increase of construction. In the left panel I present coefficients

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[30]Table A2 in the Appendix presents results including all municipalities.

[31]There could exist spatial correlation between municipalities. In contrast to the settings discussed in Kelly (2019), I control for municipality fixed effects here and observe the outcome variable before the treatment. As long as the spatial correlation does not vary over time, it will be captured by municipality fixed effects.

[32]We expect coefficients in column 1, and 3 to be identical, because the analysis is based on a full panel in which treatment occurs at the same point in time for all treated observations. In this case the coefficient of *Protest1953* captures differences in construction of protest and non-protest municipalities before 1953, which is identical to what the average of municipality fixed effects across these groups captures. The coefficient of *Post1952* includes the difference in construction after 1953 for municipalities that did not have a protest and the interaction *Protest1953* × *Post1952* the difference in construction of protest municipalities after 1952 compared to before. The mean of all time fixed effects after 1952 is thus equivalent to the coefficient of *Post1952*. Standard errors do change between columns 1 and 3, but these changes are so small that they cannot be seen when rounding to three digits.

[33]Conley standard errors are calculated with a cutoff of 30 km. I can increase the cutoff to 200 km, without a large effect on the magnitude of the standard errors; standard errors decrease from 0.132 for the baseline regression (30 km cutoff) to 0.118 for the baseline regression (200 km cutoff).

of interactions of each year with protest dummies, in the right panel coefficients of interactions of four-year-windows with protest dummies. Both regressions control for year and municipality fixed effects. The first time period (the year 1946 or the years 1946 to 1949) is always the baseline category. Results look very similar to the pattern observed when looking at raw averages (see Figure 1). Until 1952, construction per capita levels in protest and non-protest municipalities are nearly identical. Beginning in 1953, construction increases in protest compared to non-protest municipalities. Individual year coefficients are positive, but mostly not statistically significantly different from zero at the 5 percent level. To maximize statistical power, I repeat the analysis with four year windows and find that post 1953 construction activity is statistically significantly different in protest and non-protest municipalities. The difference between protest and non-protest municipalities initially increases after the construction of the Berlin Wall in 1961, and then it decreased again after 1965. This time was marked by a decrease in overall construction (see Figure A2) and an increase in sticks across the country. There is no difference in construction between protest and non-protest municipalities in the early 1980s, when the regime channeled resources towards the production of export goods, and overall construction decreased. At the end of the 1980s, differences in construction between protest and non-protest municipalities arise again, indicating that protest municipalities continued to oppose the regime and thus had to be targeted with carrots until the demise of the GDR.

Quality of Housing

In addition to the quantity of housing, the regime also had control over the quality of new residential units. It could target opposition municipalities with lower or higher quality as well as smaller and larger flats. I examine the share of newly constructed flats with different amenities (modern heating, kitchen, toilet, bathroom) and with different sizes in each year to understand what types of living units the regime provided. Table A4 in the Appendix shows results. New flats in protest municipalities after 1952 did not differ with respect to the existence of modern heating or a kitchen (column 1 and 2). The share of newly constructed flats with a toilet or a bathroom is lower than in non-protest municipalities (columns 3 and 4). The share of flats with more than 3 rooms does not change statistically significantly (column 5). The share of small apartments (smaller than 40 sqaure meters) remains constant). The share of living units that were of medium size and suited for families increased (40 to 100 square meters, significant at 1 percent level, column 7), at the cost of the share of very large living units (significant at 1 percent level, column 8). Overall, these results suggest that in order to supply more flats in a short amount of time, the regime provided protest municipalities with smaller living units that were less likely to have a toilet or a bathroom.

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Political Economy: Who Increased Construction?

To understand the political economy behind the increase in construction in opposition municipalities, it first needs to be established whether this increase was brought about by the regime. Even though the GDR was a socialist country, private construction existed. The government, however, strongly favored state-led construction. If the state channeled more resources to protest municipalities, we expect state but not private construction to increase. Column 4 and 5 in Table 3 present the results of Regression 2 with state and private construction as the dependent variable. State-led construction increases by 0.897 flats per 1,000 inhabitants (significant at the 1 percent level, column 4). There is no difference in private construction in protest municipalities compared to non-protest municipalities after 1952 (column 5), as expected if the government actively targeted protest municipalities with construction.

Another way to assess the role of the GDR government is to look at construction patterns after the regime ceased to exist. If increases in construction were brought about by the regime, they should disappear after 1990. In column 6, I examine aggregate construction from 1990 to 1994. In protest municipalities, construction is around 2 flats per 1,000 inhabitants lower than in non-protest municipalities from 1990 to 1994.[34] The negative coefficient suggests that there might be mean reversion; as non-protest municipalities received less construction per capita during the GDR regime, the need to build is larger in these municipalities. The coefficient is not significant, but this is likely the result of small sample size.

Political Economy: Why does Construction Increase?

There are several potential explanations why the regime increased construction in protest municipalities. It could be the case that it did not want to target its opposition, but places with a higher need for housing or a certain type of workforce. If these differences are correlated with protest activity in 1953 and had an impact on construction from 1953 onward, we could wrongly interpret the correlation between protests and construction as the GDR targeting its opposition with carrots. To rule this out, I extend the difference-in-difference model to a more generalized approach of the following form

$$Construction_{mt} = \beta Protest_m \times Post1952_t + \gamma Controls_m \times Post1952_t$$
$$+ \alpha_m + \alpha_t + \varepsilon_{mt}, \tag{3}$$

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[34]In 1989 protest municipalities still had higher construction than non-protest municipalities. Estimating this equation for construction in the year 1989 is 2.219 with a standard error of 3.406.

where $Construction_{mt}$, $Protest_m$, $Post1952_t$ and ε_{mt} are defined as before. α_t and α_m represent time and municipality fixed effects. All factors that affect all municipalities equally over time, such as the general increase in construction that is evident in Figure A2, are captured by the year fixed effects. All factors that differ between municipalities and have the same effect over time are captured by municipality fixed effects. $Controls_m$ are a number of control variables, which I interact with a dummy for the period post 1952. This allows these controls to have a different effect after protests occurred. The demand for housing in 1953, for example, could have an impact on construction only starting in 1953, if the regime only became aware of housing concerns in 1953 and addressed this issue afterwards. β then represents the additional construction in protest municipalities after 1952 after controlling for all differences in construction levels between municipalities. Standard errors are clustered at the municipality level to control for heteroskedasticity and within-municipality correlation of error terms over time.

Results of estimating equation 3 are presented in Table 4. The baseline coefficient for the regression without controls is 0.878.

A potential omitted variable could be demand for housing. After World War II, the housing stock in East Germany was severely damaged, and reconstruction efforts were still far from completed by 1953. If in areas with more housing demand, people were more likely to protest in 1953, and the regime addressed housing shortages after the Uprising, this could explain the difference between protest and non-protest municipalities. To test whether demand for housing explains the differences in construction, I use three different measures for the local demand for housing. First, I control for the share of households at the municipality level looking for a flat shortly after protests took place, second, for World War II destruction at the municipality level for a subset of municipalities, and third, for the number of air raids that targeted a municipality during World War II. Column 1 in Table 4 presents results when controlling for the share of households in a municipality looking for a flat in January 1954 interacted with a dummy for all years after 1952. The share of people looking for a flat positively predicts construction after 1953, which indicates that the regime did in fact target municipalities that had a larger need for construction. Controlling for demand for housing does not affect the magnitude or significance of the coefficient of protest activity (0.691, 1 percent significance level).

However, it cannot be ruled out that local officials in protest municipalities felt the need to report a smaller demand than actually existed. In this case, including the official numbers does not allow us to disentangle the effect of signaling opposition from signaling demand for additional housing. Therefore, I next turn to a measure that was collected before protests took place: the share of buildings destroyed in a municipality in 1945. This data is only available for one area of the GDR, the area of former Saxony, thus the number of observations drops. War destruction negatively predicts construction after 1953, which is expected if municipalities that had the largest

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level of destruction received more construction directly after the war. Even after controlling for war destruction, protests are still positively associated with per capita construction and the coefficient does not change (0.778, significant at 1 percent level, column 2).[35] I next turn to another proxy for destruction during World War II, which is available for the entire GDR: the number of air raids that targeted a municipality. This captures a more general need for reconstruction, as air raids will also have destroyed, for example, infrastructure. In column 3, I include this as a control variable, and the coefficient of protests post 1952 remains unchanged (0.890, significant at 1 percent level).[36] The results for all three measures of housing demand show that higher demand for additional housing in protest municipalities did not drive the observed differences in construction after protests occurred. Protest municipalities see a larger increase in construction than would be predicted based on their need for additional housing.

The self-proclaimed *Workers' and farmers' state* could have targeted manufacturing workers for ideological reasons when introducing its new social policy after 1953. Since manufacturing workers were more likely to protest, this could explain the differences in construction between protest and non-protest municipalities. We might similarly be worried about construction workers, as increasing construction is a policy that directly affects their work. If the state targeted specific workers, we would expect the effect of protests on construction to disappear once we control for the share of construction or manufacturing workers in 1950 (the closest job census year to 1953). Column 4 presents coefficients when controlling for the share of construction workers, and column 5 when controlling for the share of manufacturing workers. The coefficient of interest remains nearly unchanged (0.749, significant at 5 percent level, and 0.864, significant at 1 percent level). There is thus no evidence that the increase in construction in protest municipalities was the result of the regime targeting construction or manufacturing workers.

Column 6 tests whether initial support for the regime in 1946 drives results. While initial support measured by voting shares for the regime in 1946 is negatively associated with construction after 1952, protests municipalities still exhibit higher construction (0.890, significant at 1 percent level). Column 7 controls for all factors simultaneously, and results again remain virtually unchanged and protest municipalities are associated with 0.836 additional flats per 1,000 inhabitants each year after 1952. Taken together, the results of regression 3 suggest that construction in protest municipalities increased because these municipalities opposed the regime, and not because of other local characteristics.

All results are also significant when using Conley standard errors to calculate significance levels

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[35]When I estimate the baseline regression just for the municipalities for which I have information on war destruction, the coefficient $\hat{\beta}$ is 0.748, and significant at the 1 percent level. Controlling for the share of destroyed buildings thus has no effect on the estimated coefficient.

[36]The number of air attacks does not not predict construction after 1953, indicating that this measure seems to be an imprecise proxy of residential housing demand.

(see Table A3 in the Appendix).

Targeting the Opposition

It might be the case that, while the regime appeared to direct resources to opposition municipalities, it was in fact targeting its supporters in these locations. However, archival evidence suggests that the government very eagerly tried to alleviate housing concerns of opponents of the regime. A report from the administration of the regional district Berlin from 1981 discussed the difficulties of finding a flat in the GDR as a driving factor of petitions of GDR citizens who wanted to resettle to West Germany. Even though people who wanted to relocate to the West were seen as opponents of the GDR, the administration elaborately discussed how to solve the underlying housing issues and organized new flats for petitioners wherever possible.

To test this more formally, I compare the results of regression 2 for municipalities that were county capitals and those that were not. County administrations, which were located in county capitals, were staffed by people supporting the regime. The share of people supporting the regime should thus be higher in county capitals. If the GDR government targeted its supporters in opposition municipalities, we would expect the difference in construction between protest and non-protest municipalities to be higher in capitals than in non-capital municipalities. Columns 1 and 2 of Table 5 shows that this is not the case. Within the group of municipalities that are no county capitals, construction is 0.446 additional flats higher after 1952 (significant at 5 percent level), in county capitals this difference is 0.515 (not significant, but only calculated based on 1,346 observations). The magnitude of the effect did not differ with the share of supporters in municipalities.

I argue that the regime targeted the opposition because it wanted to increase stability. If this is true, we expect the regime to target the opposition when and where it poses the largest threat. The construction of the Berlin Wall in 1961 provides a setting to test this. Until 1961, migration to the West was possible and the opposition could choose between *exit* and *voice* (in the words of Albert Hirschman, 1970) to show their discontent with the regime. Voicing their opinion, for example in the form of protest, decreased stability, while exiting increased stability, because it meant that fewer people in the GDR opposed the regime (de Bruyn, 1991, p. 26f, Giesecke, 2014, p. 124f). As emigrating from the GDR was easier for people with a network of relatives and friends in West Germany, I proxy for the availability of the *exit* strategy by distance to the West before the construction of the Berlin Wall. Afterwards, the opposition could only *voice* their opinion and distance to the West no longer mattered. I thus compare construction in opposition municipalities close and far from the West border before and after 1961. Column 3 in Table 5 presents results for municipalities that are close to West Germany (less than 50km away), i.e. places in which until 1961 the *exit* option existed, and column 4 presents results for municipalities that are not

close to the West border, i.e. places where even before 1961 the *exit* option was less viable. In line with the argument that the regime targeted the opposition to increase stability, I find that in opposition municipalities that were close to the border construction experience a smaller increase in construction from 1953 to 1961 than municipalities that were further away from the border (although this difference is not significant), and construction levels increase even further once the *exit* option had been made unavailable in 1961. The regime first let its opposition leave the country, and when it could not do so any more, they had to target them more. In municipalities where the opposition was less likely to leave, the regime began to target the opposition after 1953 to the full extent, and nothing changed with the construction of the Berlin Wall.

Alternative Mechanisms: Career Incentives or Bureaucrat Quality?

Differences in incentives for or characteristics of local bureaucrats who decided on the allocation of construction could potentially also explain the increase in construction in opposition municipalities. Research in other settings has shown that bureaucrats' incentives and ability can have large effects on allocations (Banerjee et al., 2014; Khan et al., 2019; Xu, 2018). Decisions on the allocation of construction across municipalities in the GDR were made at the county level in so-called county councils, which implies that local bureaucrats had an important role in determining where construction took place. These councils were headed by chairmen, who held most decision power (Bittorf, 2014, p. 102). If the regime discharged chairmen who were not able to deal with the opposition in 1953, career conscious chairmen might have began to target the opposition with carrots to prevent protest and their dismissal. Another potential explanation is that places with more opposition were assigned higher quality chairmen after 1953, who were more effective at providing goods to their citizens. Construction would be higher in all municipalities in their districts, and overall there would be a correlation between protests and higher construction levels after the Uprising.

I first investigate the role of career concerns. The chairman of the county Löbau was replaced after protests took place in his county during the Uprising of 1953. The following extract can be found in his personal file

"Colleague Hutschenreither was withdrawn as chairman of the county council due to his behavior in the days around the 17th of June 1953. Colleague H. was on a holiday [...] from beginning of June until beginning of July. As the leading figure of his county, he did not deem it necessary to obtain information about the situation in the county Löbau after the fascist provocation became known, not even via telephone."[37]

If the government punished bureaucrats that did not prevent protests – and this was not just a pretext in the case of Mr Hutschenreither – we expect the probability that a county chairman is

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[37]From the personnel file of the county council Löbau, Number 2953, available at the County Archive Zittau.

replaced to be higher in counties with more opposition. To test this, I examine the "survival" of county chairmen who were in power during protests in 1953 as a function of the share of protest municipalities within their county using a hazard duration model. The share of protest municipalities in 1953 is not associated with a statistically significant difference in survival rates of county chairmen (Table 6, column 1). This suggests that bureaucrats were not punished through dismissals if they were in charge of areas that had more protests in 1953.

But since the Uprising of 1953 came unexpectedly for the regime, it might have not punished bureaucrats for an event that even the regime's elite was unable to anticipate. Instead, the regime might have fired bureaucrats that were in power later and proved unable to deal with the opposition. In fact, the rate of replacement in 1953 was only slightly higher than in the year before; only 22 percent of bureaucrats were replaced in 1953 (compared to 18 percent in 1952). Therefore, I extend the time frame under consideration to 1948 until 1989 to estimate how the probability of replacement of chairmen of county councils changed over time. The estimation equation is

$$Replacement_{ct} = \beta ShareProtests_c \times PostProtest1953_t + \alpha_c + \alpha_t + \varepsilon_{ct}, \qquad (4)$$

where $Replacement_{ct}$ is a dummy that takes the value 1 if the county chairman of county c is replaced non-temporarily in year t.[38] $ShareProtests_{ct}$ is the share of protest municipalities in county c according to borders in year t. This is a measure of the opposition that exists in a county in year t, using the incidence of protests in 1953 as a proxy for the existence of opposition. $PostProtest1953_t$ is a dummy that takes value 1 if the replacement took place after the Uprising of 1953, i.e. if the replacement took place after the June 1953 (not the year 1953). α_c are county fixed effects, that account for all differences in replacement rates that existed before and after the Uprising. α_t are year fixed effects that for example control for the fact that replacement rates were higher in years before (farce) elections took place. Standard errors are clustered at county level.

Counties with a higher share of protests were not more likely to experience a change in their chairmen in any given year after 1953 holding all county and year specific factors constant (column 2). County chairmen in counties with more protests were thus not more likely to be replaced than their counterparts in counties with less protests, neither directly after 1953 nor over the entire period of analysis. This would be unlikely if the regime punished local officials for actions of the opposition.

Another alternative explanation is that more able bureaucrats were assigned to counties with more opposition. I estimate equation 4 with different quality measures as the dependent variable. In the following regressions, I control for appointment year fixed effects, to control for example for a potential professionalization of the bureaucracy over time. I proxy quality of chairmen in dif-

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[38]Temporary replacements took place if the chairmen could not serve for a limited period of time, for example due to medical issues or because he earned additional degrees.

ferent ways: First, I look at differences in education by analyzing whether counties with a higher share of protests were more likely to be assigned a chairmen with a doctoral degree. I do not find any evidence for this, the coefficient β is small and insignificant (column 3). There is also no evidence that chairmen in more oppositional counties had more experience as chairmen because they were appointed to another county beforehand (column 4). Maybe the regime was able to choose chairmen that did not differ in their observables, but were better at their role as chairmen. To test this, I look at chairmen who received the Patriotic Order of Merit (*Vaterländischer Verdienstorden*) for their work as chairmen. This order was given to individuals and institutions in the GDR that had distinguished themselves with their actions, which included local bureaucrats that did exceptionally well in their position. I record 40 instances where a county chairman received this order of merit. Column 5 shows that chairmen in counties with a higher share of protest municipalities were not more likely to ever receive an order of merit for their work as county council. It is also not the case that people with better qualifications were chosen as chairmen for the more difficult counties: chairmen in counties with higher share of protests were not more likely to have had received an Order of Merit for their work as chairmen before their appointment before or after 1953 (column 6). We could also imagine that the chairmen differed from each other in how good their understanding of the local situation was. I proxy this by the distance between place of birth to the county capital for those chairmen for which I could find information on their birthplace. There is no statistically significant effect of the share of protest municipalities on the distance in general or after 1953 (column 7).[39] Overall, the evidence presented in Table 6 does not support the argument that differences in construction were driven by differences in incentives or in the quality for local bureaucrats. Instead, the same bureaucrats allocated more resources to the opposition.

Carrots: More Stores in Protest Municipalities

As a second measure of living standards at the municipality level, I turn to the availability of consumption goods. In the GDR, consumption goods were often sold out quickly and to be successful at getting hold of them, consumers had to arrive swiftly at stores that had scarce goods for sale. Thus, the local existence of stores can be seen as a proxy for the availability of consumption goods to the local population. I estimate the following difference-in-difference model

$$NumberStores_{mt} = Protest1953_m \times Protest_t + \gamma Population_{mt} + \alpha_m + \alpha_t + \varepsilon_{mt}, \qquad (5)$$

where $NumberStores_{mt}$ is the number of stores in municipality m in year t (1947, 1950, 1955 and 1957/8). $Controls_{mt}$ is population in municipality m and year t. α_m are municipality fixed

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[39]Alternatively, the distance between a chairmen's hometown and the district capital could proxy for hometown favoritism (Do et al., 2017).

effects, α_t are year fixed effects. All municipalities lie in the district of Dresden (see Figure A4). Again, I limit the analysis to municipalities that had between 2,000 and 10,000 inhabitants in 1950 to make treatment and control group more comparable.

Results are presented in column 7 of Table 3. Note that for this analysis, I only have information on 74 municipalities over 4 points in time. Nevertheless, I find that protest municipalities experience a sizable increase in stores compared to non-protest municipalities after 1953: The number of stores increases by 3.7. Likely as a result of small sample size, this effect is not significant at conventional significance levels. These results suggest that the increase in residential construction was part of a broader increase in living standards in opposition municipalities after the Uprising of 1953.

4.2 Sticks: More Army Units

One way for the ruling elite to prevent protests is by increasing living standards of the opposition. Another way is to target the opposition with tools of repression that shut down any threats to the power of the regime. This section examines to what extent the GDR government adopted this second option. I focus on the military as one component of the security apparatus of the GDR. While the military was officially only established in 1956, para-military police units existed since 1949 until they were incorporated into the military in 1956.[40] Throughout the existence of the GDR, the military was seen as a potential tool to stop internal turmoil as numerous internal documents on procedures in case of unrest show (see Section 2). Decisions on the allocation of the military were made at the central level, and the regime was the only provider of military units.

Military units are mobile and can potentially be used against protests that occur close to a municipality in which military units are stationed. To account for this, I calculate 30 km buffers around the center of each municipality (see Figure 6) and aggregate the number of military units within each buffer. Figure 2 shows the mean number of military units in a 30 km radius around protest and non-protest municipalities. Until 1952, there are no differences in the number of military units, but after 1952 protest municipalities experience a larger increase in the number of military units than non-protest municipalities.

I estimate the following difference-in-difference model

$$Unitswithin30km_m = \beta Protest_m \times Post1952_t + \gamma Controls_{mt} + \alpha_m + \alpha_t + \varepsilon_{mt}, \qquad (6)$$

where $Unitswithin30km_m$ is the aggregated number of military units that exist within a 30 km buffer around the center of municipality m. The number of units stationed in and near a municipality

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[40]In my analysis, I refer to the joint set of military police (1949-1956) and army (1956 to 1989) as military units, unless specified otherwise.

offers a proxy of the local strength of the military, as information on the number of soldiers are not available. $Protest_m$ and $Post1952_t$ are defined as above. $Controls_{mt}$ include the number of protests in the buffer excluding protest activity in municipality m and the number of municipalities in the buffer interacted with $Post1952$, as well as population in municipality m. I include municipality, α_m, and time, α_t, fixed effects. α_m controls for all municipality specific factors that are constant over time, for example whether there is any pre-existing military infrastructure from the Nazi Army. α_t controls for all factors that change for all municipalities over time, such as an increase in the number of units across the country when the military was founded in 1956. Standard errors are clustered at the municipality level to account for serial correlation within municipalities over time. Again, I limit the analysis to municipalities that had between 2,000 and 10,000 inhabitants in 1950, to make treatment and control group more comparable. Figure 2 shows that until 1952, protest and non-protest municipalities have the same number of military units stationed in them. This suggests that it is reasonable to assume that in the absence of protests, both groups of municipalities on average would have experienced the same development of the number of military units. By restricting the analysis to places within a certain population bin, I also alleviate concerns about spatial correlation between error terms (as suggested in Ferman, 2019).

Table 7 presents the results of Regression 6. Column 1 compares protest and non-protest municipalities before and after 1952. Protest municipalities have around 0.15 fewer military units stationed in and around them until 1952 (significant at 10 percent level). After 1952, the average number of military units stationed in a municipality in a year increased by around 1 unit (significant at 5 percent level). Municipalities with protests experience an additional increase of 0.425 military units (significant at 5 percent level, all coefficients column 1). To account for correlation of error terms within municipalities over time, I aggregate all pre and all post periods for each municipality as suggested by Bertrand et al. (2004). Protest municipalities according to this regression have 0.436 additional units stationed in and around them in each year after 1952 (significant at 5 percent level, column 2).[41] Column 3 shows that these differences between protest and non-protest municipalities are not driven by time-invariant differences between municipalities, such as the existence of buildings from the former Nazi military or distance to Berlin, or by overall time effects, such as the general build-up of the NPA. Protest municipalities have around 0.391 additional military units stationed in and around them after 1952, when controlling for municipality and time fixed effects (significant at 5 percent level, column 3). The results also hold for other buffer sizes around municipalities (see Figure A6 in the Appendix).

To show that the increase in military units in opposition municipalities does not capture a reaction to external threats, I exploit the time-varying rationale for establishing military units in the

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[41] In contrast to the setting with construction, we do not expect coefficients to remain unchanged here, as I include control variables in addition to municipality fixed effects.

GDR. Before 1961, military units were placed with respect to internal security considerations, whereas after 1961 the military began to focus on potential external threats (Diedrich et al., 1998, p. 24f). If the regime targeted military units after 1952 to protest municipalities to prevent a second uprising, and not because these municipalities share some characteristic that made them attractive for military units per se, protests should no longer predict the location of new military bases after 1961. To exclude any path dependence (municipalities that have units before 1961 are likely to also have units after 1961), the regression underlying results in column 4 only regards municipalities that did not have any military units until 1961. The coefficient of protests is small and insignificant, and implies that there is no longer a relationship between protest activity and the number of military units after 1961 (column 4). Thus, protest municipalities were only targeted by military units in the time frame during which considerations about internal warfare dominated military location decisions, but not once considerations about external warfare play a role. It is thus unlikely that the increase in the number of military units is the result of some characteristic that made protest municipalities more attractive as military locations. The results, however, do not imply that after 1961 military units became irrelevant as a tool to secure internal stability, as the stock of military units that targeted to protest municipalities before 1961 continued to exist.

Grid Cell Analysis

The buffers used in the analysis above are overlapping, and thus military units will be double counted as they fall within more than one 30 km radius. To rule out that this drives my results, I additionally run a grid cell level analysis where each unit is assigned to a single grid cell. I generate a grid that covers the whole area of the GDR and split the country in 0.3×0.3 degree grid cells (see Figure 7).[42] Units are assigned to the grid cell in which their municipality's geographic center is located, and I only include cells which hold at least one municipality.

I estimate a difference-in-difference model which has the following form

$$MilitaryUnits_{gt} = \beta Protest_g \times Post1952_t + \delta Controls_{gt} + \alpha_g + \alpha_t + \varepsilon_{gt}, \qquad (7)$$

where $MilitaryUnits_{gt}$ measures the number of military units within grid cell g in year t. $Protest_g$ is the number of protests in 1953 that occurred in grid cell g. $Controls_{gt}$ is aggregated population in g. α_g are grid cell fixed effects, that for example capture the existence of historical military buildings, and α_t are time fixed effects, that for example capture that over time the number of military units increased. Standard errors are clustered at the grid cell level in all regressions. If a grid cell does not include any municipality, I exclude it from the analysis (see Figure 7). To make sure that my results are not driven by the exact location of the grid cell level borders, I run this regression 100 times,

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[42]In the GDR this corresponds to cells that have around 20.5×33.5 km.

each time moving the underlying grid 0.03 degrees east and/or 0.03 degrees north. The coefficient of interest in regression 7, β, indicates how many more military units exist in a grid cell with one additional protest in 1953.

The distribution of coefficient β for all 100 regressions is presented in Figure 8. All coefficients are significant at the 5 percent level (see Figure A6 in the Appendix). The coefficients range from 0.159 to 0.286. The median regression coefficient is shown in column 5 of Table 7. A grid cell with an additional protest in 1953, has 0.224 additional units stationed in this grid cell in each year after 1952. On average, a grid cell contains 1.86 military units, thus the effect amounts to around 10 percent of the mean. As I control for grid cell fixed effects this accounts for all differences between grid cells that are constant over time, for example distance to the West German border. Results are robust to other grid cell sizes (see Figure A6 in the Appendix).

Sticks: More Stasi Presence

Next, I turn to a second measure of a stick: the secret police in the GDR, known as the Stasi. The Stasi helped the regime to secure its power by collecting information on the (potential) opposition in the population through an extensive network of unofficial collaborators, who spied on fellow GDR citizens. The scope of this network was extensive. In 1989, there existed around 189,000 unofficial collaborators in the GDR, which was around 1 collaborator for every 90 GDR citizens (BStU, 2019). To proxy for the strength of the Stasi on the municipality level, I turn to the existence of Stasi objects at the end of the regime in 1989.[43] I estimate the following model

$$StasiPresence_m = \beta Protest_m + \gamma Controls_m + \alpha_c + \varepsilon_m, \qquad (8)$$

where $StasiPresence_m$ is a dummy indicating whether there has been any public or any secret Stasi presence in municipality m in 1989. The Stasi helped to secure stability of the regime by providing it with information on the opposition. This was only possible by secret spying activity, that I proxy by looking at the existence of hidden Stasi objects. Public Stasi objects fulfilled a more administrative function, and do not capture differences in local spying intensity. These public objects thus serve as a robustness check: If protest municipalities were more likely to house Stasi objects because this helped the regime to secure power, and not because protest municipalities were for examples administrative centers, we expect only the probability to house secret and not public Stasi objects to be higher. $Protests_m$ is a dummy indicating whether any protest activity occurred in m in 1953. $Controls$ are population in 1989, distance to any border of the GDR, a dummy for county capitals, distance to the county capital, and shares of workers employed in industry as well as state administration in 1971. α_c are county fixed effects. Standard errors ε_m are clustered at the

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[43]No information on Stasi presence at the municipality level over time is available.

county level. The model can be interpreted as a linear probability model.

Results are presented in columns 6 and 7 in Table 7. The probability that any disguised objects, such as safe houses or flats used for secret meetings, is around 10 percentage points higher in protest municipalities (significant at 10 percent level, column 6). There is no difference in the likelihood to house any public Stasi objects, for example official office buildings that were known to belong to the Stasi (column 7). This suggests that the GDR government not only targeted opposition areas with military units that could potentially be used violently against the population, but also increased their control of the population in other, less visible ways.

4.3 Interactions: Using Carrots to Counteract Negative Effects of Sticks

The GDR regime targeted its opposition with both carrots and sticks. Crucially, if carrots are strategically used to alleviate the negative effect sticks have on the popularity of the regime, the provision of carrot should increase after sticks enter a municipalities. By exploiting the panel dimension of my dataset, I am able to test how construction per capita changes before and after new military units are deployed to a municipality.

I estimate the following model

$$
\begin{aligned}
Construction_{mt} = {} & \beta Protest_m \times Post1952 \\
& + \gamma_1 NewMilitaryUnitsPast_{mt} + \gamma_2 NewMilitaryUnitsPast_{mt} \times Protest_m \\
& + \delta_1 NewMilitaryUnitsFuture_{mt} + \delta_2 NewMilitaryUnitsFuture_{mt} \times Protest_m \\
& + \alpha_m + \alpha_t + \varepsilon_{mt},
\end{aligned}
\tag{9}
$$

where $Construction_{mt}$ is the number of flats per 1,000 inhabitants in municipality m and year t, $Protest_m$ is a dummy for whether there has been any protest activity during the Uprising of 1953 in municipality m, and $Post1952$ a dummy for all years after 1952. $NewMilitaryUnitsPast_{mt}$ and $NewMilitaryUnitsFuture_{mt}$ are dummies measuring whether additional military units were assigned to municipality m in the years $t-4$ until t or from $t+1$ until $t+5$. If the regime used construction to increase popularity in municipalities in which it had made itself unpopular by locating military there, γ_1 will be positive. If γ_2 is positive, this indicates that the regime additionally targeted protest municipalities in which it stationed military. δ measures whether there is an anticipation effect, i.e. whether construction already increases before new units arrive in a municipality. α_m and α_t are municipality and time fixed effects. Standard errors are clustered at the municipality level.

Results in Table 8 provide evidence that the regime used carrots to counteract the negative effect sticks had on popularity, and that this was not limited to opposition municipalities: Both protest and

non-protest municipalities see higher construction levels if new military units have been stationed in them in the current year or up to 4 years before (1.723 additional flats built, significant at 5 percent level, column 1). There is no statistically significant anticipation effect, i.e. construction only increases after additional units arrive in a municipality (column 2). These pattern remain unchanged in magnitude and significance when including whether there have been new military units in the past or in the future at the same time (column 3): All municipalities that received military units in the current year or up to four years before have 1.837 additional flats being built in them (significant at 5 percent) level. As I control for municipality fixed effects in all specifications, this does not capture some underlying difference between municipalities that receive military units and those that do not. Instead, this effect demonstrates how construction changes within the same municipality after additional military units enter.

The increase in construction after additional military units enter a municipality might simply reflect construction efforts to provide housing for the military units themselves. Yet, in the GDR, "normal" soldiers had to live on base, only higher ranked soldiers were allowed to live in flats outside of base (Kersten et al., 2011, p. 34). Thus, construction for soldiers would mostly consist of military barracks. To exclude such barracks, I only consider flats that have a kitchen in column 4, as military housing for units would not have a kitchen in every living unit. The coefficients remain nearly unchanged compared to column 1, indicating that this result is not driven by the construction of housing to host the additional military units.

Is the general difference in construction between protest and non-protest municipalities simply the result of protest municipalities receiving more military units? In column 5, I estimate the relationship between protest municipalities, the existence of military units in a municipality, and construction levels. Even after controlling for the existence of military units, construction in protest municipalities is 0.794 flats per 1,000 inhabitants higher per year than in non-protest municipalities after 1952. In a municipality with military units, each year on average 1.5 additional flats are built. This suggests that the difference in military presence between protest and non-protest municipalities does not fully account for differences in construction levels. The regime used construction to target its unpopularity in regions in which it put the military, but channeled construction to opposition municipalities beyond that.

5   Effectiveness: Popularity in Elections at the End of the GDR

The GDR regime targeted protest municipalities with carrots and sticks to ensure stability after the Uprising of 1953. After 1953 there have been no other large scale protests in the GDR until 1989/90. To better understand the role of geographically targeted carrots and sticks in ensuring the regime's survival until 1989, I examine voting results in 1990 in this section. In October 1990

the GDR and West Germany were reunified. However, the future of reunified Germany was not clear yet. The first joint election with West Germany in 1990 therefore also had the role of a referendum on the future of the former GDR. One of the parties that stood for election was the official successor of the former regime party, that changed its name from SED to PDS. In contrast to other major parties, the PDS for example had opposed reunification of East and West Germany (PDS, 1990, p. 23). Voting results thus provide a clearer measure of local attitudes towards the regime. As elections were free and secret, voting results provide a picture of the regime's local popularity.

I estimate the following regression

$$
\begin{aligned}
\%ChangeVotesRegime_m = {} & \beta_1 Protest1953_m \\
& + \beta_2 Construction_m + \beta_3 Construction_m \times Protest1953_m \\
& + \beta_4 Military_m + \beta_5 Military_m \times Protest1953_m \\
& + \beta_6 Construction_m \times Military + \beta_7 Construction_m \times Military \times Protest1953_m \\
& + \gamma Controls_m + \alpha_c + \varepsilon_m,
\end{aligned}
\tag{10}
$$

where $\%ChangeVotesRegime_m$ is the percent change in voting for the regime party between 1946 and 1990 in municipality m.[44] I look at changes relative to 1946, rather than just levels in 1990, to account for potentially persistent local political political preferences, and to normalize the size of changes by the extent of political support for the SED in 1946. $Construction_m$ is standardized yearly construction per 1,000 inhabitants in m. $Military_m$ is a dummy for the existence of any military units within a 30km radius of m. Both variables and their interaction are interacted with $Protests1953$ which is a dummy for protest activity in m in 1953. This allows the relationship between measures of support with carrots and/or sticks to differ in protest and non-protest municipalities. $Controls_m$ are a dummy for county capitals, distance to county capital, distance to West border, distance Berlin, population 1989, share manufacturing workers in 1971. α_c are county fixed effects. Standard errors are clustered at the county level

Table 9 presents results of equation 10. For the interpretation of the results it is important to note that the regime party lost support in the whole country. Positive coefficients thus should be interpreted as a smaller decrease in popularity, not an increase in popularity. In column 1, I control for the standardized number of flats and the number of military units. Municipalities in which more construction occurred experienced a smaller decrease in voting shares of the regime, whereas municipalities with more military units see a larger decrease in the voting share for the regime (both coefficients are significant at the 1 percent level). In column 2, I add the interaction between

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[44]This is calculated by looking at the share of votes for the SED in 1946 and the share of votes for the PDS, the legal successor of the SED, in 1990. The variable is then calculated as $\frac{Share\ PDS\ 1990_m - Share\ SED\ 1946_m}{Share\ SED\ 1946_m}$.

construction and military. Construction still has a positive effect and military a negative effect on voting shares (significant at 5 percent and 1 percent level). The two tools do not interact, the relevant coefficient is small and insignificant. In column 3, I allow the relationship between construction, military as well as their interaction to differ for protest and non-protest municipalities. The coefficients suggest, that the effects of construction are slightly stronger for protest municipalities. Overall, these results suggest that construction increased popularity and military decreased popularity.

Protest municipalities received 0.878 additional flats and 0.391 military troops per year, which according to the estimates in column 1 of Table 9 implies that carrots were able to reverse the negative effect of sticks. If the regime had only targeted sticks to protest municipalities they would have seen an additional decrease in the voting share of around 40 percentage points. By additionally providing the municipalities with carrots, there is a 50 percentage point increase in the voting share, ceteris paribus.

6 Conclusion

This paper studies how an autocratic regime targets its opposition with carrots and sticks using the example of the German Democratic Republic. In 1953, some municipalities signaled their opposition to the regime by engaging in protests. As a result, construction of flats per capita increased in protest compared to non-protest municipalities, and this increase was the result of the regime targeting the opposition to ensure stability. The rise in construction cannot be explained by differences in the demand for additional housing, the share of construction workers, or the share of manufacturing workers. At the same time, protest municipalities were more likely to receive military units and hidden Stasi objects. Military units in the GDR were seen as measures that can be directed against opposing citizens and municipalities had no economic incentives to try to attract the National People's Army. Voting results in 1990 suggest, that increasing construction increased popularity, but also increased incentives to show opposition against the government, while sticks decreased popularity but helped to overcome the moral hazard concerns. By using both tools, the regime was able to alleviate the negative side-effects of carrots and sticks.

Many current autocracies are known to turn to carrots to secure their power, for example China or the United Arab Emirates. The findings of this paper help us to understand the rationale behind this better. A number of additional factors potentially affect the allocation of carrots and sticks, and might interact with them. Numerous autocratic leaders fear that their military will attempt a coup against them, and might therefore be more reluctant to place the military in opposition areas. Rich autocracies might face different constraints when deciding on the allocation of resources than poor ones. Propaganda tools might augment the positive effect carrots have on popularity of the regime.

By looking at other countries we can better understand the effects of institutional differences on the decision to target the opposition with carrots and sticks.

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7 Figures and Tables
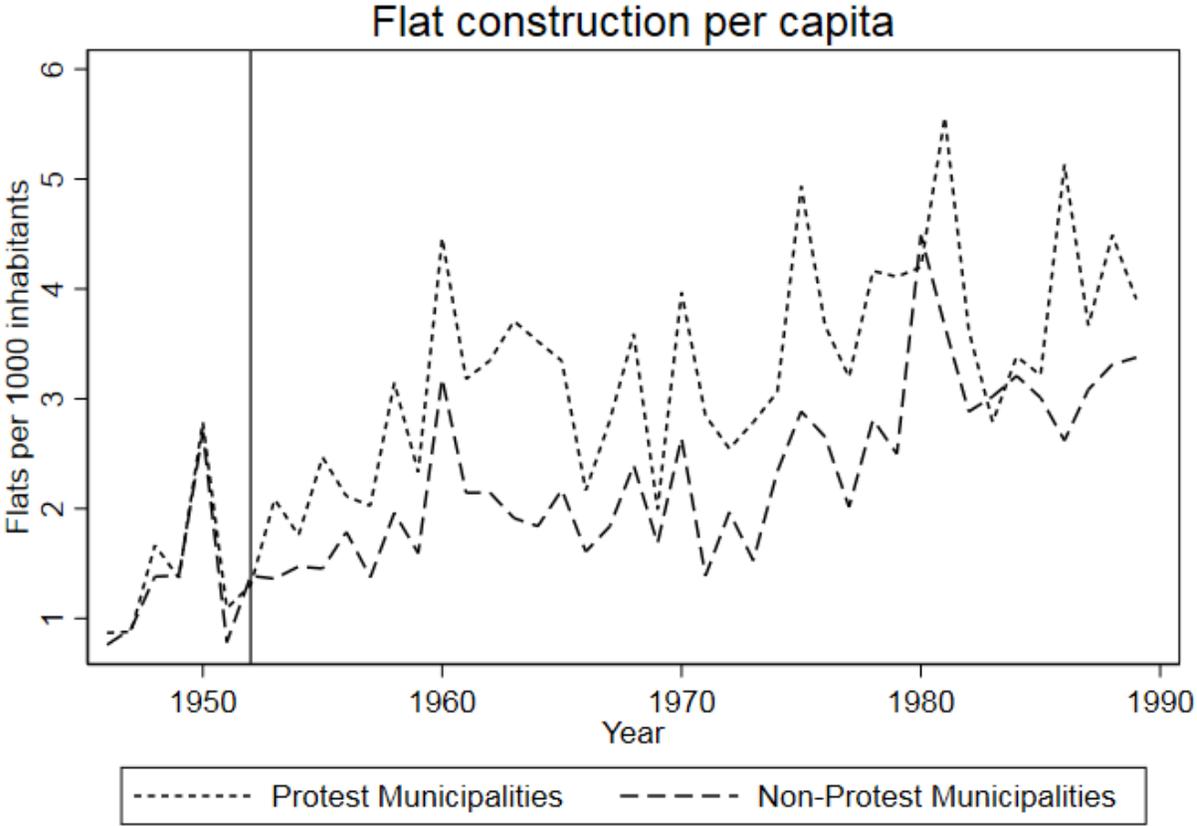
7.1 Figures

Figure 1: Flat Construction per Capita at the Municipality Level

Note The figure shows average construction of flats per 1,000 inhabitants from 1946 to 1989 in protest and non-protest municipalities. The sample is limited to municipalities that have between 2,000 and 10,000 inhabitants in 1950. The vertical line indicates the year 1952. Data sources: see Section 3.
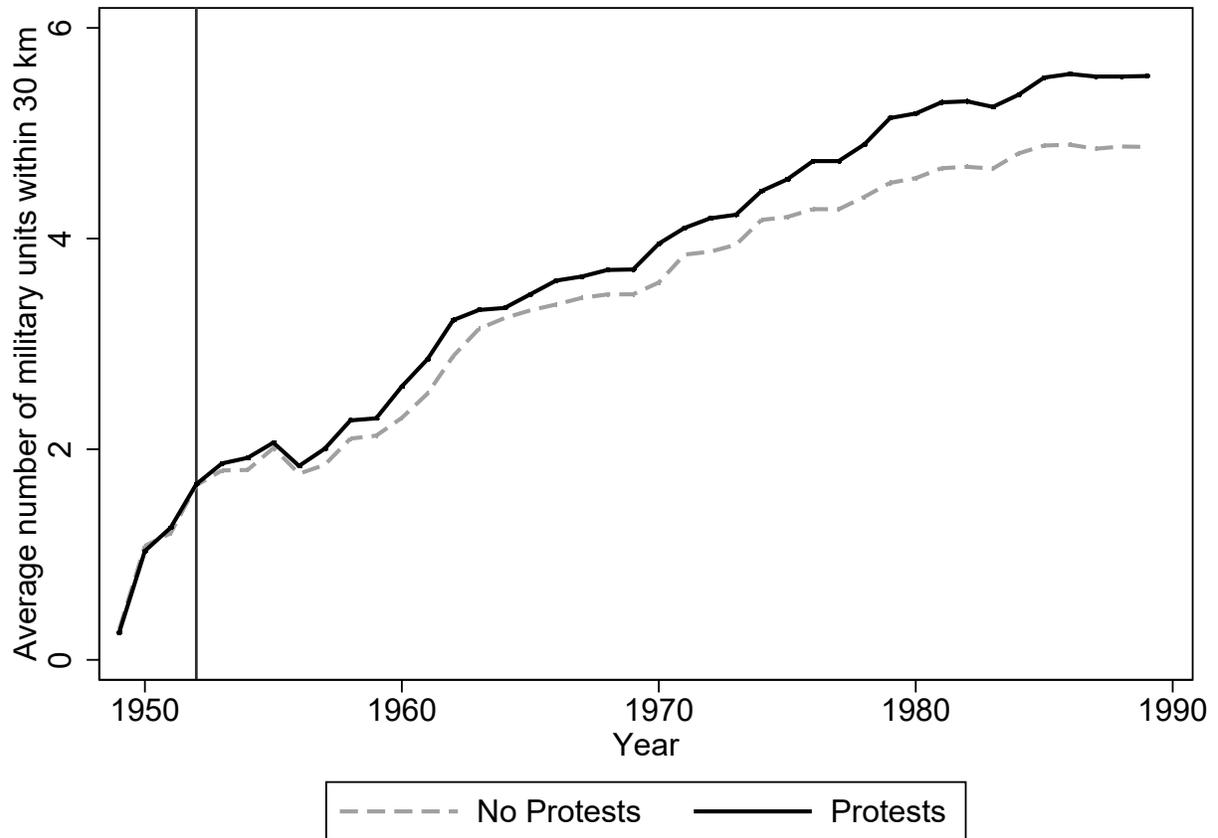
Figure 2: Number Military Units in Protest and Non-Protest Municipalities

Note The figure shows the average number of military units within 30 km of a municipality from 1949 to 1989 in protest and non-protest municipalities for municipalities that had between 2,000 and 10,000 inhabitants in 1950. The vertical line denotes the year 1952. Data sources: see Section 3.
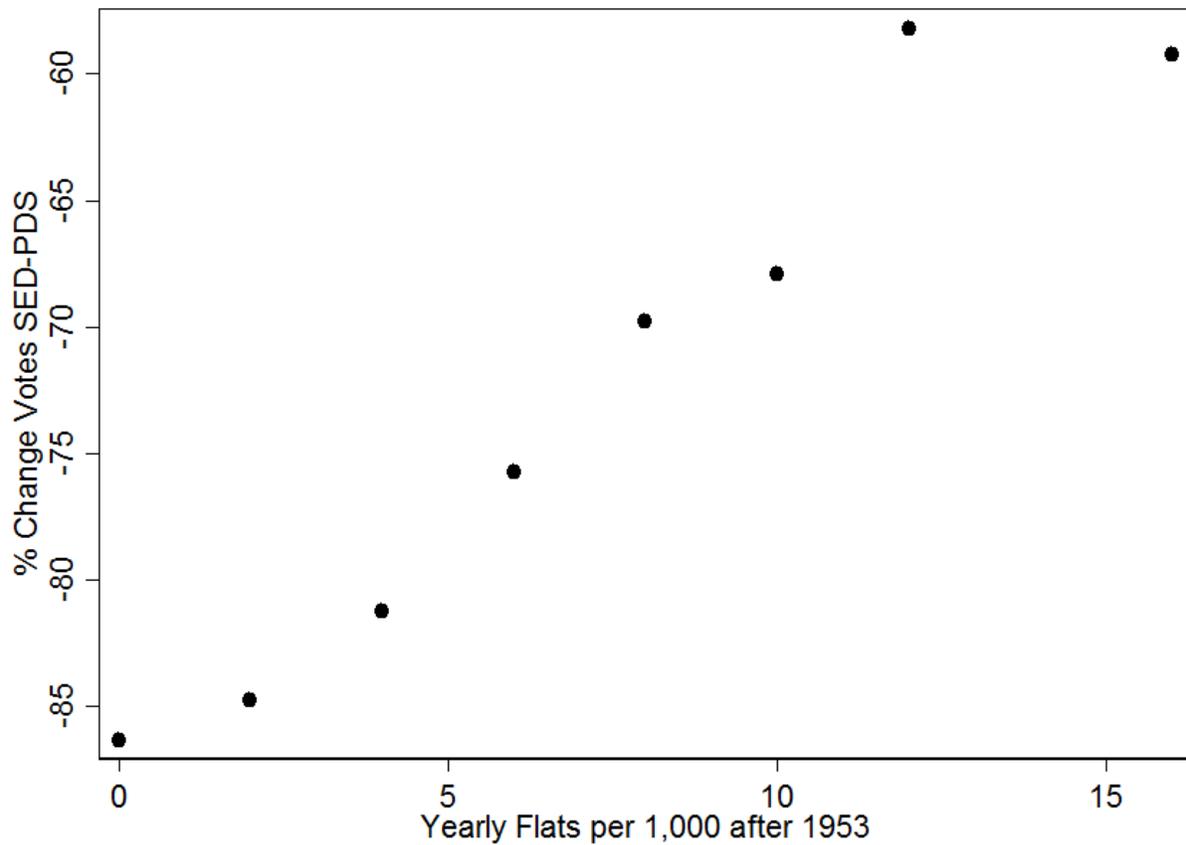
Figure 3: Construction and percent change in votes for regime

Note: The figure shows the average percentage change in votes of the regime party for different bins of the average number of yearly flats per 1,000 inhabitants for municipalities that had between 2,000 and 10,0000 inhabitants in 1950. Bins are 0–2, 2–4, 4–6, 6–8, 8–10, 10–12, 12–14, 14–15 yearly flats per 1,000 inhabitants. Each point presents the average percentage change in votes of the municipalities in the corresponding construction bin. The percentage change in votes is calulcated with votes for the PDS in the election of 1990 and the votes for the SED in the election of 1946. Data sources: see Section 3.

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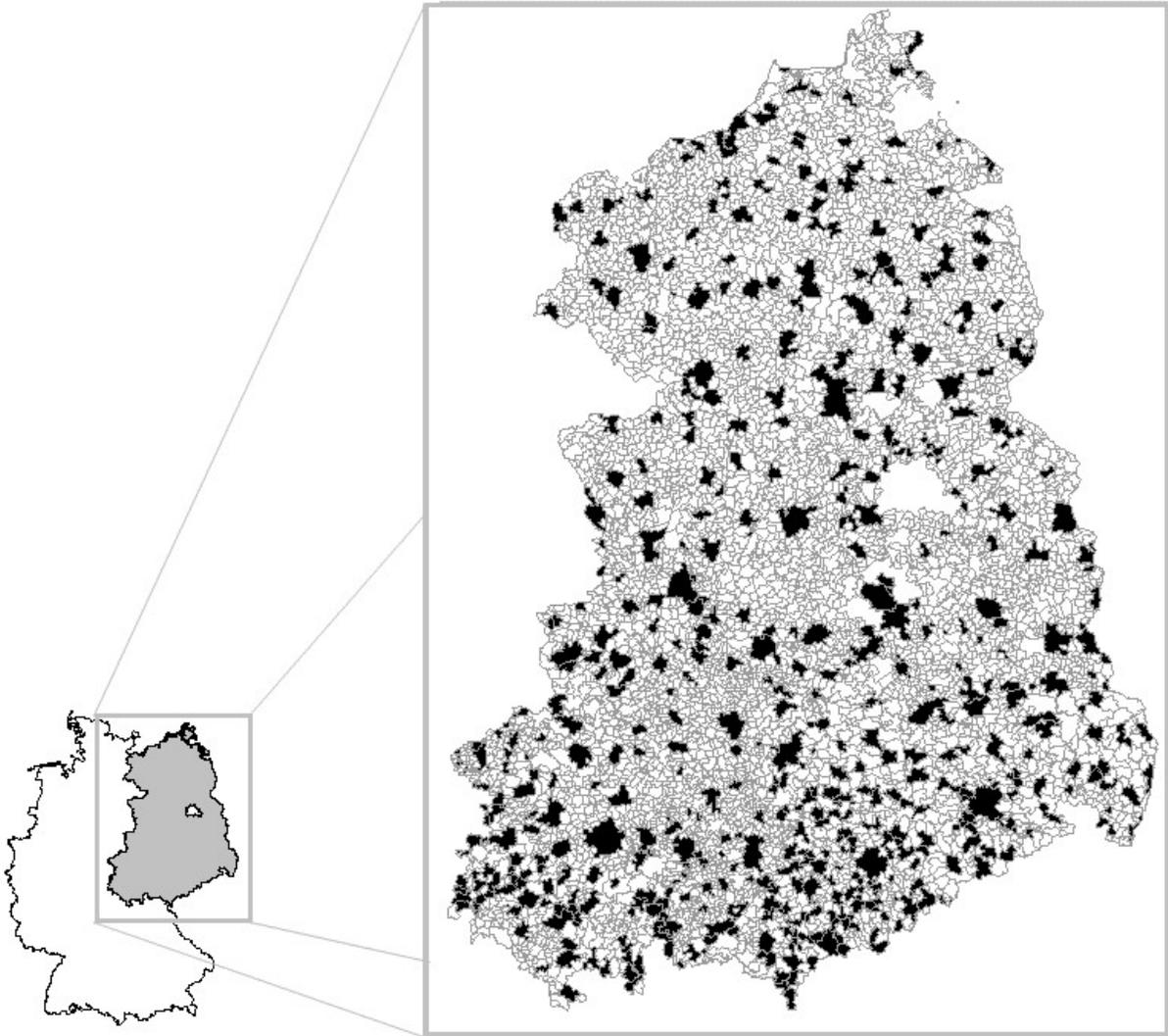
Figure 4: Protests in the GDR during the Uprising of 1953

Note The map on the left shows the location of the former German Democratic Republic in current day Germany. The white area represents West and East Berlin. On the right side within the map of the German Democratic Republic, each black area denotes a municipality that had a protest event during the Uprising of 1953. This encompasses protests, demonstrations, strikes, or violence against individual persons or institutions between the 16th and 21st of June 1953. Berlin is excluded from the analysis. Municipality borders are from 1997. Data sources: see Section 3.
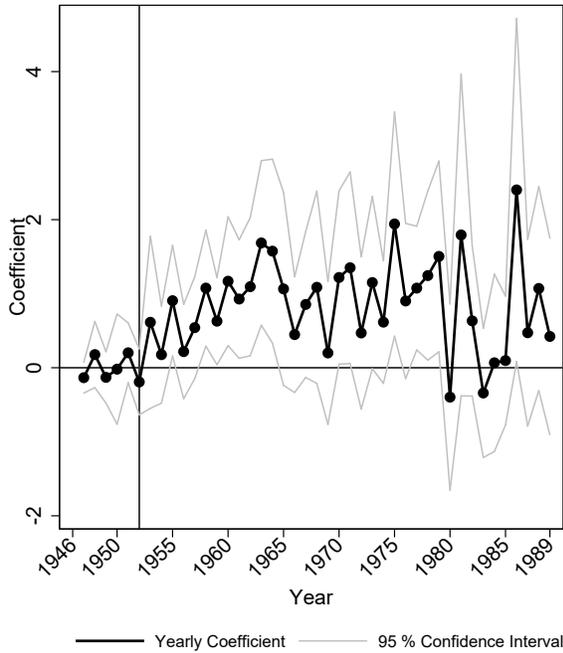
(a) Yearly coefficients
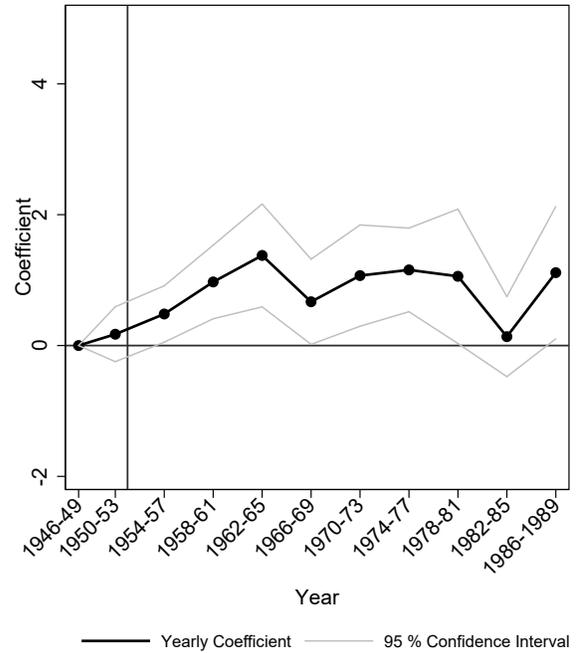
(b) 4 Year coefficients

Figure 5: Difference-in-Difference Estimator: Yearly coefficients, 2,000 to 10,000 inhabitants

Note The figure shows the coefficients of the regression $Construction_{mt} = \Sigma_\tau Protest1953_m \times Time_\tau + \alpha_m + \alpha_t + \varepsilon_{mt}$ where $Construction_{mt}$ is construction per 1,000 inhabitants in municipality m and year t, $Protest1953$ is a dummy that takes value 1 for municipalities that had protest activity in 1953, $Time_\tau$ is a dummy that takes value for for time period τ, α_m are municipality fixed effects and α_t year fixed effects. In the left panel τ are years from 1947 to 1989 (the year 1946 is the omitted category) and in the right panel τ stands for four-year windows (1946 to 1949 is the omitted category). Analysis is limited to municipalities that had between 2,000 and 10,000 inhabitants in 1950. Data sources: see Section 3.
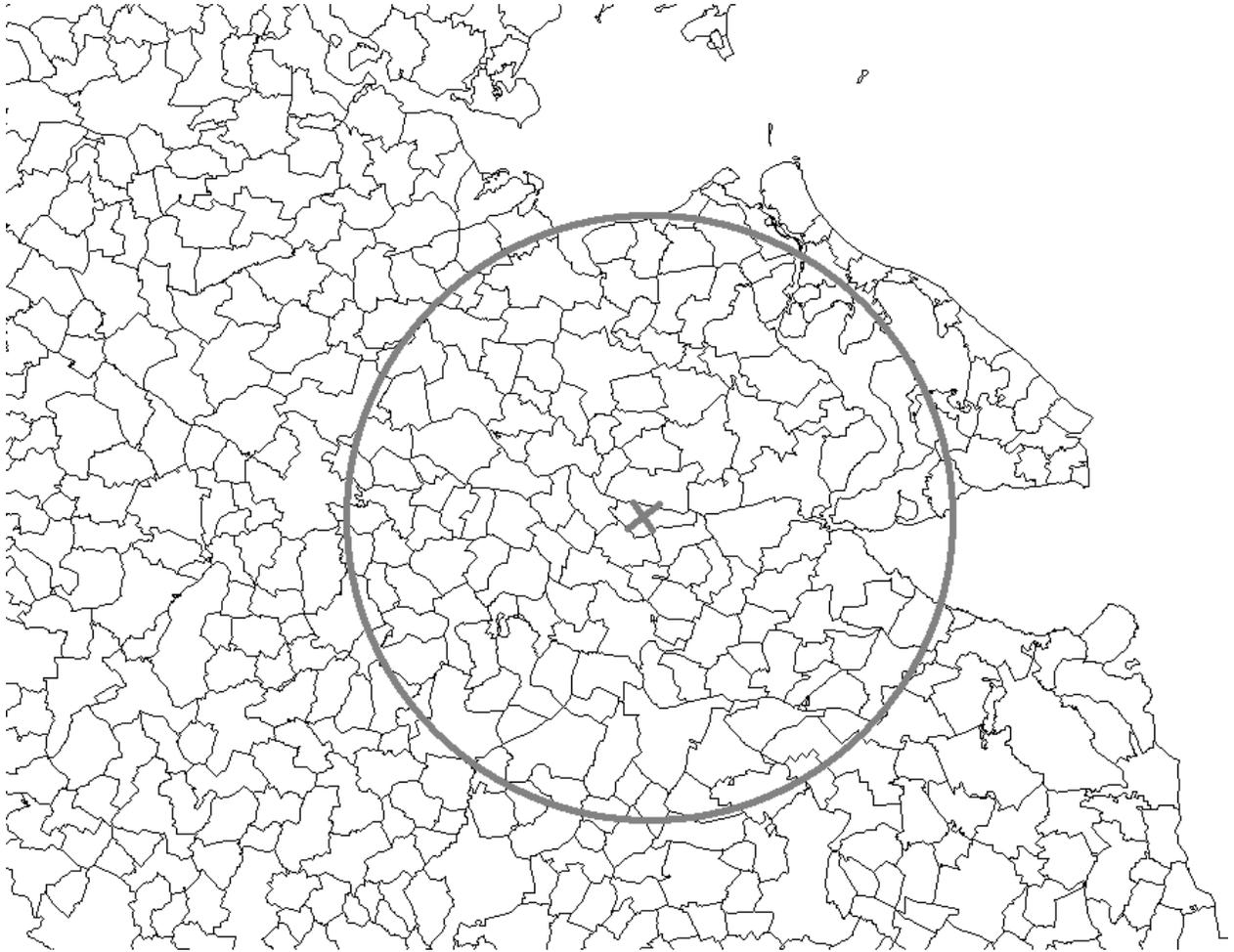
Figure 6: Illustration of 30 km buffer

Note The figure shows a zoom in on a 30 km buffer and municipality borders in the GDR. Municipality borders are from 1997. I aggregate the number of military units within these buffers to analyze whether the regime channels military units towards protest municipalities. Data sources: see Section 3.
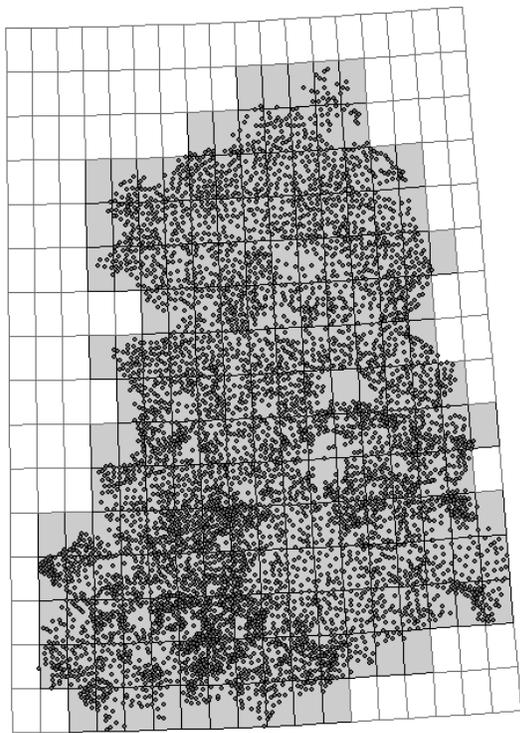
(a) Grid Cell Analysis: First Grid
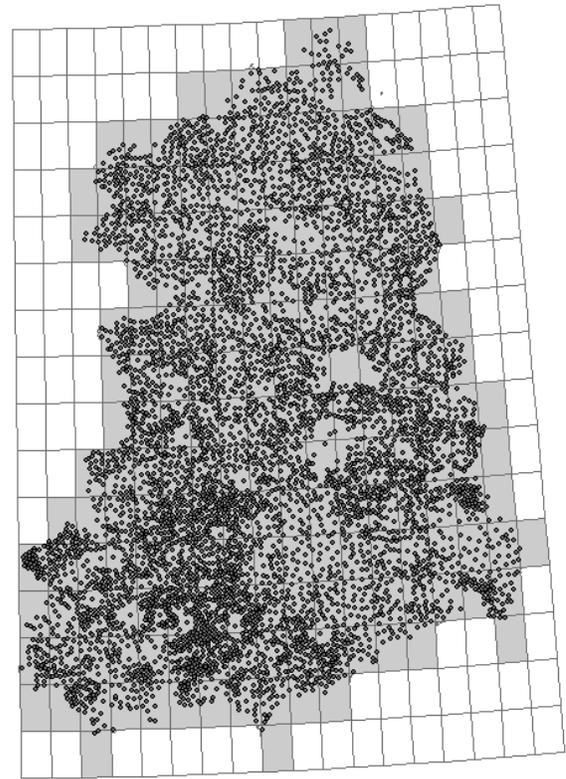
(b) Grid Cell Analysis: Last Grid

Figure 7: Grid Cells

Note The figure shows grid cells of size 0.3 times 0.3 degrees. Each dot represents one municipality. For the empirical analysis I only employ grid cells in which at least one municipality is located, i.e. gray grid cells. The figure on the left shows the starting grid. I generate 100 grids by moving this grid east and south in 0.03 degree steps. The figure on the right shows the last grid. Data sources: see Section 3.

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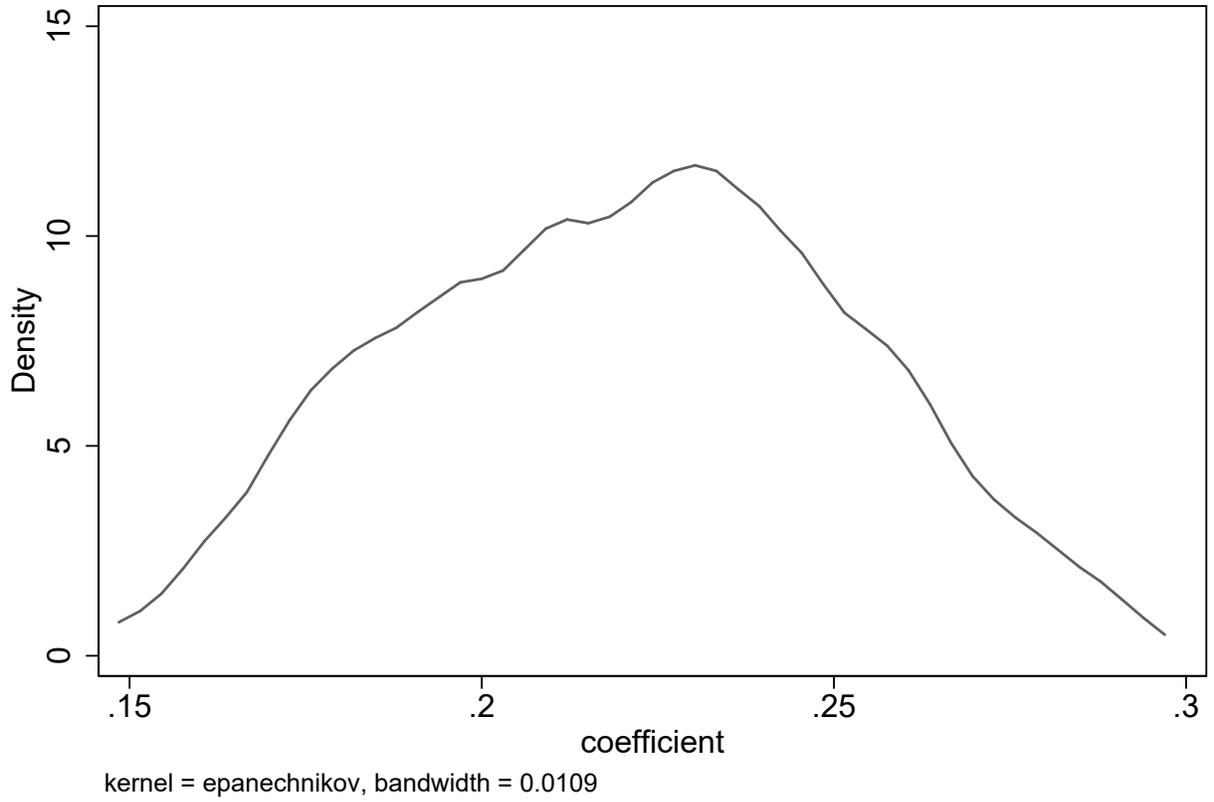
Figure 8: Grid Cell Analysis: Distribution of coefficients

Note: The figure shows the distribution of coefficients of the regression $MilitaryUnits_{gt} = \beta Protest1953 \times Post1952_t + \delta Controls_g + \alpha_g + \alpha_t + \varepsilon_{gt}$ where $MilitaryUnits_{gt}$ measures the number of military units within grid cell g in year t, $Protest1953_g$ is the number of protests in 1953 that occurred in grid cell g, $Controls_{gt}$ is aggregated population in g, α_g are grid cell fixed effects, and α_t are time fixed effects. Standard errors are clustered at the grid cell level. I run this regression 100 times, each time moving the underlying grid 0.03 degrees east and/or 0.03 degrees north. All coefficients are significant at the 5 percent level, see figure A6 in the Appendix. Data sources: see Section 3.

Table 1: Summary Statistics

	Protest Municipalities			Non-Protest Municipalities			Difference
	N	Mean	SD	N	Mean	SD	
Panel A: Charactersitics of Municipalities							
Population 1946	197	4966	2288	725	3868	1650	1098***
Population 1950	208	4915	2226	762	3943	1692	971***
Population 1964	207	4683	2745	749	3456	1692	1226***
Population 1971	205	4719	2895	756	3403	1736	1216***
Share Votes SED 1946	187	0.444	0.090	711	0.461	0.100	-0.0167**
Working Population 1950	130	2612	1162	510	2316	1019	295***
Share Construction 1950	118	0.049	0.019	490	0.045	0.032	0.005
Share Industry 1950	104	0.228	0.012	339	0.212	0.07	0.016
Share Buildings Destroyed 1945	46	0.073	0.135	294	0.059	0.132	0.017
Share Population Looking for Flat 1954	160	0.020	0.011	546	0.018	0.012	0.002*
Distance to Berlin	208	138.051	62.949	762	166.840	59.742	-28.788***
Distance to any Border	208	47.918	30.259	762	35.587	28.812	12.331***
Panel B: Outcomes before 1953							
New Flats per Capita per Year	208	1.424	2.522	762	1.329	3.493	0.095
New State Flats per Capita per Year	208	1.360	2.460	762	1.247	3.412	0.113
New Private Flats per Capita per Year	208	0.028	0.156	762	0.044	0.263	-0.016
Military Units < 30 km per Year	208	1.054	1.134	762	1.058	1.155	-0.004
Panel C: Outcomes after 1953							
New Flats per Capita per Year	208	3.332	7.649	762	2.360	6.021	0.972*
New State Flats per Capita per Year	208	3.182	7.563	762	2.172	5.574	1.010*
New Private Flats per Capita per Year	208	0.097	0.826	762	0.109	0.864	-0.012
Military Units < 30 km per Year	208	3.968	3.037	762	3.608	2.562	0.360***

Note Mean and standard deviation for municipalities with and without any protest activity in 1953. Sample is limited to municipalities with 2,000 to 10,000 inhabitants in 1950. The column *difference* reports the difference in means between the two groups. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

Table 2: Where Do People Protest?

	Location	Polit. Preferences	Pop. Growth	Industry	Housing Demand			Milit. Presence	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Distance Berlin	-0.084*								0.113
	(0.048)								(0.210)
Distance West Border	0.014								0.325*
	(0.048)								(0.189)
Distance County Capital	-0.076								0.189
	(0.075)								(0.240)
County Capital	0.264***								0.322***
	(0.054)								(0.097)
Share Votes SED		0.088***							-0.076
		(0.032)							(0.084)
Turnout 1946		-0.238**							-0.374
		(0.101)							(0.283)
Population Growth, 1946 to 1953			0.039						0.015
			(0.027)						(0.128)
Share in Manufacturing				0.377***					0.521***
				(0.087)					(0.111)
Share in Construction 1950				0.501					0.335
				(0.314)					(0.394)
Share Households Searching Flat					0.334**				0.797**
					(0.131)				(0.320)
War Destruction						0.134*			
						(0.072)			
Air Raids							-0.000		-0.000***
							(0.000)		(0.000)
Barracked Police Units 1953								-0.002	-0.542***
								(0.100)	(0.155)
Population 1953	✓	✓	✓	✓	✓	✓	✓	✓	✓
County FEs	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean Dep. Variable	0.100	0.096	0.099	0.123	0.116	0.153	0.099	0.100	0.151
Observations	5,187	4,825	4,926	1,917	3,335	750	5,166	5,187	1,171
Adj. R²	0.321	0.311	0.312	0.290	0.302	0.390	0.310	0.310	0.307

Note Estimation results of the regression $Protest1953_m = \beta_1 Population1953_m + \beta_2 Controls_m + \alpha_c + \varepsilon_m$ using all municipalities. $Protest1953_m$ is a dummy variable indicating whether any protest activity occurred in a municipality in 1953. All regressions control for population in 1953. In column 1 I control for geographical controls. Distance to the West Border (except Berlin) and Distance County Capital measure distance in 100 km. County Capital is a dummy for county capitals. In column 2 I control for political preferences: Share Votes SED and turnout 1946 are from the state legislature election in 1946. Population growth in column 3 is the percent increase in population from 1946 to 1953. Column 4 controls for share in Industry, and Construction 1950 is share of the working force working in the respective sector according to the 1950 job census. Column 5 to 7 control for alternative measures of the demand for housing. Share Households Searching Flats is the share of households that were looking for a flat in January 1954. War destruction is destruction in percent in Saxony in 1945. Air raids is the number of air attacks on a municipality during World War II. Barracked Police Units 1952 is a dummy variable for the existence of barracked police units within a municipality. Standard errors clustered at the county level reported in parentheses. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

Table 3: Carrots: Difference-in-Differences Estimators Construction

	Flat construction per 1,000 inhabitants						Stores
	All			State	Private	1990 - 94	1948-1958
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Protest 1953	0.095	0.095				-3.026	
	(0.120)	(0.120)				(2.914)	
Post 1952	1.030***	1.030***					
	(0.078)	(0.090)					
Protest53 × Post1952	0.878***	0.878***	0.878***	0.897***	0.004		3.694
	(0.223)	(0.193)	(0.223)	(0.221)	(0.016)		(2.231)
Year FE			✓	✓	✓		✓
Municipality FEs			✓	✓	✓		✓
County FEs						✓	
Controls						✓	✓
Observations	41,932	1,906	41,932	41,932	41,932	633	296
Adjusted R-squared	0.009	0.432	0.076	0.076	0.034	0.107	0.726

Note Estimation results of the equation $Construction_{mt} = \beta Protest1953 \times Post1952_t + \alpha_m + \alpha_t + \varepsilon_{mt}$ using only municipalities with 2,000 to 10,000 inhabitants in 1950. The dependent variable, $Construction_{mt}$, is the number of newly constructed flats per 1,000 inhabitants per year and municipality. $Protest1953$ is an indicator variable whether any protest activity occured in the municipality in 1953. $Post1952_t$ is an indicator variable for all years after 1952. α_m are municipality fixed effects and α_t are time fixed effects. In column 1 and 2 fixed effects are excluded. Column 2 uses the methodology suggested by Bertrand et al. (2004) and aggregate all pre and post treatment observations for each municipality. In column 6 the dependent variable is aggregate construction from 1990 to 1994. Controls in column 6 are a dummy for military presence, county capital, the share of workers that work in manufacturing, distance to Berlin, share of population looking for flat in 1954 and the share of people voting for the SED in 1946. In column 7 the dependent variable is the number of *Konsum* and *HO* stores in municipality m. Standard errors are reported in parentheses. Standard errors are clustered at the municipality level in columns 1, and 3, 4, 5, 6, and 7 and clustered at county level in column 6. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

Table 4: Carrots: Difference-in-Differences Estimators Construction with Controls

	Flat construction per 1,000 inhabitants						
	Housing Demand			Industry Shares 1950			
	Share Looking for Flat	War Destruction	Air Attacks	Construction	Manufacturing	Share SED	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Protest 1953	0.691***	0.778**	0.890***	0.749**	0.864***	0.890***	0.836**
× Post 1952	(0.233)	(0.332)	(0.224)	(0.303)	(0.314)	(0.238)	(0.339)
Control	8.081***	-1.699*	-0.006	-3.280	2.991***	-2.258**	
× Post 1952	(2.349)	(0.900)	(0.006)	(3.576)	(1.037)	(1.032)	
Mun FEs	✓	✓	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓	✓	✓
Observations	30,316	14,652	41,932	26,224	19,052	38,852	12,716
Adj R²	0.067	0.055	0.076	0.072	0.082	0.075	0.066

Note Estimation results of the equation $Construction_{mt} = \beta Protest1953 \times Post1952_t + \gamma Control_m \times Post1952 + \alpha_m + \alpha_t + \varepsilon_{mt}$ using only municipalities with 2,000 to 10,000 inhabitants in 1950. The dependent variable, $Construction_{mt}$, is the number of newly constructed flats per 1,000 inhabitants per year and municipality. $Protest1953$ is an indicator variable whether any protest activity occured in the municipality in 1953. $Post1952_t$ is an indicator variable for all years after 1952. $Controls_m$ are the share of the population looking for a flat in 1954, war destruction in Saxony, number of air attacks during World War II, Share of Workers in construction and manufacturing in 1950 and the share of votes for the SED in 1946 in columns 1 to 6, respectively. α_m are municipality fixed effects and α_t are time fixed effects. Standard errors are reported in parentheses. Standard errors are clustered at the municipality level. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

Table 5: Carrots: Heterogeneous Effects

	Flats per 1,000 inhabitants			
	County Capital		Dist. West Germany	
	no	yes	close	not close
	(1)	(2)	(3)	(4)
Protest 1953 × Post 1952	0.446**	0.515	0.612***	0.819***
	(0.212)	(1.328)	(0.210)	(0.266)
Protest 1953 × Post 1961			0.590*	-0.033
			(0.315)	(0.299)
Obs	40,584	1,348	28,600	27,500
Adj R-squared	0.063	0.115	0.079	0.070

Note Estimation results for $Construction_{mt} = \beta Protest1953 \times Post1952_t + \alpha_m + \alpha_t + \varepsilon_{mt}$ using only municipalities with 2,000 to 10,000 inhabitants in 1950 for different sample splits. The dependent variable, $Construction_{mt}$, is the number of newly constructed flats per 1,000 inhabitants per year and municipality. $Protest1953$ is an indicator variable whether any protest activity occurred in the municipality in 1953. $Post1952_t$ is an indicator variable for all years after 1952. α_m and α_t are municipality and time fixed effects. In columns 1 and 2, the sample is split in county capitals and non-county capitals. In columns 3 and 4, the sample is split by the distance to West Germany where municipalities fewer than 50 km away from West Germany are considered close and all others are considered not close. Standard errors clustered at the municipality level reported in parentheses. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

Table 6: Channels: Chairmen of County Councils

	Duration of term		Characteristics of Chairmen				
	Survival Analysis	Replacement	PhD	Appointment Before	Order of Merit Ever	Order of Merit Before	Distance Place of Birth to County Capital
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share Protests	-0.189 (0.362)						
Share Protest × Post Protest 1953		0.017 (0.047)	0.009 (0.033)	0.080 (0.131)	0.051 (0.077)	0.014 (0.011)	-3.476 (2.634)
County FEs		✓	✓	✓	✓	✓	✓
Year FEs		✓					
Appointment Year FEs			✓	✓	✓	✓	✓
Mean Dep. Var		0.131	0.028	0.076	0.067	0.004	1.915
Observations	391	4,334	567	567	567	567	108
Clusters		112	111	111	111	111	37
Adj. R²		0.065	0.312	0.287	0.304	0.358	0.449

Note Column 1 presents the estimates of a Cox Hazard model analyzing the survival of county chairmen who were in power during the protests in 1953. $ShareProtests$ is the share of municipalities within a county that had a protest in 1953. Column 2 shows the results of the regression $Replacement_{ct} = \beta ShareProtests_c \times PostProtest1953_t + \alpha_c + \alpha_t + \varepsilon_{ct}$ where $Replacement_{ct}$ is a dummy that takes on value 1 if in a given year t the chairmen of county c is replaced non-temporarily, $ShareProtests_c$ is the share of protest municipalities in 1953 in county c, $PostProtest1953_t$ is a dummy that takes on 1 after the Uprising in 1953 and α_c and α_t are county and time fixed effects. The unit of analysis is the county times year. For columns 3 to 6 the underlying model is $ChairmenCharacteristic_{ct} = \beta_3 ShareProtests_c \times PostProtest1953_t + \alpha_c + \alpha_t + \varepsilon_{ct}$, where $PostProtest1953_t$ is a dummy indicating whether chairmen of county c after the Uprising 1953. α_t are appointment year fixed effects. The remaining variables are defined as before. The units of observation is the new chairmen in year t. In column 3 the dependent variable is a dummy whether a chairman held a doctoral degree, in column 4 a dummy that takes on value 1 if the chairmen has served as chairmen in another county before, in column 5 a dummy whether he received an Order of Merit for his work as chairmen before he was appointed at the county, in column 6 a dummy whether he received an Order of Merit for his work as chairmen ever, and in column 7 the geodetic distance between the place of birth of the chairmen and the county capital. Standard errors clustered at the county level reported in parentheses. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

Table 7: Sticks: Military Units Buffer Analysis

	Number of Military Units In 30 km Buffer				Grid Level Analysis	Stasi Objects 1989	
	1949 to 1989			From 1961	1949 to 1989	Secret	Public
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Protest 1953	-0.149*	-0.126		0.184		0.071*	-0.013
	(0.080)	(0.134)		(0.225)		(0.042)	(0.030)
Post 1952	1.020**	1.016					
	(0.469)	(0.666)					
Protest 1953 × Post 1952	0.425**	0.436**	0.391**		0.224		
	(0.178)	(0.187)	(0.173)		(0.095)		
Controls	✓	✓	✓	✓	✓	✓	✓
Year FEs			✓	✓	✓		
Mun FEs			✓				
Grid FEs					✓		
County FEs						✓	✓
Observations	39,770	1,940	39,770	26,180	8,580	917	917
R-squared	0.104	0.397	0.818	0.094	0.787	0.287	0.381

Note Column 1 to 4 show results of regression $Units within 30km_m = \beta Protest1953 \times Post1952_t + \gamma Controls_{mt} + \alpha_m + \alpha_t + \varepsilon_{mt}$ using only municipalities with 2,000 to 10,000 inhabitants in 1950. $Units within 30km_m$ is the aggregated number of military units within a 30 km buffer around municipality m. $Protest1953$ is an indicator variable whether any protest activity occured in the municipality in 1953. $Post1952$ is an indicator variable for all years after 1952. α_m are municipality and α_t year fixed effects. Column 2 uses the methodology suggested by Bertrand et al. (2004) and aggregate all pre and post treatment observations for each municipality. In Column 4 I only look at municipalities that did not receive any military units before 1961, and start the analysis with the year 1961. Column 5 shows the median regression result of the grid level regression, as outlined in 7. Column 6 looks at the existence of public Stasi objects in 1989, in column 7 the existence of secret Stasi object in 1989. Control variables in columns 6 and 7 are population in 1989, distance to any border of the GDR, a dummy for county capitals, distance to the county capital, share of workers employed in industry in 1971 and share of workers employed in state administration in 1971, in addition to county fixed effects according to 1989 county borders. Data sources: see text. Standard errors are reported in parentheses. Standard errors are clustered at the municipality level in columns 1, 3, 4, and 5 and at the county level in column 6 and 7. Standard errors are robust in column 2. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

Table 8: Reaction of Carrots to Sticks

	Construction per 1,000 inhabitants				
	All			With Kitchen	All
	(1)	(2)	(3)	(4)	(5)
Protest 1953 × Post 1952	0.926***	0.730***	0.783***	0.920***	0.794***
	(0.245)	(0.263)	(0.281)	(0.245)	(0.217)
New Military in 5 years before	1.723**		1.837**	1.726**	
	(0.787)		(0.785)	(0.787)	
New Military in 5 years before × Protest 1953	-0.372		-0.367	-0.372	
	(0.276)		(0.277)	(0.276)	
New Military in next 5 years		1.004	1.175		
		(0.787)	(0.788)		
New Military in next 5 years × Protest 1953		-0.195	-0.184		
		(0.286)	(0.286)		
Military in Municipality					1.503***
					(0.557)
Military in Municipality × Protest 1953					0.851
					(1.203)
Observations	41,932	41,932	41,932	41,932	41,932
Adjusted R-squared	0.076	0.076	0.076	0.076	0.077

Note Estimation results for $Construction_{mt} = \beta Protest_m \times Post1952 + \gamma_1 NewMilitaryUnitsPast_{mt} + \gamma_2 NewMilitaryUnitsPast_{mt} \times Protest_m + \delta_1 NewMilitaryUnitsFuture_{mt} + \delta_2 NewMilitaryUnitsFuture_{mt} \times Protest_m + \alpha_m + \alpha_t + \varepsilon_{mt}$, for municipalities that had between 2,000 and 10,000 inhabitants in 1950. $Construction_{mt}$ is the number of newly build flats per 1,000 inhabitants in municipality m and year t. The dependent variable in columns 1 to 3 and 5 is the number of newly constructed flats per 1,000 inhabitants per municipality and year. In column 5, the dependent variable is the number of newly constructed flats with a kitchen per 1,000 inhabitants per municipality and year. *NewMilitaryUnitsPast* is a dummy for whether any additional military troops were assigned to a municipality between the current year and four years before. *NewMilitaryUnitsFuture* is a dummy for whether any additional military units entered a municipality in the following one to five years. All regressions control for year and municipality fixed effects. Standard errors are clustered at the municipality level and are reported in parentheses. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

Table 9: Effectiveness: Voting in 1990

	% Change Voting Regime Party 1946 to 1990		
	(1)	(2)	(3)
Protest 1953	0.328	0.289	0.605
	(0.659)	(0.672)	(1.037)
Std Construction pc after 1953	2.073***	1.815**	1.930
	(0.491)	(0.916)	(1.173)
Std Construction pc after 1953 × Protest 1953			0.463
			(1.416)
Number military < 30 km	-1.006***	-1.011***	-1.031***
	(0.362)	(0.367)	(0.385)
Number military < 30 km × Protest 1953			-0.123
			(0.195)
Std Construction pc after 1953		0.058	-0.099
× Number Military < 30 km		(0.155)	(0.238)
Std Construction pc after 1953			0.224
× Number Military < 30 km × Protest 1953			(0.247)
Controls	✓	✓	✓
County FE	✓	✓	✓
Observations	873	873	873
Adj R^2	0.566	0.566	0.571

Note Regression results of $\%ChangeVotesRegime_m = \beta_1 Protest1953_m + \beta_2 Construction_m + \beta_3 Construction_m \times Protest1953_m + \beta_4 Military_m + \beta_5 Military_m \times Protest1953_m + \beta_6 Construction_m \times Military + \beta_7 Construction_m \times Military \times Protest1953_m + \gamma Controls_m + \alpha_c + \varepsilon_m$, where $\%ChangeVotesRegime_m$ is the percent change in voting for the regime party between 1946 and December 1990 in municipality m. $Construction_m$ is standardized yearly construction per 1,000 inhabitants in m. $Military_m$ is a dummy for the existence of any military units within a 30 km radius of m. $Protests1953$ is a dummy for protest activity in m in 1953. This allows the relationship between measures of support with carrots and/or sticks to differ in protest and non-protest municipalities. $Controls_m$ are a dummy for county capitals, distance to county capital, distance to West border, distance Berlin, population 1989, share manufacturing workers in 1971. All regressions control for county fixed effects, α_c. Standard errors clustered at the county level reported in parentheses. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.
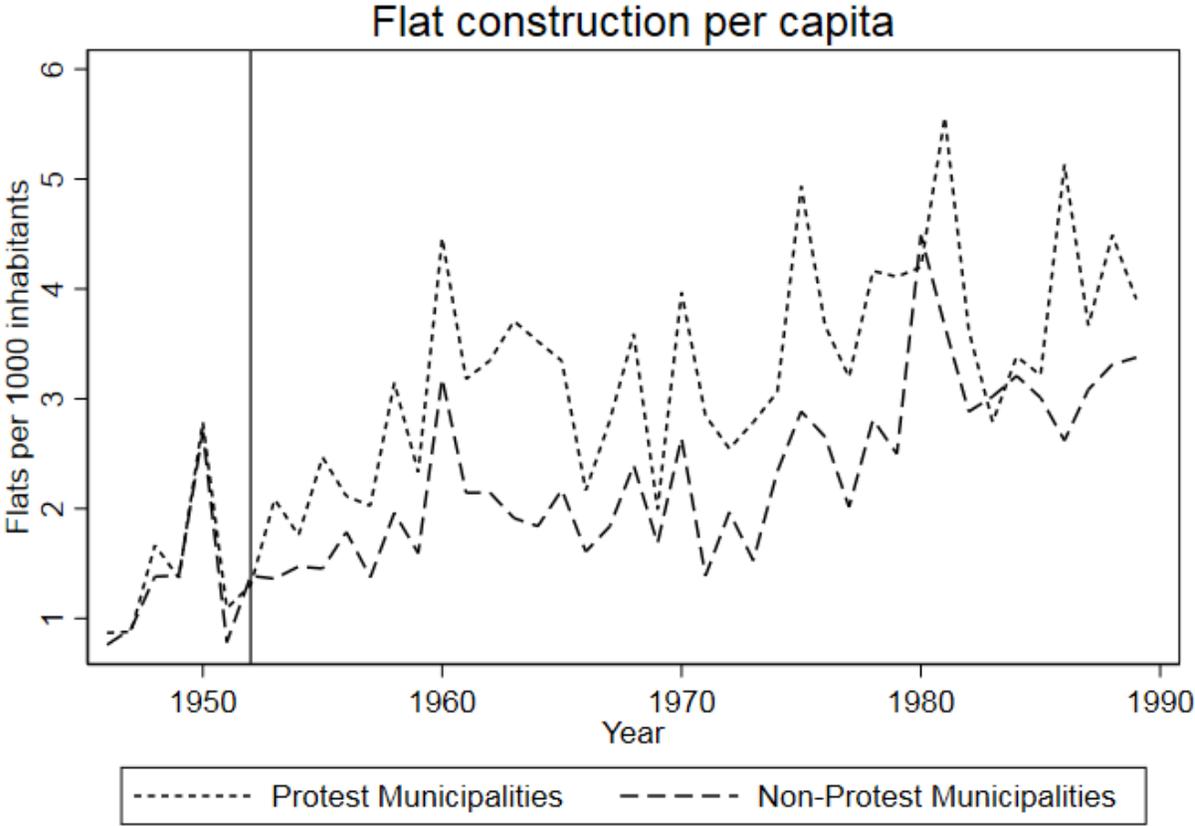
A Appendix

A.1 Figures

Figure A1: Flat Construction per Capita at the Municipality Level - Extended Sample

Note The figure shows average construction of flats per 1,000 inhabitants from 1946 to 1989 in protest and non-protest municipalities for all municipalities. The vertical line indicates the year 1952. Data sources: see Section 3.
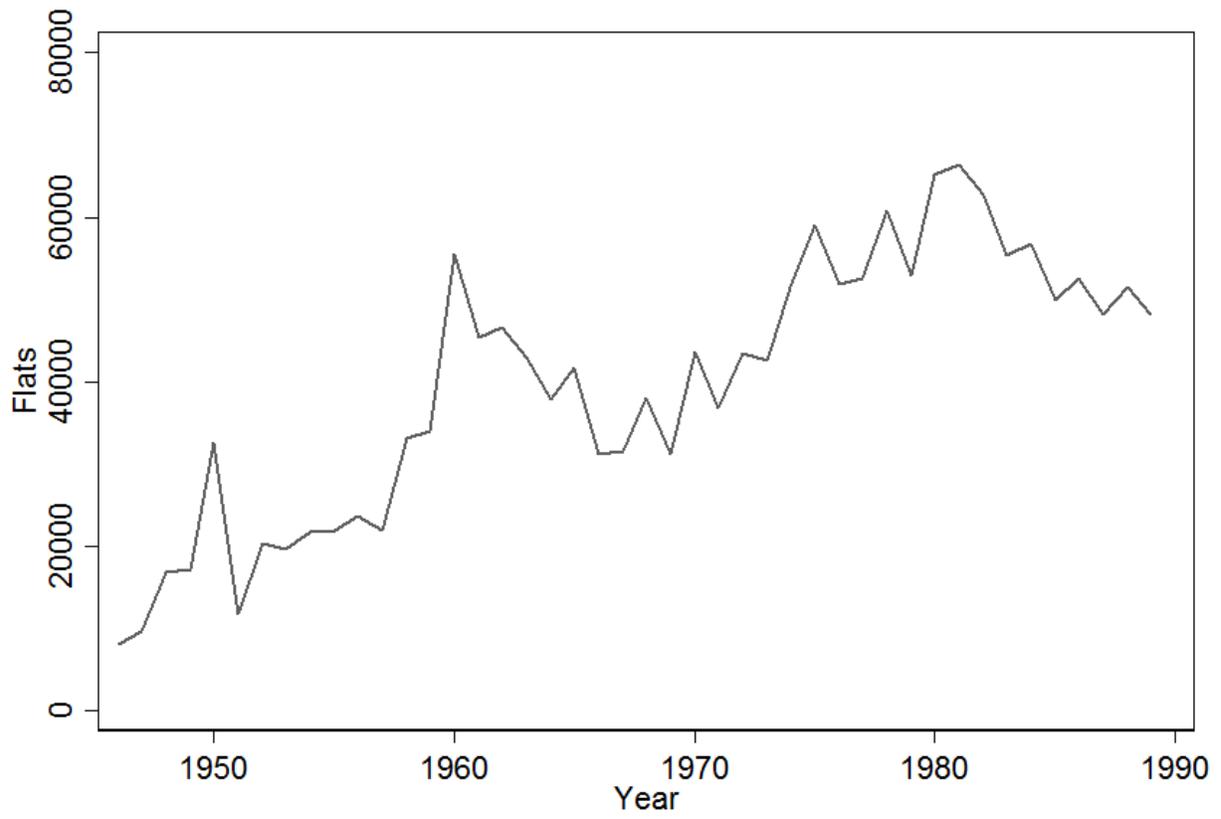
Figure A2: Overall Flat Construction

Note The figure shows overall new flat construction from 1946 to 1989. see Section 3.
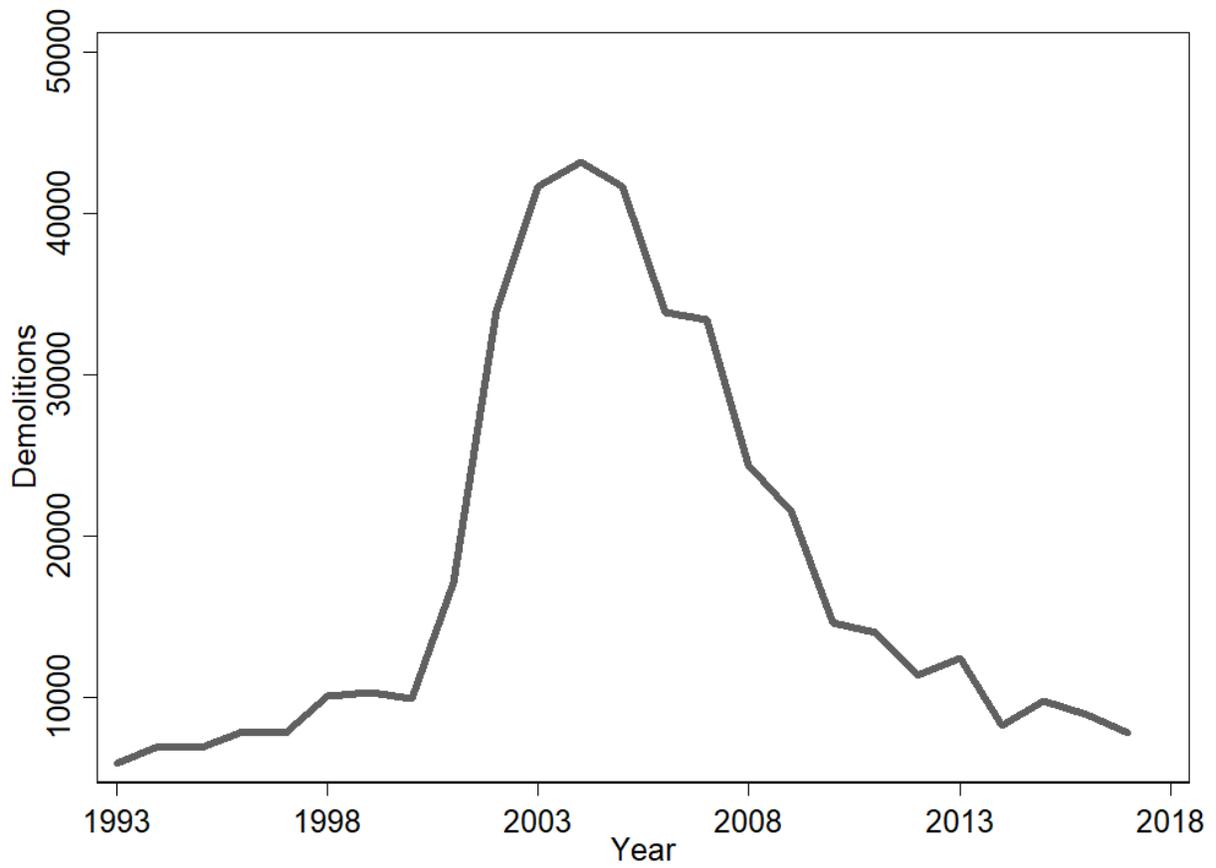
Figure A3: Demolitions in East Germany

Note: The figure shows the aggregate number of demolitions of buildings in former East Germany from 1993 to 2017. This includes East Berlin. Data sources: Bundesamt (2018).

Figure A4: Map with municipalities with phone access from 1947 to 1955

Note: The figure shows municipalities with phone access in the dataset. Municipality borders are from the year 1997. Data sources: see Section 3.
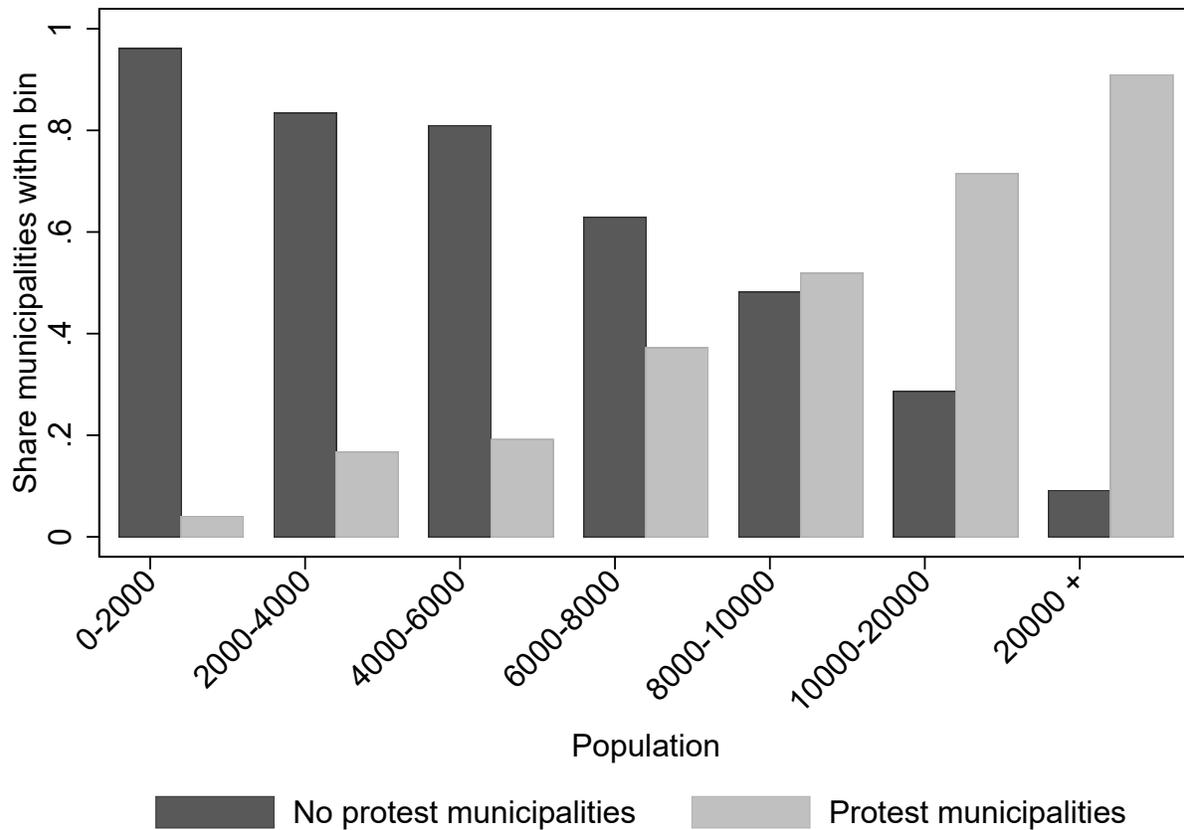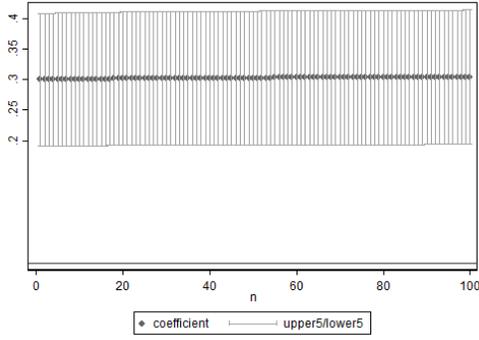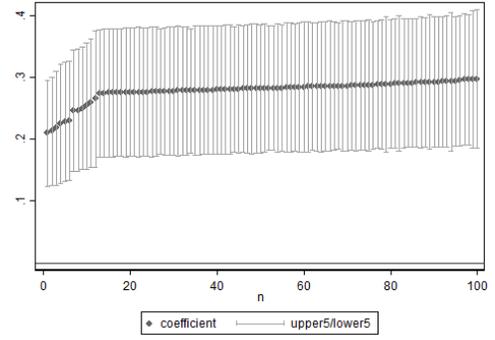
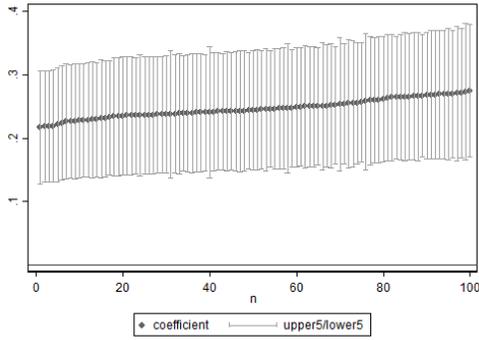Figure A5: Share of municipalities with different size of population

Note: The figure shows the share of municipalities without and with protests by different population bins based on population numbers in 1950. Data sources: see Section 3.

(a) 0.025×0.025

(b) 0.05×0.05

(c) 0.075×0.075
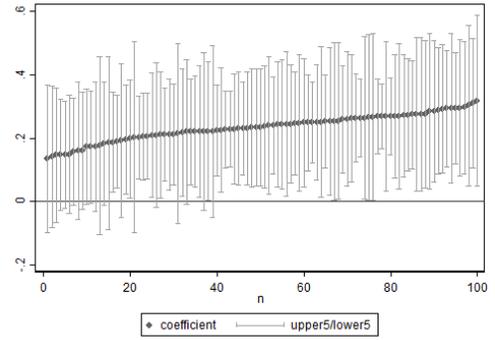
(d) 0.1×0.1
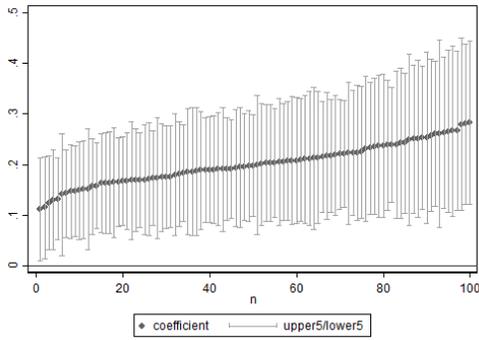
(e) 0.15×0.15
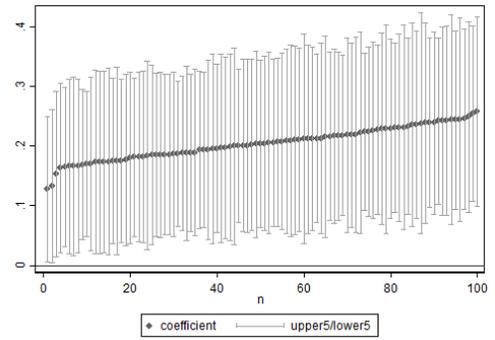
(f) 0.25×0.25
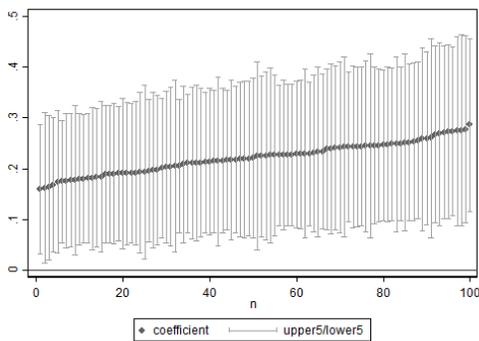
(g) 0.3×0.3
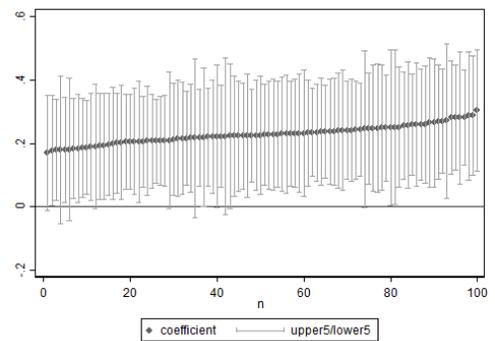
(h) 0.5×0.5

Figure A6: Grid Analysis using different grid sizes

Note: The figure shows coefficients of regression 7 with 95 % confidence intervals for different grid sizes. Data sources: see Section 3.

A.2 Tables

Table A1: Where Do People Protest? 2,000-10,000 inhabitants in 1950

	Location	Polit. Preferences	Pop. Growth	Industry	Housing Demand			Mil. Presence	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Distance Berlin	-0.239								-0.069
	(0.216)								(0.380)
Distance West Border	0.169								0.925**
	(0.199)								(0.369)
Distance County Capital	-0.317								0.068
	(0.308)								(0.607)
County Capital	0.354***								0.439***
	(0.091)								(0.123)
Share Votes SED		0.095							-0.374
		(0.189)							(0.261)
Turnout 1946		0.443							-0.213
		(0.411)							(0.745)
Population Growth, 1946 to 1953			0.017						-0.140
			(0.017)						(0.215)
Share in Industry 1950				0.085					0.258
				(0.264)					(0.299)
Share in Construction 1950				0.360					0.597
				(0.488)					(0.559)
Share Households Searching Flat					0.984**				
					(0.395)				
War Destruction						0.178			
						(0.132)			
Air Raids							0.001		-0.001
							(0.001)		(0.001)
Barracked Police Units 1953								-0.018	
								(0.175)	
Population 1953	✓	✓	✓	✓	✓	✓	✓	✓	✓
County FEs	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean Dep. Variable	0.211	0.204	0.210	0.237	0.234	0.137	0.212	0.211	0.231
Observations	1,034	954	979	447	744	401	1,022	1,034	403
Adj. R²	0.346	0.334	0.345	0.300	0.324	0.267	0.326	0.324	0.355

Note Estimation results of the regression $Protest1953_m = \beta_1 Population1953_m + \beta_2 Controls_m + \alpha_c + \varepsilon_m$ using municipalities that had 2,000 to 10,000 inhabitants in 1950. $Protest1953_m$ is a dummy for whether any protest activity occurred in m in 1953. All regressions control for population in 1953. In column 1 I control for geographical controls. Distance to Berlin, Distance to the West Border (except Berlin) and Distance County Capital measure distance in 100 km. County Capital is a county capitals dummy. In column 2 I control for political preferences: Share Votes SED and turnout in the state legislature election in 1946. Population growth in column 3 is the percent increase in population from 1946 to 1953. Column 4 controls for share of working force in Industry & Construction 1950 according to the 1950 job census. Column 5 to 7 control for the demand for housing. Share Households Searching Flats is the share of households that were looking for a flat in January 1954. War destruction is % destruction in Saxony in 1945. Air raids is the number of air raids on m during World War II. Barracked Police Units 1952 is a dummy variable for the existence of barracked police units in m. The existence of a barracked police unit in 1953 is excluded in column 8, because in the municipalities for which data on all other variables is available there are no police units in 1953. Standard errors clustered at the county level reported in parentheses. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

Table A2: Carrots: Difference-in-Differences Estimators Construction, Full Sample

	Flat construction per 1,000 inhabitants					Stores
	All			State	Private	1948-1958
	(1)	(2)	(3)	(4)	(5)	(6)
Protest 1953	-0.423***	-0.423***				8.313***
	(0.107)	(0.101)				(2.099)
Post 1952	0.009	0.009				
	(0.041)	(0.045)				
Protest 1953 × Post 1952	1.918***	1.918***	1.918***	1.806***	0.041***	
	(0.168)	(0.142)	(0.168)	(0.152)	(0.014)	
Year FE			✓	✓	✓	
Municipality FEs			✓	✓	✓	✓
Controls						✓
Observations	220,264	10,012	220,264	220,264	220,264	540
Adjusted R-squared	0.004	0.025	0.055	0.053	0.026	0.727

Note Estimation results of the equation $Construction_{mt} = \beta Protest1953 \times Post1952_t + \alpha_m + \alpha_t + \varepsilon_{mt}$ using all municipalities independent of population in 1950. The dependent variable, $Construction_{mt}$, is the number of newly constructed flats per 1,000 inhabitants per year and municipality. $Protest1953$ is an indicator variable whether any protest activity occured in the municipality in 1953. $Post1952_t$ is an indicator variable for all years after 1952. α_m are municipality fixed effects and α_t are time fixed effects. Column 2 uses the methodology suggested by Bertrand et al. (2004) and aggregate all pre and post treatment observations for each municipality. In column 6 the dependent variable is the number of *Konsum* and *HO* stores in municipality m. Standard errors are reported in parentheses. Standard errors are clustered at the municipality level in columns 1, 3, 4, 5 and 6. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

Table A3: Carrots: Difference-in-Differences Estimators Construction With Conley Standard Errors

					Construction per 1,000 inhabitants			
					Share Workers 1950			
	Baseline	Share Looking for Flat	War Destruction	Air Attacks	Construction	Manufacturing	Share SED	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Protest 1953 × Post 1952	0.878***	0.691***	0.778***	0.890***	0.749***	0.864***	0.890***	0.836**
	(0.132)	(0.149)	(0.226)	(0.132)	(0.170)	(0.177)	(0.139)	(0.219)
Control × Post 1952		8.081***	-1.699*	-0.006	-3.280	2.991***	-2.258**	
		(2.089)	(0.595)	(0.004)	(3.199)	(0.673)	(0.692)	
Mun FEs	✓	✓	✓	✓	✓	✓	✓	✓
Time FEs	✓	✓	✓	✓	✓	✓	✓	✓
Observations	41,932	30,316	14,652	41,932	26,224	19,052	38,852	12,716
Adj R²	0.001	0.001	0.000	0.001	0.000	0.001	0.001	0.002

Note Results of Regression $Construction_{mt} = \beta Protest1953_m \times Post1952 + \gamma Control_m \times Post1952 + \alpha_m + \alpha_t + \varepsilon_{mt}$ for municipalities between 2,000 and 10,000 inhabitants. $Construction_{mt}$ is construction per 1,000 inhabitants, $Protest1953$ is an indicator variable whether any protest activity occured in the municipality in 1953. $Post1952_t$ is an indicator variable for all years after 1952. α_m are municipality fixed effects and α_t are time fixed effects. Controls are share of population looking for a flat in a municipality in 1950, war destruction in Saxony, air attacks during World War II, share workers in construction and manufacturing sector 1950. Conley standard errors with a cutoff of 30 km in parenthesis. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

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Table A4: Carrots: Quality of Flats

	Share of Flats with							
	Modern Heating	Kitchen	Toilet	Bathroom	>3 rooms	<40m^2	40 to 100m^2	>100m^2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Protest 1953 × Post 1952	0.003	0.001	-0.037***	-0.015*	-0.011	-0.001	0.056***	-0.055***
	(0.014)	(0.002)	(0.009)	(0.008)	(0.010)	(0.004)	(0.014)	(0.015)
Time FE	✓	✓	✓	✓	✓	✓	✓	✓
Municipality FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	34,599	34,599	34,599	34,599	34,599	34,599	34,599	34,599
Adj. R^2	0.153	0.010	0.203	0.150	0.057	0.019	0.161	0.167

Note Estimation results for $Quality_{mt} = \beta Protest1953_m \times Post1952 + \gamma Control_m \times Post1952 + \alpha_m + \alpha_t + \varepsilon_{mt}$ for municipalities between 2,000 and 10,000 inhabitants in 1950. The dependent variables is the share of newly constructed flats per year and municipality with a given quality attribute as indicated by the column header. Standard errors clustered at the municipality level reported in parentheses. *, **, and *** denote significance on the 10 percent, 5 per cent, and 1 percent level, respectively. Data sources: see Section 3.

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