I Z A Institute of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 15800

Highway to Hell? Interstate Highway System and Crime

Francesca Calamunci
Jakub Lonsky

DECEMBER 2022

I Z A Institute of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 15800

Highway to Hell? Interstate Highway System and Crime

Francesca Calamunci
Sapienza University

Jakub Lonsky
University of Liverpool and IZA

DECEMBER 2022

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Highway to Hell? Interstate Highway System and Crime*

The United States witnessed an unprecedented crime wave in the second half of the twentieth century, with the total index crime rate more than tripling between 1960-1980. Little is known about the causes of this surge in criminal activity across the country. This paper investigates the role played by the Interstate Highway System (IHS), an ambitious federal government project that led to the construction of over 40,000 miles of highways between 1956-1992. Using a staggered difference-in-differences design and a county-by-year panel dataset spanning all US counties between 1960-1993, we find that a highway opening in a county led to a 5% rise in the local index crime. This effect is driven by property crime (namely larceny and motor vehicle theft), while violent crime remained unaffected. Exploring potential mechanisms, we show that the increase in crime could be explained by the positive effect of IHS on local economic development. At the same time, we find that increases in the local law enforcement size and presence in the affected communities mitigated any substantial crime surge induced by the highway construction.

JEL Classification: H54, K42, O18

Keywords: Interstate Highway System, local crime, economic development, local law enforcement

Corresponding author:
Francesca Calamunci
Department of Economics and Law
Sapienza University
Via del Castro Laurenziano 9
00161 Rome
Italy

E-mail: francescamaria.calamunci@uniroma1.it

* We are thankful to Francesco Drago, Paolo Pinotti, Michele Di Maio, Osea Giuntella, Gianmarco Daniele, Shanker Satyanath and Marco Le Moglie for their comments and insightful suggestions. We are grateful to seminar attendants at Bocconi University, University of Catania, Sapienza University, University of Economics in Bratislava, the 13th Petralia Workshop, and the 48th Annual Conference of the Eastern Economic Association. We gratefully acknowledge the Einaudi Institute for Economics and Finance (EIEF) for their financial support. Any conclusions are authors' own.

1 Introduction

The United States experienced a significant surge in criminal activity in the second half of the twentieth century. Between 1960-1980, property crime rate more than tripled before levelling off in the 1980s. Violent crime rate continued to climb even into the 1980s, eventually reaching its all-time peak in 1991 (Figure 1). On the whole, violent crime rate increased almost fivefold between 1960-1991.[1] This crime wave, referred to as the great American crime rise, was largely indiscriminate – affecting all types of communities and all regions of the country (O'Flaherty and Sethi, 2015). While the subsequent crime decline of the 1990s and 2000s has been extensively studied in the literature (Levitt, 2004; Zimring, 2007; Blumstein and Wallman, 2006a), the causes of the great American crime rise remain largely unknown (O'Flaherty and Sethi, 2015). This paper focuses on the construction of the Interstate Highway System (IHS) as a potential driving force behind this phenomenon.

The Interstate Highway System – with its 46,876 miles of highways built primarily between 1956 and 1992 (Federal Highway Administration, 2021) – is the largest public works project in US history (Nall, 2015) and the second largest highway network in the world.[2] As postulated by O'Flaherty and Sethi (2015), the IHS could have increased criminals' mobility and productivity, with no or minimal corresponding productivity increases among the local law enforcement agencies. Moreover, by boosting local economic development (Michaels, 2008; Chandra and Thompson, 2000), the Interstate Highway System could have opened new areas to crime as criminal opportunities increased (Freedman and Owens, 2016; Dix-Carneiro, Soares and Ulyssea, 2018) and individuals and their property became exposed to a higher risk of victimization (Cantor and Land, 1985). Finally, the IHS construction increased lead exposure in affected communities, as driving proliferated after the World War II and lead concentration in gasoline sharply increased in the 1960s (Reuben, Elliott and Caspi, 2020).[3] Given the established link between *in utero* and childhood exposure to lead and violent criminal activity in the adulthood (Gronqvist, Nilsson and Robling, 2020; Feigenbaum and Muller, 2016), the IHS could have also contributed to the continued rise in violent crime throughout

[1] From 160.9 in 1960 to 758.1 in 1991. The crime rate is measured per 100,000 population (source: FBI's Uniform Crime Reporting (UCR) Program).

[2] In 2010, the IHS was surpassed in total length by China's National Trunk Highway System (He, Xie and Zhang, 2020; Rodrigue, 2020).

[3] Although lead concentration in gasoline began to dwindle in the 1970s, it was not until 1996 that the leaded gasoline was formally banned by the Environmental Protection Agency (EPA, 1996).

the 1980s – at the time when the property crime was already plateauing (Figure 1).

In this paper, we evaluate the impact of the Interstate Highway System construction on local crime in US communities by exploiting a staggered rollout design as the highways were successively introduced into new counties across the country. More specifically, using a county-by-year panel dataset that spans all 3,135 US counties between 1960-1993,[4] we employ a difference-in-differences estimation strategy with staggered treatment adoption, which compares counties where an interstate highway opened with those where it did not, before and after the introduction of the highway infrastructure. The strategy relies on the assumption of parallel pre-trends between treated and untreated counties, which we successfully test for using an event study design. In addition, given that the Interstate Highway System is a federal project funded primarily by the federal government,[5] and whose plans date back to the late 1930s (Federal Highway Administration, 2021), the existence of any contemporaneous shocks that could have affected crime in the untreated counties is very unlikely.

Our results indicate that opening of an interstate highway in a county increased total index crime rate by 5.1%. This effect is driven by property crime (5.5%) while violent crime remained unaffected. Considering the individual index crimes reported by the FBI's Uniform Crime Reporting program, we find that the surge in local crime was due to an increased incidence of motor vehicle theft (7.7%) and theft/larceny (6.7%). Next, we focus on the sub-period of 1960-1980, which was characterized by the most pronounced rise in aggregate crime (Fig. 1), coupled with the construction of the majority of interstate highways (Michaels, 2008). We observe a 6.1% increase in burglary rate and a 5.8% rise in robbery rate, in addition to the rise in motor vehicle theft (8.7%) and larceny (4.8%). Finally, our design enables the evaluation of the effect of highways on local drug-related and driving under the influence (DUI) arrests, although due to data constraints, the period of analysis is limited to 1974-1993. We find virtually no effect across a range of variables, including total drug-related arrests, DUI arrests, arrests for drug possession vs sale/manufacturing, as well as a detailed arrest breakdown by the drug type.

[4] The panel is unbalanced as not all local law enforcement agencies reported their crime statistics to the FBI in each year. The agency-level crime data was aggregated to the county level by Jacob Kaplan (see Data section for more information). 1960 is the first year for each UCR county-level crime data is available. 1993 is the last year for which we have data on IHS construction (Baum-Snow, 2007)

[5] Federal government paid 90% of the cost of the project with states contributing the remaining 10%. In the western States with large amounts of untaxed public land, the Federal share could be increased to 95% (Federal Highway Administration, 2021).

Our findings are robust to a battery of robustness checks, such as the inclusion of county-specific linear time trends, the use of the inverse hyperbolic sine transformation of the dependent variables, and the elimination of potential outliers from the sample. Moreover, we obtain consistent results when implementing an alternative dynamic estimator developed by Sun and Abraham (2020), which is robust to any treatment effects heterogeneity. The validity of our main estimates is further supported by the results from a propensity score matching analysis as well as a series of random inference placebo tests.

Next, we investigate two of the mechanisms through which the Interstate Highway System could have affected local crime. First, we show that the estimated effect on crime could be explained by the positive impact of the IHS on local economic development. In particular, we find that a highway opening in a county led to a 2.1% increase in the share of working population. This effect is driven solely by a 6.4% rise in employment in the manufacturing sector. Furthermore, we show that highways increased the density of business establishments[6] (4.6%) as well as the average firm size (2.1%) in the affected counties. Second, we study the responses of the local law enforcement to the highway opening in the county. More specifically, we evaluate how the Interstate Highway System affected the size of the local police force as well as its presence in the community. We find that a highway opening induced a 5.6% increase in the the number of police officers per 10,000 county population. In addition, the police presence in the affected counties intensified, as patrolling activities rose by 2.5%.[7] As expected, the increased patrolling was due to extra vehicular patrols per officer (3.1%), while foot patrols remained unaffected. Previous studies have established a clear negative causal effect of police size (Levitt, 2002; Evans and Owends, 2007) and presence (Di Tella and Schargrodsky, 2004; Draca et al., 2011) on local index crime, especially violent crime (Chalfin and McCrary, 2018). Given our modest estimates on crime, it appears likely that the responses of the local law enforcement did in fact mitigate any substantial surge in criminal activity induced by the highway opening.

Our paper contributes to the existing literature in three key areas. First, we add to the literature studying the big swings in the US crime throughout the second half of the twentieth century and into the twenty-first century. The vast majority of studies focus on explaining the great American

[6]Measured as the number of business establishments per 100 km^2.

[7]Captured by the number of patrols per officer.

crime decline of the 1990s (Levitt, 2004; Zimring, 2007; Blumstein and Wallman, 2006a,b; Reyes, 2007), and to lesser degree also the subsequent modest crime decline of the twenty-first century (O'Flaherty and Sethi, 2015; Marcotte and Markowitz, 2011). The four traditional variables – the size of the police force, demographic changes, the size of the prison population, and the macroeconomic performance – do not explain all or even most of this crime drop (Levitt, 2004; O'Flaherty and Sethi, 2015). Instead, scholars have proposed and tested a variety of non-traditional factors, such as the end of the crack epidemic (Blumstein and Wallman, 2006a; Levitt, 2004), police productivity (Zimring, 2011), phasing out of leaded gasoline (Reyes, 2007), psychopharmaceuticals (Marcotte and Markowitz, 2011; Cuellar and Markowitz, 2007), and the rise of private protection (Cook and MacDonald, 2011; Helsley and Strange, 1999; Lee and Wilson, 2013).

In contrast to the literature on the great American crime decline of the 1990s, studies of the causes of the great American crime rise of the 1960s and 1970s are very limited (O'Flaherty and Sethi, 2015). According to O'Flaherty and Sethi (2015), the four traditional variables fail to explain any meaningful share of the log point change in the aggregate violent or property crime rates in the US between 1965-1975.[8] Miron (1999) suggests the surge in violent crime was caused by President Nixon's War on Drugs – declared in 1971 – though his argument has not been widely accepted (O'Flaherty and Sethi, 2015). We consider a unique factor that could help explain this nationwide crime surge – the construction of the Interstate Highway System – arguably the largest public works project in US history (Nall, 2015; Federal Highway Administration, 1999).

Second, we contribute to the literature evaluating the impact of the Interstate Highway System construction on local communities. Previous studies have shown a positive effect of IHS opening on local economic activity in general (Chandra and Thompson, 2000), and trade-related activities in particular (Michaels, 2008; Keeler and Ying, 1988). In fact, as Jaworski, Kitchens and Nigai (2020) estimate, removing the IHS would reduce real GDP by $619.1 billion (3.9%) with one quarter due to reduced international market access. Other papers have explored the population dynamics brought on by the IHS construction. Baum-Snow (2007) argues that highways fueled the suburbanization of American cities, with one-third of this effect attributed to the reduced quality of life in central city areas (Brinkman and Lin, 2022). To the best of our knowledge, we are the first to estimate

[8]See Table 23.7 in O'Flaherty and Sethi (2015).

the causal impact of the Interstate Highway System construction on local crime.[9] Furthermore, we unpack this relationship by exploring the effect on individual index crimes (both violent and property crimes).

Finally, we also add to the literature studying the impact of infrastructure construction in general on local crime and delinquent behavior. While a number of studies have explored the effects of infrastructure construction on local economic outcomes (Faber, 2014; Donaldson, 2018; Banerjee, Duflo and Qian, 2020; Lindgren, Pettersson-Lidbom and Tyrefors, 2021; He, Xie and Zhang, 2020; Chandra and Thompson, 2000; Michaels, 2008), fewer papers have considered the impact on local crime (Montolio, 2018; Agnew, 2020; Baires, Dinarte and Schmidt-Padilla, 2020). We contribute to this emerging literature on infrastructure and crime by studying one of the unintended consequences of the second largest highway network in the world.

The rest of the paper is organized as follows: Section 2 discusses background and related literature. Section 3 presents the conceptual framework. In Section 4, we describe the data, empirical specification, and the identification strategy. Results are presented in Section 5. Section 6 discusses further threats to identification, while Section 7 presents the discussion of potential mechanisms. Section 8 then concludes the paper.

2 Background and previous work

2.1 History of the Interstate Highway System

The Interstate Highway System (IHS) – with 46,876 miles of highways built as of 2021 (Federal Highway Administration, 2021) – is arguably the largest public works project in the US history (Nall, 2015; Federal Highway Administration, 1999). The final cost estimate in 1991 put the overall price tag at around \$128.9 billion (or 2.1% of the total US GDP in 1991), with federal funds accounting for \$114.3 billion of this sum (Federal Highway Administration, 2021).[10] For a long time, the IHS was unmatched in size and scope by any other highway network in the world. In fact, it was not until 2010 that that the IHS was surpassed in total length by China's National Trunk

[9] Two correlational studies in criminology have also explored the relationship between the Interstate Highway System and local crime. Each of them focuses only on a single US state (McCutcheon et al., 2016; Martin, 1995).

[10] This estimate covers only the 42,795 miles built under the Interstate Construction Program. Turnpikes incorporated into the IHS as well as other logical additions and connections financed without Interstate Construction funds are excluded (Federal Highway Administration, 2021).

Highway System (He, Xie and Zhang, 2020; Rodrigue, 2020).

The history of the IHS planning goes back to the late 1930s, when President Roosevelt instructed the U.S. Bureau of Public Roads to look into the feasibility of building toll superhighways across the continental US (Federal Highway Administration, 2021). In 1941, Roosevelt then appointed the National Interregional Highway Committee which in its 1944 report to the US Congress laid out concrete plans for the so-called National System of Interstate and Defense Highways. This was authorized as a provision of the Federal-Aid Highway Act of 1944, *de facto* establishing the plans for the future Interstate Highway System (Gifford, 1984; Turner, 1972). However, it was not until the passage of the Federal-Aid Highway Act of 1956 and the Federal-Aid Revenue Act of 1956 that the actual funding and logistics for the project were secured and construction could finally begin. Thus, it is President Eisenhower (1953-1961) who is generally considered the "Father of the Interstate System" (Federal Highway Administration, 2021; Turner, 1972).[11]

Initial spatial planning of the IHS took into considerations a number of factors, namely the location of military and naval establishments, the nationwide distribution of population, agricultural production and manufacturing activity, the location of post-World War II employment, and the interregional traffic demand (U.S. House of Representatives, 1944). By 1956, national defense became one of the main driving motives behind the IHS construction. Highways were seen as a key strategic infrastructure necessary to facilitate any emergency military deployments across the country (U.S. Congress, 1949; Curtiss, 1955). However, just as important were the needs to connect principal metropolitan areas, cities, and industrial centers, as well as to connect with routes of continental importance in Canada and Mexico (U.S. House of Representatives, 1944; Michaels, 2008) The early authorization of 37,324 miles was extended to 41,000 in 1956. These roads were to be built according to the federal interstate standards, such as minimum design speed of 70 mph (113 km/h) except in urban and mountainous areas, all access onto and off the highway controlled with interchanges and grade separations, minimum of two lanes in each direction (each 12 feet wide), a 10-foot right paved shoulder, a 4-foot left paved shoulder, and 16 feet of vertical clearance (to accommodate most military vehicles) (AASHTO, 2001, 2005).

The bulk of the Interstate Highway System was built between 1956-1975 (Michaels, 2008). In

[11] Hence the official name of the IHS – the Dwight D. Eisenhower National System of Interstate and Defense Highways (Federal Highway Administration, 2021).

1992, the IHS was declared complete although some construction continued throughout the 1990s and 2000s (McNichol, 2006). Today, the 46,876 miles of interstate highways remain an essential component of US transportation. In 2019, the IHS carried 26% of annual vehicle-miles of travel despite comprising only 1.2% of national road mileage (Federal Highway Administration, 2019).

2.2 Trends in U.S. crime

Since World War II, the US has witnessed periods in which all major index crimes moved up and down together (Figures 1 and 2). The determinants of these so-called big swings in American crime are still relatively unknown, as many of the proposed explanations have not been supported by empirical evidence (O'Flaherty and Sethi, 2015). The most extensively studied period is the great American crime decline of the 1990s, which was followed by the modest crime decline of the twenty-first century (Zimring, 2007; Levitt, 2004; Marcotte and Markowitz, 2011; Blumstein and Wallman, 2006a,b). During the 1990s, aggregate violent crime rate in the US dropped by 33% while the property crime rate decreased by 30%. The most pronounced decline was observed for robbery (-47%), murder (-44%), and burglary (-42%), though all the other individual index crimes decreased as well.[12] Four traditional factors have been proposed to explain this crime drop: the size of the police force (Chalfin and McCrary, 2018; Eck and Maguire, 2000), the size of the prison population (Levitt, 1996; Donohue, 2009), changing age composition of the population (Zimring, 2007; O'Brien, 1989), and macroeconomic performance (Freeman, 2001; Gould, Weinberg and Mustard, 2002). However, on the whole, these variables together do not explain all or even most of the crime decline during the 1990s (Levitt, 2004; O'Flaherty and Sethi, 2015).

Thus, a variety of so-called "non-traditional" factors have been proposed in the literature, including, but not limited to: the end of the crack epidemic (Blumstein and Wallman, 2006a; Levitt, 2004), legalization of abortion in 1973 (Donohue and Levitt, 2001), police productivity (Zimring, 2007), phasing out of leaded gasoline in the 1970s and 1980s (Reyes, 2007), psychopharmaceuticals (Marcotte and Markowitz, 2011; Cuellar and Markowitz, 2007), the rise of private protection (Cook and MacDonald, 2011; Helsley and Strange, 1999; Lee and Wilson, 2013), and electronic banking (Wright et al., 2017). While some of these factors appear to have merit, others lack any credible

[12] Authors' calculations based on the aggregate UCR data obtained from the Sourcebook of criminal justice statistics Online.

empirical evidence to support them.

Although the causes of the great American crime decline of the 1990s have been explored in a considerable detail, relatively little is known about the reasons behind the great American crime rise of the 1960s and 1970s (O'Flaherty and Sethi, 2015). Between 1960-1980, the property crime rate increased by 210% before leveling off during the 1980s. Violent crime, on the other hand, continued to climb even throughout the 1980s, eventually reaching its all-time peak in 1991. Overall, the violent crime rate increased by 371% between 1960-1991.[13] While some of this crime surge can be attributed to improved crime reporting and more reliable data collection, these factors still cannot explain most of the crime increase observed during this period. The four traditional variables also fail to explain any meaningful part of this crime rise (O'Flaherty and Sethi, 2015). Miron (1999) suggests that President Nixon's War on Drugs – declared in 1971 – played a major role, but the argument has not gained much traction. Other potential factors behind this phenomenon – none of which have been rigorously examined – include the increased lead content in gasoline coupled with a general uptake in driving after World War II,[14] the expansion of air travel, Vietnam War draft lottery and its role in reducing the deterrent effect of prisons, and the impact of the race-related riots of the 1960s (O'Flaherty and Sethi, 2015). The construction of the Interstate Highway System – another potential explanation put forward by O'Flaherty and Sethi (2015) – is indeed the subject of this paper.

2.3 Interstate Highway Construction and local communities

A number of studies have explored the effects of Interstate Highway System on local communities. Estimating the impact of IHS on suburbanization, Baum-Snow (2007) finds that, in the absence of the IHS, the aggregate central city population would have grown by roughly 8 percent between 1950 and 1990. Instead, the observed central city population declined by 17 percent, despite the 72 percent population growth in the metropolitan areas as a whole. As suggested by Brinkman and Lin (2022), one-third of this effect can be attributed to the reduced quality of life,

[13] Authors' calculations based on the aggregate UCR data obtained from the Sourcebook of criminal justice statistics Online.

[14] After World War II, the lead concentration in gasoline steadily increased until the EPA-imposed restrictions in 1973, which eventually led to the complete phaseout of leaded gasoline in 1995 (Oudijk, 2010; Reuben, Elliott and Caspi, 2020).

especially through barrier effects.[15] In a case study of the city of Detroit, Carter (2019) similarly finds that highway construction led to a decline in population density (as well as the percentage of Black residents) in the affected neighborhoods. The property values were also negatively affected both in the short- and the long-run.

A handful of papers have also considered the impact of Interstate Highway System on trade and economic outcomes. Using a multisector general equilibrium model of interregional and international trade between US counties and many countries, Jaworski, Kitchens and Nigai (2020) show that removing the IHS would reduce real GDP by $619.1 billion (3.9%) with one quarter due to reduced international market access. Consistent with this result, Michaels (2008) finds that counties connected by the highway network experienced an increase in trade-related activities, such as trucking and retail sales, which raised the relative demand for skilled manufacturing workers in skill-abundant counties and reduced it elsewhere.[16] Chandra and Thompson (2000) further argue that highway construction had a differential local impact across industries, with some growing due to reduced transportation costs, while others shrinking as the economic activity relocated. On the whole, they posit the highways affected the spatial allocation of economic activity by raising the level of economic activity in the counties they pass through, while simultaneously drawing activity away from the adjacent counties. In the context of these findings, we are the first to causally estimate the impact of the Interstate Highway System construction on local crime.

2.4 The effects of infrastructure on local outcomes

More generally, previous literature has explored the impact of infrastructure projects on local outcomes, focusing primarily on the local economic development. Studying China's National Trunk Highway System, Faber (2014) finds that network connections led to a reduction in GDP growth (driven by the reduction in industrial output growth) among non-targeted peripheral counties. He, Xie and Zhang (2020) further argue that the highway system helped poor rural counties grow faster in GDP while slowing down growth in the rich rural counties, compared to the unconnected rural counties. The literature on the economic effects of infrastructure has not been limited to studying road networks. Donaldson (2018) shows that railroad construction in colonial India led to increased

[15] Increases in the cost of travel between neighborhoods severed by a highway/freeway.

[16] Higher productivity growth in trucking is also found in Keeler and Ying (1988).

interregional and international trade as well as higher real income levels. Similarly, Lindgren, Pettersson-Lidbom and Tyrefors (2021) find that historical railway construction in Sweden had a large positive effect on real nonagricultural income. Authors attribute this finding to economic growth rather than a reorganization of existing economic activity. Finally, considering the impact of access to transportation infrastructure in general, Banerjee, Duflo and Qian (2020) find that China's counties with close proximity to the transportation networks had higher per capita GDP levels across sectors in 1986-2006, although the effect is not large and there was no observable difference in the per capita GDP growth rates.

There is also a recent and still relative scant literature on the effects of infrastructure projects on local crime. Highway construction has been shown to increase gang-related crimes (e.g. homicides, extortions) in El Salvador (Baires, Dinarte and Schmidt-Padilla, 2020) as well as burglary rates in Ireland (Agnew, 2020). Montolio (2018) further considers the impact of a nationwide infrasructure investment policy on local crime rates in Spain. He finds that through its effect on unemployment rates, the policy managed to substantially reduce crime and reoffending rate in the short run. We contribute to this nascent literature by exploring the crime effect of the construction of the world's second largest highway system in existence.

3 Conceptual framework

The effect of Interstate Highway System on local crime is *ex ante* ambiguous. On one hand, as Agnew (2020) argues, highways can increase the mobility and productivity of criminals, providing them with the least-cost path that connects far away locations through high-speed limits and a lack of traffic barriers. This decreases the time offender is in transit and provides them with a quick escape option and the possibility to commit several offences in a short time (Agnew, 2020). IHS also facilitates predatory crime by bringing together persons who are unknown to one another. That is, the restaurants, hotels, gas stations, and rest areas that dot the interstate highways are places that bring together large numbers of potential offenders and victims who are mostly unknown to each other (Strand, 2012).

Interstate Highway System construction can also spur local economic development (Michaels, 2008; Chandra and Thompson, 2000) which increases the amount of "thievable" property available, thus leading to more criminal opportunities in the affected communities (Freedman and Owens, 2016; Dix-Carneiro, Soares and Ulyssea, 2018). Similarly, higher employment can lead to a decreased concentration of sustenance and leisure activities within primary-group locations (residences, neighborhoods), thus exposing individuals and their property to a higher risk of victimization (Cantor and Land, 1985). Finally, IHS construction along with a surge in driving after the World War II increased exposure to atmospheric lead, as leaded gasoline was not banned until 1996. Previous research has identified a clear link between *in utero* and childhood exposure to lead and violent criminal behavior in the adulthood (Gronqvist, Nilsson and Robling, 2020; Feigenbaum and Muller, 2016; Reyes, 2007).

The Interstate Highway System could also have an inverse relationship with local crime. In particular, as documented in the previous literature, improved wages and employment prospects increase individual's opportunity cost of committing crime, thus reducing their propensity to participate in the criminal labor market (Gould, Weinberg and Mustard, 2002; Fougère, Kramarz and Pouget, 2009; Lin, 2008). Another reason for a negative relationship could be a change in the behavior of the local law enforcement. More precisely, local police departments might respond – proactively or reactively – to a highway opening by increasing in size and boosting their presence in the affected communities. Studies have shown that larger police force reduces local crime (Levitt, 2002; Evans and Owends, 2007). As Chalfin and McCrary (2018) further argue, the effect is larger for violent crime than property crime, given the difference in estimated police elasticities (-0.12 for violent crime vs. -0.07 for property crime). Heightened police presence has also been found to reduce crime (Di Tella and Schargrodsky, 2004; Draca et al., 2011), with the implied elasticity with respect to the total crime between -0.3 and -0.5 (O'Flaherty and Sethi, 2015).

4 Data and empirical strategy

4.1 Data

The dataset used in the analysis is an unbalanced county-by-year panel which spans all 3,131 US counties from 1960 until 1993.[17] 1960 is the first year for which agency-level data[18] from the

[17]We employ the 1990 US county classification.
[18]Which are then aggregated to the county level.

FBI's Uniform Crime Reporting Program is available. 1993 is the last year available in Baum-Snow (2007)'s Interstate Highway System dataset. Our panel dataset thus combines several data sources. First, we use data from Baum-Snow (2007) to identify each opening of an interstate highway in a US county during the 1960-1993 period. The evolution of the construction of the Interstate Highway System in each decade during this period is depicted in Figure 4. We combine the Baum-Snow (2007)'s data with the county-by-year panel dataset compiled by Kaplan (2021b) based on the FBI's Uniform Crime Reporting Program (UCR): Offenses Known and Clearances by Arrest, 1960-2019, dataset. This database contains a detailed breakdown of the incidence of all UCR Part I index crimes, that this, the property crimes burglary (breaking or entering), larceny-theft, motor vehicle theft, and the violent crimes murder, aggravated assault, robbery, and forcible rape.[19] We do make a couple of minor adjustments with respect to the official definition of the Part I index crimes. In particular, we consider homicide instead of murder (due to the latter occurring too infrequently on the county level). Homicide is the act of killing of one human being by another human being, which may or may not be legal. Murder, on the other hand, is the act of one human being unlawfully killing another human being. Homicide is also more appropriate in our context, as it will capture any occurrence of vehicular manslaughter – homicide caused by one's unlawful or negligent operation of a motor vehicle – that might be directly induced by highway construction.[20] Similarly, we also use the more encompassing total assault, as opposed to just the aggravated assault. The UCR Part I index crimes are further supplemented with the data from the FBI's Uniform Crime Reporting (UCR) Program Data: Arrests by Age, Sex, and Race, 1974-2016, compiled by Kaplan (2018), which enable the analysis of drug-related and driving under the influence (DUI) arrests, albeit for the limit period of 1974-1993.

For the study of potential mechanisms, we merge in county-level data from the FBI's Uniform Crime Reporting Program: Law Enforcement Officers Killed and Assaulted (LEOKA), 1960-2019. This database – compiled by Kaplan (2021a) – contains information about the size of the local law enforcement agencies. Moreover, it enables the analysis of the number of patrols per officer, which captures the intensity of the police presence in local communities. Finally, we add data from the U.S. Census Bureau's County Business Patterns (CBP), 1964-1993, which contains various measures

[19]Source: FBI, UCR: Crime in the United States, 2011. Since 1979, Part I index crimes also include arson, but its occurrence is rare and detection uncertain (O'Flaherty and Sethi, 2015), thus we exclude it from the analysis.

[20]Source: Cornell Law School, Legal Information Institute, Wex.

of local economic performance. The CBP data is obtained from the University of Minnesota's Integrated Public Use Micro Data Series (IPUMS): National Historical Geographic Information System (Manson et al., 2022). We further supplement the IPUMS extract with the data on county-level employment and sectoral employment, which was recently compiled in Eckert et al. (2022a) and Eckert et al. (2022b). Table 1 reports descriptive statistics for main variables used in the empirical analysis.

4.2 Difference-in-differences with staggered treatment adoption

To empirically investigate the impact of the Interstate Highway System's construction on local crime in the US, we take advantage of the data's panel structure and estimate the following difference-in-differences fixed effects specification with staggered treatment adoption:

$$Ln\ (crime\ rate)_{i,t} = \alpha_i + \beta_1 Any\ highway_{i,t} + \beta_2 X_{i,t} + \gamma_t + \theta_{s,t} + \Phi_c t + \varepsilon_{i,t} \tag{1}$$

where $Ln\ (crime\ rate)_{i,t}$ is the natural logarithm of the total # of UCR Part I index crimes per 100,000 population in county i and year t. $Any\ highway_{i,t}$ is the indicator variable equal to 1 when $t \geq E_i$, where E_i is the year when county i registered the opening of at least 1 mile of interstate highway. Eq. (1) further controls for population density ($X_{i,t}$), county fixed effects (α_i), year fixed effects (γ_t), state-by-year fixed effects ($\theta_{s,t}$), and commuting zone-specific[21] linear time trends ($\Phi_c t$). State-by-year fixed effects control for any state-level policy changes and other year-shocks that affect equally all counties within the same state. Commuting zone time trends capture any linear changes to the local labor markets. $\varepsilon_{i,t}$ is the error term, clustered at the county level. Observations are weighted by the average 1960-1993 county population. The total crime rate is then broken down into property crime rate (incl. burglary, motor vehicle theft, larceny) and violent crime rate (incl. assault, robbery, homicide, rape). We further split these two categories into seven individual crime rates to understand which specific crimes drive the main result. Lastly, we can also evaluate the impact of highway construction on drug-related arrests (total, possession, sale/manufacturing) as well as alcohol-related arrests (total, DUI),[22] although the arrest data is only available from 1974

[21] Commuting zones are essentially county groupings which approximate local US labor markets (Autor and Dorn, 2013).

[22] DUI refers to the Driving under the influence offense.

onwards.

The coefficient of interest – β_1 – captures the (plausibly) causal effect of Interstate Highway System opening on county crime, conditional on the set of covariates $(X_{i,t}, \alpha_i, \gamma_t, \theta_{s,t}, \Phi_c t)$. The identifying assumption relies on the absence of contemporaneous shocks that would affect crime in the control counties. Given that the Interstate Highway System is a federal project primarily funded by the federal government, and whose plans date back to the late 1930s (Federal Highway Administration, 2021), the existence of such shocks is arguably very unlikely. Another threat to the identification are differential pre-trends between the treated and control counties. To address this concern, we estimate a traditional event study design which takes the same form as eq. (1), except $\textit{Any highway}_{i,t}$ is now replaced by a set of lags and leads for each year before and after the IHS opening. The year before the IHS opening is the reference year. In addition to testing the parallel pre-trends assumption, the event study specification also allows the investigation of the dynamic evolution of the highway treatment effect.

5 Results

We begin the presentation of the results by showing the event study estimates. Figures 5, 6, and 7 display the dynamic specification of eq. (1) with confidence intervals at 90 and 95 percent levels, respectively. The pre-highway opening estimates validate our parallel pre-trends assumption, while the post-opening estimates suggest a modest increase in property crime driven by a rise in the incidence of theft/larceny (Figures 5 and 6). Turning to the difference-in-differences estimates (eq. 1), we find that the opening of an interstate highway in a county led to a 5.1% increase in the total index crime rate (Table 2, col. 3). Consistent with the event study figures, this result is driven by a 5.5% rise in the property crime rate (Table 3, Panel A, col. 3), while we observe virtually no increase in the violent crime rate (Table 3, Panel B, col. 3). Breaking these down into individual index crimes, we find that the IHS opening induced a 7.7% increase in motor vehicle theft alongside a 6.7% increase in theft/larceny. The estimation results are robust to the use of the inverse hyperbolic sine transformation of the dependent variables (Table A.1), as well as the elimination of the potential outliers – the counties in the top and bottom 1% of the population distribution (Table A.2). Moreover, controlling for the more restrictive and computationally demanding county-specific linear time trends – instead of the commuting zone trends – does not substantially alter the results (Table A.3). Another concern could be the vastly different county area sizes across the United States. Reassuringly, as shown in Table A.4, the difference-in-differences estimates are similar in counties both above and below the median county area.

Next, we explore the effects of the Interstate Highway System construction on crime during the sub-period 1960-1980. These years were characterized by the most prominent rise in the aggregate index crime (Figure 1), coupled with the construction of the bulk of interstate highways (Figure 4). Table 5 presents the results. Consistent with the main analysis, we observe a 4.7% increase in the total index crime rate, driven by a 5.1% rise in the property crime rate (Table 5, cols. 1 and 2). Interestingly, the individual crimes positively affected by the highway construction now include burglary (6.1%) and robbery (5.8%), in addition to motor vehicle theft (8.7%) and theft/larceny (4.8%) – the two crimes identified in the full sample analysis.

Finally, our research design enables the examination of the Interstate Highway System's impact on local drug-related and driving under the influence (DUI) arrests, although the available data limits the period of study to 1974-1993. As shown in Table A.5, we do not find a relationship between IHS opening and county-level drug-related or DUI arrests (Table A.5, cols. 1 and 4). The same holds true when considering arrests separately for drug sale/manufacturing (Table A.5, col. 2) and drug possession (Table A.5, col. 3). There is also no effect heterogeneity with respect to the drug type, as depicted in Table A.6. Nevertheless, given the limited period under study, these null results need to be interpreted with caution.

6 Threats to identification and further robustness checks

6.1 Alternative estimator

Difference-in-differences estimation with staggered treatment timing could suffer from a bias if there are heterogeneous treatment effects over time, since the main estimate is the weighted sum of average treatment effects (ATEs) in each group and time period. In particular, as de Chaisemartin and D'Haultfoeuille (2020) point out, some ATEs may be given negative weights, which might cause the difference-in-differences estimate to have a different sign than all the ATEs. In the dynamic estimation setting, similar issues arise since the coefficient on certain lags and leads might be skewed by influences from previous periods (Sun and Abraham, 2020). In recent years, several alternatives difference-in-differences estimation techniques have been developed to overcome this issue (Sun and Abraham, 2020; de Chaisemartin and D'Haultfoeuille, 2020; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021). Given the complexity of our setup – namely the large number of fixed effects – we implement the interaction-weighted (IW) estimator developed by Sun and Abraham (2020). The estimator is based on three steps: first, it estimates the lags and leads in the event study specification, but with separate coefficient for each "cohort".[23] Then, it estimates the weights by sample shares of each cohort in the relative period(s). Finally, the IW estimator is derived as the weighted average of estimates across cohorts (from step 1) with weight estimates from step 2. In our setting, we use the never-treated group as the control group.[24]

Figures A.1, A.2, and A.3 depict the estimates from the event study specification. Compared to the standard TWFE event study estimates (Figs. 5, 6, and 7), we observe a more pronounced rise in the total index crime driven by property crime, although violent crime also appears affected in the initial periods after the highway opening (Figure A.1). Among the property crimes, larceny increases immediately while motor vehicle theft and burglary experience an upward trend following the opening (Figure A.2). The only violent crime that exhibits a clear increase is assault, although the effect is limited to the initial four periods (Figure A.3). Turning to the static IW estimates, we find that the total index crime increases by 2.5% (Table A.7, col. 1), which is about a half of the original estimate in Table 2. The estimates for property crime (3%) and larceny (4.5%) also decline in magnitude, while the motor vehicle theft becomes statistically insignificant (Table A.7, cols. 2, 5, and 6). On the other hand, the highway opening now leads to a 2% rise in burglary rate as well as a 3.8% increase in assault rate (Table A.7, cols. 4 and 7), both of which were not found to be statistically significant before.

6.2 Matching strategy

Next, in order to select a "better" control group, we use propensity score matching techniques to match treated and untreated counties according to a set of pre-period 1940 characteristics. The 1940

[23] A cohort is comprised with units (counties) with the same timing of the treatment.

[24] Due to computational limits, we do not include the commuting zone linear time trends in the estimation, as that would make the variance matrix highly singular.

data was obtained from the IPUMS: National Historical Geographic Information System (Manson et al., 2022). In each case, we estimate a probit model with the dependent variable equal to 1 if the county acquires a highway and 0 otherwise. The following matching techniques are applied: (1) one-to-one matching which links each treated county to its nearest neighbor in terms of the propensity score; (2) matching each treated county to five nearest neighbors; (3) Kernel matching. The underlying characteristics include: county area, birth rate (per 1,000 population), share of white population, share of African-American population, median years of schooling (separately by gender), and unemployment rate (separately by race). Table A.8 shows the matching quality for each variable and method. In all cases, the mean difference between treated and control groups is not statistically significant (Table A.8, cols. 5 and 6). Furthermore, as suggested by Rosenbaum and Rubin (1985), we report the standardized bias (Table A.8, col. 4), defined as the mean difference expressed as a percentage of the square root of the average of the sample variances in both groups. According to Caliendo and Kopeinig (2008), a standardized bias of 5% is considered a good cutoff point to determine whether the matching operation was successful. Out of the three methods used, Kernel matching (Panel C) achieves the best result, with high p-values and low bias (below 5%) for each predicting variable. The results of estimating eq. (1) on the matched samples are depicted in Table A.9. Reassuringly, our main estimates are not sensitive to the implementation of all three matching methods.

6.3 Validity test

Lastly, we present a series of random inference tests in the spirit of Dell and Olken (2020) and Gagliarducci et al. (2020), which aim to check whether the effect of the IHS opening is (likely) causal or due to a random chance alone. To that end, we construct placebo distributions of the treatment effect by randomizing along both the spatial and the temporal dimension of our panel data. More specifically, we carry out the following three exercises, each of which uses 500 permutations: (1) randomization of the year of highway opening while keeping the (un)treated counties unchanged; (2) randomization of the treatment across counties while keeping the timing of the treatment unchanged; (3) randomization of both the timing of treatment and the treatment across counties. Results are shown in Figures A.4, A.5, and A.6. Each histogram represents a placebo distribution for a particular crime outcome that was found statistically significant in the main analysis (Tables

2, 3, and 4). The vertical solid red line represents our DID estimate. The distribution cutoff points for p-values[25] obtained from the random inference test with 500 permutations are reported as black solid lines (p-value of 0.01), dashed lines (p-value of 0.05), and dotted lines (p-value of 0.10), respectively. In all four cases when the timing is randomized, the placebo p-value of the DID estimate is well below 0.01 (Fig. A.4). Similarly, when we randomize both the time and the group treatment, we obtain p-values that are all below 0.05 (Fig. A.6). The treatment group (only) randomization provides the most conservative p-values, although even these are all below 0.10 (Fig. A.5)

7 Potential mechanisms

7.1 Local economic development

One potential mechanism through which the Interstate Highway System likely affected crime is via its effect on local economic development, as improved economic conditions could have increased criminal opportunities (Freedman and Owens, 2016) and exposed individuals and their property to a higher risk of victimization (Cantor and Land, 1985). Previous research has indeed identified a positive relationship between the IHS and some local economic outcomes. Focusing on non-metropolitan counties, Chandra and Thompson (2000) find that the IHS construction raised total earnings by 6%-8% in counties that directly benefited from the infrastructure project. This effect was driven by a 5%-8% earnings growth in services and retail industries. Similarly, Michaels (2008) shows that the IHS raised trucking income and retail sales by 7%-10% per capita in rural counties it crossed, relative to other rural counties. To further supplement these analyses, we employ the 1964-1993 County Business Patterns data compiled from Manson et al. (2022), Eckert et al. (2022a), and Eckert et al. (2022b), and re-estimate eq. (1) on a broad set of economic outcomes.

Results are presented in Table 6. In contrast to the previous studies, we do not observe a positive effect on annual earnings per employee (Table 6, col. 1), although income data is only available in CBP after 1973 and there is no data on sectoral breakdown. On the other hand, we do find some increase in employment induced by the highway construction. In particular, we observe a 2.1% rise

[25]The p-value in this case represents the fraction (%) of the 500 permutations for which the placebo DID estimate landed to the right of a given cutoff point.

in the share of working population (Table 6, col. 2), which appears solely driven by a 6.4% increase in employment in the manufacturing sector (Table A.10, col. 4). In addition to employment, we also evaluate the impact of the interstate highways on firm[26] density and average firm size. While the number of firms per 1,000 population remained largely unaffected (Table 6, col. 3), we do observe a 4.6% rise in the number of firms per 100 km^2 (Table 6, col. 4). Moreover, we estimate a modest 2.1% increase in the average firm size, as measured by the number of employees per firm (Table 6, col. 5). Overall, the combined results on the local economic development could help explain the observed positive impact of the Interstate Highway System on local crime, especially given that the property crimes – as opposed to the violent crimes – are driving this result.

7.2 Police size and presence in local communities

Another mechanism we can evaluate is the impact of the interstate highway construction on the size of the local law enforcement as well as its presences in the affected counties. Law enforcement agencies (LEAs) might respond to an anticipated or observed crime surge by boosting their ranks and increasing their presence in the affected communities. Studies have shown a causal inverse relationship between the size of the police force and index crime (Levitt, 2002; Evans and Owends, 2007). This effect is larger for violent crime than property crime, due to the larger police elasticity of crime for the former (Chalfin and McCrary, 2018). Similarly, it has been shown in the literature that increased police presence reduces crime (Di Tella and Schargrodsky, 2004; Draca et al., 2011), with an implied elasticity of total crime with respect to the police presence of about 0.3-0.5 (O'Flaherty and Sethi, 2015). Therefore, we re-estimate eq. (1) using measures of the size and presence of the local law enforcement as the dependent variables. To that end, we employ data from the 1960-1993 FBI's Uniform Crime Reporting Program: Law Enforcement Officers Killed and Assaulted (LEOKA) database, compiled in (Kaplan, 2021b).

Results are shown in Table 7. First, we observe that local police departments did respond to a highway opening in the county by hiring more officers, as the number of police officers per 10,000 population rose by about 5.6% (Table 7, col. 1). Second, we find a statistically significant – albeit modest in magnitude – increase in police presence in the affected communities. More specifically,

[26] We use the term *firm* interchangeably with the term *business establishment* (used in the County Business Patterns data).

there was a 2.5% increase in the number of patrols per officer following a highway opening (Table 7, col. 2). This surge in patrolling activity can be attributed to an increased intensity of vehicular patrols (3.1%), while foot patrolling remained virtually unaffected (Table 7, cols. 3 and 4). On the whole, our findings suggest a meaningful response of the local law enforcement to the highway construction, which likely mitigated the effect of the infrastructure on local crime. This claim is further supported by the fact that violent crime – generally more responsive to increased police size than property crime – remained unaffected by the highway opening.

8 Conclusion

This paper studies the impact of the Interstate Highway System on local crime in US communities. Using a staggered difference-in-differences design and a panel dataset spanning all 3,135 US counties between 1960-1993, we find that opening of an interstate highway in a county increased local crime rate by 5.1%. This effect is driven by property crime, and in particular, by increased incidence of motor vehicle theft (7.7%) and theft/larceny (6.7%). Focusing on the prime sub-period of 1960-1980, we observe a rise in the rate of burglaries (6.1%) and robberies (5.8%), alongside a higher intensity of motor vehicle theft (8.7%) and larceny (4.8%). Lastly, we do not find an effect of highways on local drug-related and driving under the influence (DUI) arrests, although this analysis is limited to 1974-1993. Exploring potential channels, we first show that the rise in crime could be explained by better local economic development, as highway presence brought about a rise in local employment, firm density, and average firm size. At the same time, local law enforcement agencies responded to the highway construction by boosting their numbers and increasing their presence in the affected communities, hence mitigating any substantial crime rise induced by interstate highways.

All in all, the construction of the Interstate Highway System does not appear to be a significant driving force behind the great American crime rise of the 1960s and 1970s. Better understanding of the underlying causes of this nationwide crime surge is critical and has direct policy implications for present-day US, as the country has – once again – found itself in the midst of a violent crime wave (Graham, 2021; The Economist, 2021). Moreover, given the recent passage of President

Biden's $1.2tn infrastructure bill (Gambino, 2021; Tankersley, 2021),[27] understanding the impact of infrastructure construction in general – and highway building in particular – on local crime and delinquent behavior is crucial in better understanding the potential unintended consequences such policies may entail. This also appears particularly relevant for developing countries, many of which have either recently undertaken or are yet to undertake large-scale highway infrastructure projects. Future research should therefore bring more attention to the case of developing countries, such as China, whose National Trunk Highway System – with more than 111,000 km of expressways – has recently become the world's largest highway network (He, Xie and Zhang, 2020; Rodrigue, 2020).

References

AASHTO, 2001. A Policy on Geometric Design of Highways and Streets, Fourth Edition. Technical Report. American Association of State Highway and Transportation Officials.

AASHTO, 2005. A Policy on Design Standards Interstate System. Technical Report. American Association of State Highway and Transportation Officials.

Agnew, K., 2020. Crime highways: The effect of motorway expansion on burglary rates. Journal of Regional Science , 1–30.

Autor, D.H., Dorn, D., 2013. The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market. American Economic Review 103, 1553–1597.

Baires, W., Dinarte, L., Schmidt-Padilla, C., 2020. Unintended Effects of Roads: Labor, Education and Crime Ooutcomes in El Salvador. Technical Report. Working Paper.

Banerjee, A., Duflo, E., Qian, N., 2020. On the road: Access to transportation infrastructure and economic growth in Chine. Journal of Development Economics 145.

Baum-Snow, N., 2007. Did highways cause suburbanization? The Quarterly Journal of Economics 122, 775–805.

Blumstein, A., Wallman, J., 2006a. The crime drop and beyond. Annual Review of Law and Social Sciences 2, 125–146.

[27] Named the American Jobs Plan (source: The White House).

Blumstein, A., Wallman, J., 2006b. The Crime Drop in America. Revised Edition. Cambridge University Press, New York, NY.

Brinkman, J., Lin, J., 2022. Freeway Revolts! The Quality of Life Effects of Highways. The Review of Economics and Statistics. Forthcoming.

Caliendo, M., Kopeinig, S., 2008. Some practical guidance for the implementation of propensity score matching. Journal of economic surveys 22, 31–72.

Callaway, B., Sant'Anna, P.H., 2021. Difference-in-differences with multiple time periods. Journal of Econometrics 225, 200–230.

Cantor, D., Land, K.C., 1985. Unemployment and Crime Rates in the Post-World War II United States: A Theoretical and Empirical Analysis. American Sociological Review 50, 317–332.

Carter, C.E., 2019. The Road to the Urban Interstates: A Case Study from Detroit. Technical Report. Working Paper.

de Chaisemartin, C., D'Haultfoeuille, X., 2020. Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects. American Economic Review 110, 2964–2996.

Chalfin, A., McCrary, J., 2018. Are U.S. Cities Underpoliced? Theory and Evidence. The Review of Economics and Statistics 100, 167–186.

Chandra, A., Thompson, E., 2000. Does public infrastructure affect economic activity?: Evidence from the rural interstate highway system. Regional Science and Urban Economics 30, 457–490.

Cook, P.J., MacDonald, J., 2011. The Role of Private Action in Controlling Crime, in: Cook, J.P., Ludwig, J., McCrary, J. (Eds.), Controlling Crime: Strategies and Tradeoffs. University of Chicago Press.

Cuellar, A.E., Markowitz, S., 2007. Medicaid policy changes in mental health care and their effect on mental health outcomes. Health Economics, Policy and Law 2, 23–49.

Curtiss, C.D., 1955. The National System of Interstate Highways. The Military Engineer 47, 274–277.

Dell, M., Olken, B.A., 2020. The development effects of the extractive colonial economy: The dutch cultivation system in java. The Review of Economic Studies 87, 164–203.

Di Tella, R., Schargrodsky, E., 2004. Do Police Reduce Crime? Estimates Using the Allocation of Police Forces After a Terrorist Attack. American Economic Review 94, 115–133.

Dix-Carneiro, R., Soares, R.R., Ulyssea, G., 2018. Economic Shocks and Crime: Evidence from the Brazilian Trade Liberalization. American Economic Journal: Applied Economics 10, 158–195.

Donaldson, D., 2018. Railroads of the Raj: Estimating the Impact of Transportation Infrastructure. American Economic Review 108, 899–934.

Donohue, J.J., 2009. Assessing the Relative Benefits of Incarceration: Overall Changes and the Benefits on the Margin, in: Raphael, S., Stoll, M.A. (Eds.), Do Prisons Make Us Safer? The Benefits and Costs of the Prison Boom. Russell Sage Foundation.

Donohue, J.J., Levitt, S.D., 2001. The Impact of Legalized Abortion on Crime. Quarterly Journal of Economics 116, 379–420.

Draca, M., Machin, S., Witt, R., 2011. Panic on the Streets of London: Police, Crime, and the July 2005 Terror Attacks. American Economic Review 101, 2157–2181.

Duranton, G., Morrow, P.M., Turner, M.A., 2014. Roads and Trade: Evidence from the US. Review of Economic Studies 81, 681–724.

Eck, J., Maguire, E., 2000. Have changes in policing reduced violent crime? An assessment of the evidence, in: Blumstein, A., Wallman, J. (Eds.), The Crime Drop in America. Cambridge University Press, New York, NY.

Eckert, F., Fort, T.C., Schott, P.K., Yang, N.J., 2022a. Imputing Missing Values in the US Census Bureau's County Business Patterns. Technical Report. NBER Working Paper No. 26632.

Eckert, F., Lam, K.l., Mian, A.R., Müller, K., Schwalb, R., Sufi, A., 2022b. The Early County Business Pattern Files: 1946-1974. Technical Report. NBER Working Paper No. 30578.

Evans, W.N., Owends, E.G., 2007. COPS and crime. Journal of Public Economics 91, 181–201.

Faber, B., 2014. Trade Integration, Market Size, and Industrialization: Evidence from China's National Trunk Highway System. Review of Economic Studies 81, 1046–1070.

Federal Highway Administration, 1999. Top 10 Construction Achievements of The 20th Century. https://highways.dot.gov/public-roads/julyaugust-1999/top-10-construction-achievements-20th-century. Online; accessed 20 November 2021.

Federal Highway Administration, 2019. Highway Statistics Series: Highway Statistics 2019. https://www.fhwa.dot.gov/policyinformation/statistics/2019/. Online; accessed 22 November 2021.

Federal Highway Administration, 2021. Highway History. https://www.fhwa.dot.gov/interstate/faq.cfm. Online; accessed 20 November 2021.

Feigenbaum, J., Muller, C., 2016. Lead exposure and violent crime in the early twentieth century. Explorations in Economic History 62, 51–86.

Fougère, D., Kramarz, F., Pouget, J., 2009. Youth Unemployment and Crime in France. Journal of the European Economic Association 7, 909–938.

Freedman, M., Owens, E.G., 2016. Your Friends and Neighbors: Localized Economic Development and Criminal Activity. The Review of Economics and Statistics 98, 233–253.

Freeman, R.B., 2001. Does the Booming Economy Help Explain the Fall in Crime? in: Perspectives in Crime and Justice: 1999-2000 Lecture Series, NCJ 184245. National Institute of Justice. Washington, D.C.

Gagliarducci, S., Onorato, M.G., Sobbrio, F., Tabellini, G., 2020. War of the waves: Radio and resistance during world war ii. American Economic Journal: Applied Economics 12, 1–38.

Gambino, L., 2021. 'We're here to deliver': Biden touts infrastructure win as midterms loom. Technical Report. The Guardian.

Gifford, J.L., 1984. The Innovation of the Interstate Highway System. Transportation Research Part A: General 18A, 319–332.

Goodman-Bacon, A., 2021. Difference-in-differences with variation in treatment timing. Journal of Econometrics , Forthcoming.

Gould, E.D., Weinberg, B.A., Mustard, D.B., 2002. Crime Rates and Local Labor Market Opportunities in the United States: 1979-1997. The Review of Economics and Statistics 84, 45–61.

Graham, D.A., 2021. America Is Having a Violence Wave, Not a Crime Wave. Technical Report. The Atlantic.

Gronqvist, H., Nilsson, J.P., Robling, P.O., 2020. Understanding how low levels of early lead exposure affect children's life trajectories. Journal of Political Economy 128, 3376–3433.

He, G., Xie, Y., Zhang, B., 2020. Expressways, GDP, and the environment: The case of China. Journal of Development Economics 145.

Helsley, R.W., Strange, W.C., 1999. Gated Communities and the Economic Geography of Crime. Journal of Urban Economics 46, 80–105.

Jaworski, T., Kitchens, C., Nigai, S., 2020. Highways and Globalization. Technical Report. NBER Working Paper No. 27938.

Kaplan, J., 2018. Uniform Crime Reporting (UCR) Program Data: Arrests by Age, Sex, and Race, 1974-2016. Technical Report. Inter-university Consortium for Political and Social Research [distributor]. Ann Arbor, MI. URL: https://www.openicpsr.org/openicpsr/project/102263/version/V7/view.

Kaplan, J., 2021a. Jacob Kaplan's Concatenated Files: Uniform Crime Reporting Program Data: Law Enforcement Officers Killed and Assaulted (LEOKA), 1960-2019. Technical Report. Inter-university Consortium for Political and Social Research [distributor]. Ann Arbor, MI. URL: https://doi.org/10.3886/E102180V10.

Kaplan, J., 2021b. Jacob Kaplan's Concatenated Files: Uniform Crime Reporting Program Data: Offenses Known and Clearances by Arrest, 1960-2019. Technical Report. Inter-university Consortium for Political and Social Research [distributor]. Ann Arbor, MI. URL: https://doi.org/10.3886/E100707V16.

Keeler, T.E., Ying, J.S., 1988. Measuring the benefits of a large public investment: the case of the us federal-aid highway system. Journal of Public Economics 36, 69–85.

Lee, S., Wilson, H., 2013. Spatial impact of burglar alarms on the decline of residential burglary. Security Journal 26, 180–198.

Levitt, S.D., 1996. The Effect of Prison Population Size on Crime Rates: Evidence from Prison Overcrowding Litigation. Quarterly Journal of Economics 111, 319–351.

Levitt, S.D., 2002. Using Electoral Cycles in Police Hiring to Estimate the Effects of Police on Crime: Reply. American Economic Review 92, 1244–1350.

Levitt, S.D., 2004. Understanding why crime fell in the 1990s: Four factors that explain the decline and six that do not. Journal of Economic Perspectives 18, 163–190.

Lin, M.J., 2008. Does Unemployment Increase Crime? Evidence from U.S. Data 1974-2000. The Journal of Human Resources 43, 413–436.

Lindgren, E., Pettersson-Lidbom, P., Tyrefors, B., 2021. The Causal Effect of Transportation Infrastructure: Evidence from a New Historical Database. Technical Report. Working Paper.

Manson, S., Schroeder, J., Van Riper, D., Kugler, T., Ruggles, S., 2022. IPUMS National Historical Geographic Information System: Version 17.0 [dataset]. Technical Report. Integrated Public Use Microdata Series (IPUMS). Minneapolis, MN. URL: `http://doi.org/10.18128/D050.V17.0`.

Marcotte, D.E., Markowitz, S., 2011. A Cure for Crime? Psycho-Pharmaceuticals and Crime Trends. Journal of Policy Analysis and Management 30, 29–56.

Martin, D.E., 1995. Crime Along Rural Interstate Highways. Free Inquiry in Creative Sociology 23, 105–108.

McCutcheon, J.C., Weaver, G.S., Huff-Corzine, L., Corzine, J., Burraston, B., 2016. Highway robbery: Testing the impact of interstate highways on robbery. Justice Quarterly 33, 1292–1310.

McNichol, D., 2006. The roads that built America: the incredible story of the US Interstate System. Sterling Publishing Company, Inc.

Michaels, G., 2008. The effect of trade on the demand for skill: Evidence from the interstate highway system. The Review of Economics and Statistics 90, 683–701.

Miron, J.A., 1999. Violence and the U.S. Prohibitions of Drugs and Alcohol. American Law and Economics Review 1, 78—-114.

Montolio, D., 2018. The effects of local infrastructure investment on crime. Labour Economics 52, 210–230.

Nall, C., 2015. The Political Consequences of Spatial Policies: How Interstate Highways Facilitated Geographic Polarization. The Journal of Politics 77, 394–406.

O'Brien, R., 1989. Relative cohort size and age-specific crime rates: an age-period-relative-cohort-size model. Criminology 27, 57–77.

O'Flaherty, B., Sethi, R., 2015. Urban crime, in: Duranton, G., Henderson, V., Strange, W. (Eds.), Handbook of regional and urban economics. volume 5, pp. 1519–1621.

Oudijk, G., 2010. The Rise and Fall of Organometallic Additives in Automotive Gasoline. Environmental Forensics 11, 17–49.

Reuben, A., Elliott, M., Caspi, A., 2020. Implications of legacy lead for children's brain development. Nature Medicine 26, 22–28.

Reyes, J.W., 2007. Environmental policy as social policy? the impact of childhood lead exposure on crime. The B.E. Journal of Economic Analysis & Policy 17.

Rodrigue, J.P., 2020. The Geography of Transport Systems, 5th Edition. Routledge.

Rosenbaum, P.R., Rubin, D.B., 1985. Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. The American Statistician 39, 33–38.

Strand, G., 2012. Killer on the road: Violence and the American interstate. University of Texas Press, Austin, TX.

Sun, L., Abraham, S., 2020. Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. Journal of Econometrics , Forthcoming.

Tankersley, J., 2021. Biden Details $2 Trillion Plan to Rebuild Infrastructure and Reshape the Economy. Technical Report. The New York Times.

The Economist, 2021. Violent crime is rising in American cities, putting criminal-justice reform at risk. Technical Report. The Economist.

Turner, F.C., 1972. The Case for Highway Planning. Transportation Law Journal 4, 167–176.

U.S. Congress, 1949. Highway needs of the national defense, House Document No. 249, 81st cong. 1st session. Technical Report. United States Government Printing Office.

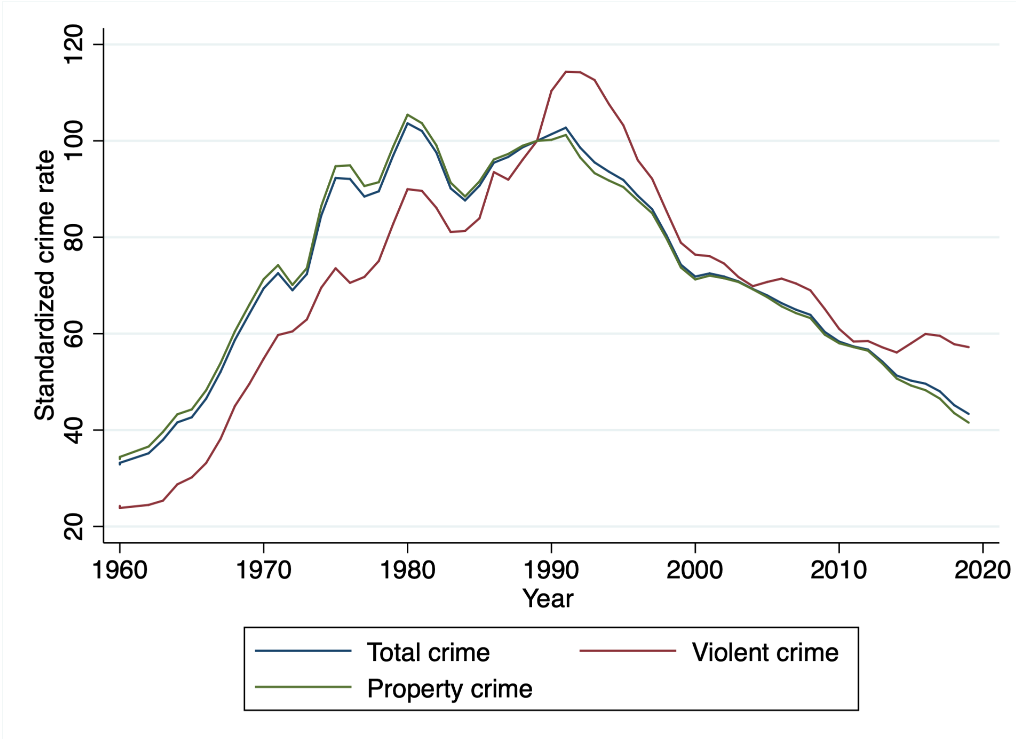
U.S. House of Representatives, 1944. Message from the President of the United States Transmitting a Report of the National Interregional Highway Committee, Outlining and Recommending a National System of Interregional Highways. Technical Report. Washington, DC.

Wright, R., Tekin, E., Topalli, V., McClellan, C., Dickinson, T., Rosenfeld, R., 2017. Less Cash, Less Crime: Evidence from the Electronic Benefit Transfer Program. Journal of Law and Economics 60, 361–383.

Zimring, F.E., 2007. The Great American Crime Decline. Oxford University Press, Oxford, UK.

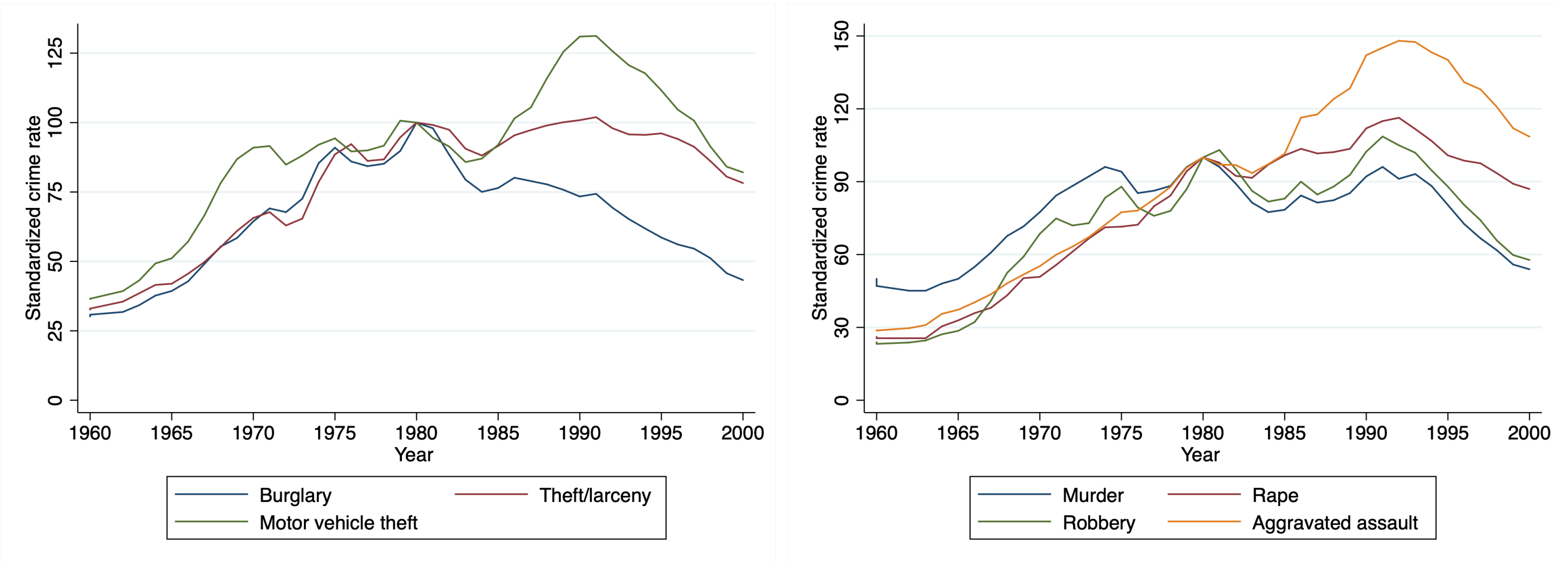
Zimring, F.E., 2011. The City That Became Safe: New York's Lessons for Urban Crime and Its Control. Oxford University Press.

Figure 1: Crime in the United States, 1960-2019



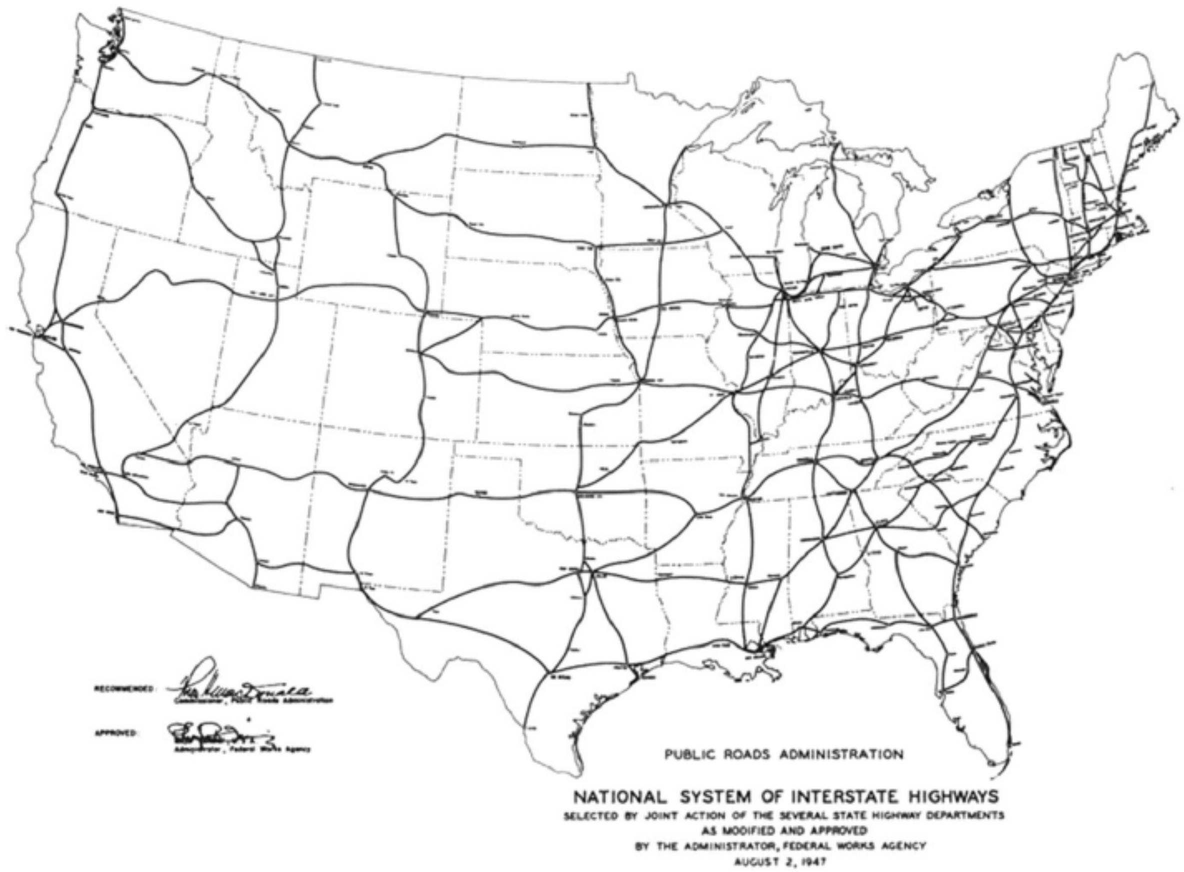
Notes - Crime rates are calculated per 100,000 inhabitants. All variables are standardized so that 1989=100. Data comes from the FBI's Uniform Crime Reporting (UCR) Program (Sourcebook of criminal justice statistics Online).

Figure 2: Trends in US crime, individual index crimes (1960-2000)



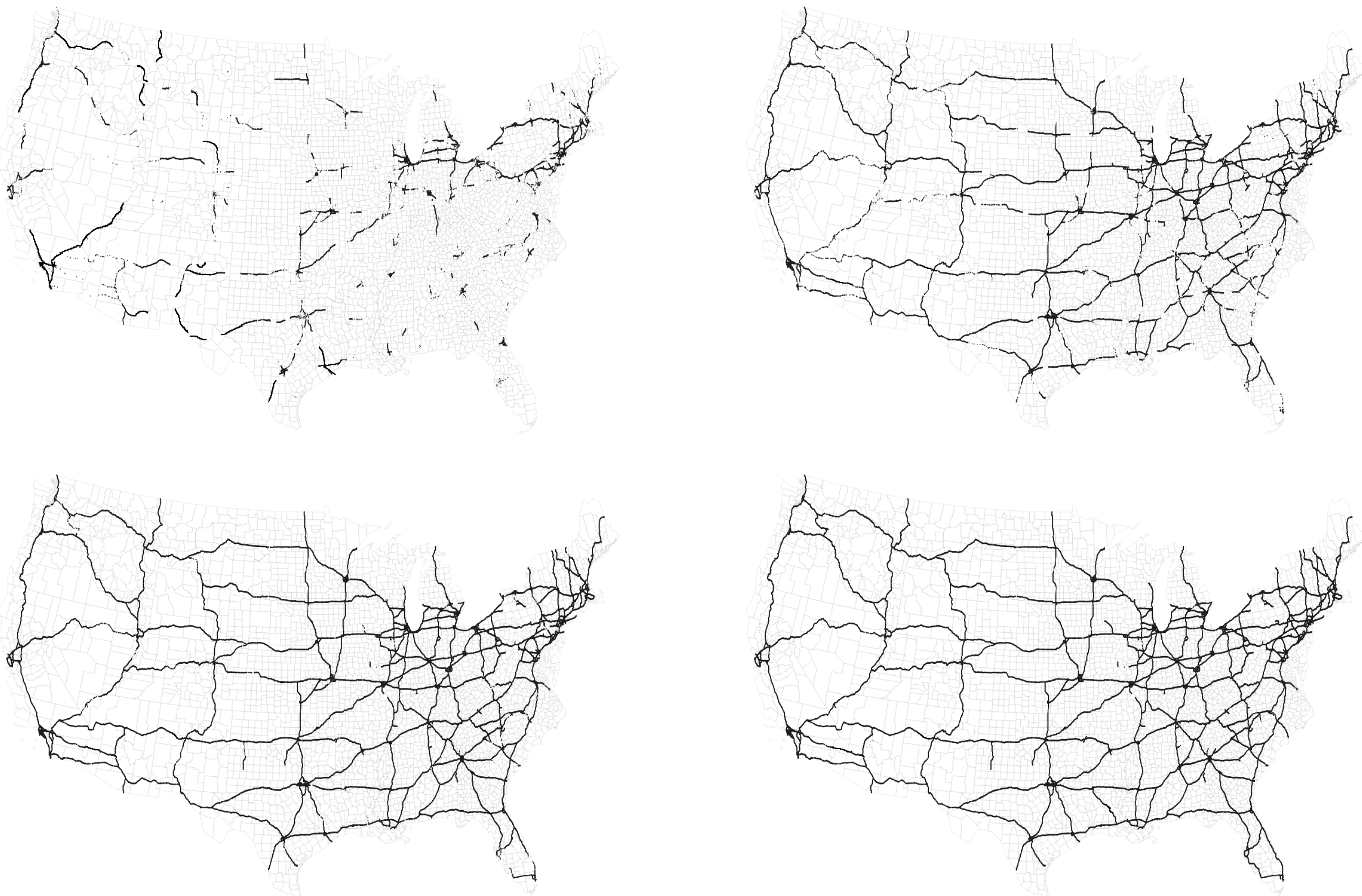
Notes - Crime rate is calculated per 100,000 inhabitants. All variables are standardized so that 1980=100. Data comes from the FBI's Uniform Crime Reporting (UCR) Program (Sourcebook of criminal justice statistics Online).

Figure 3: Planned US Interstate Highway System (as of 1947)



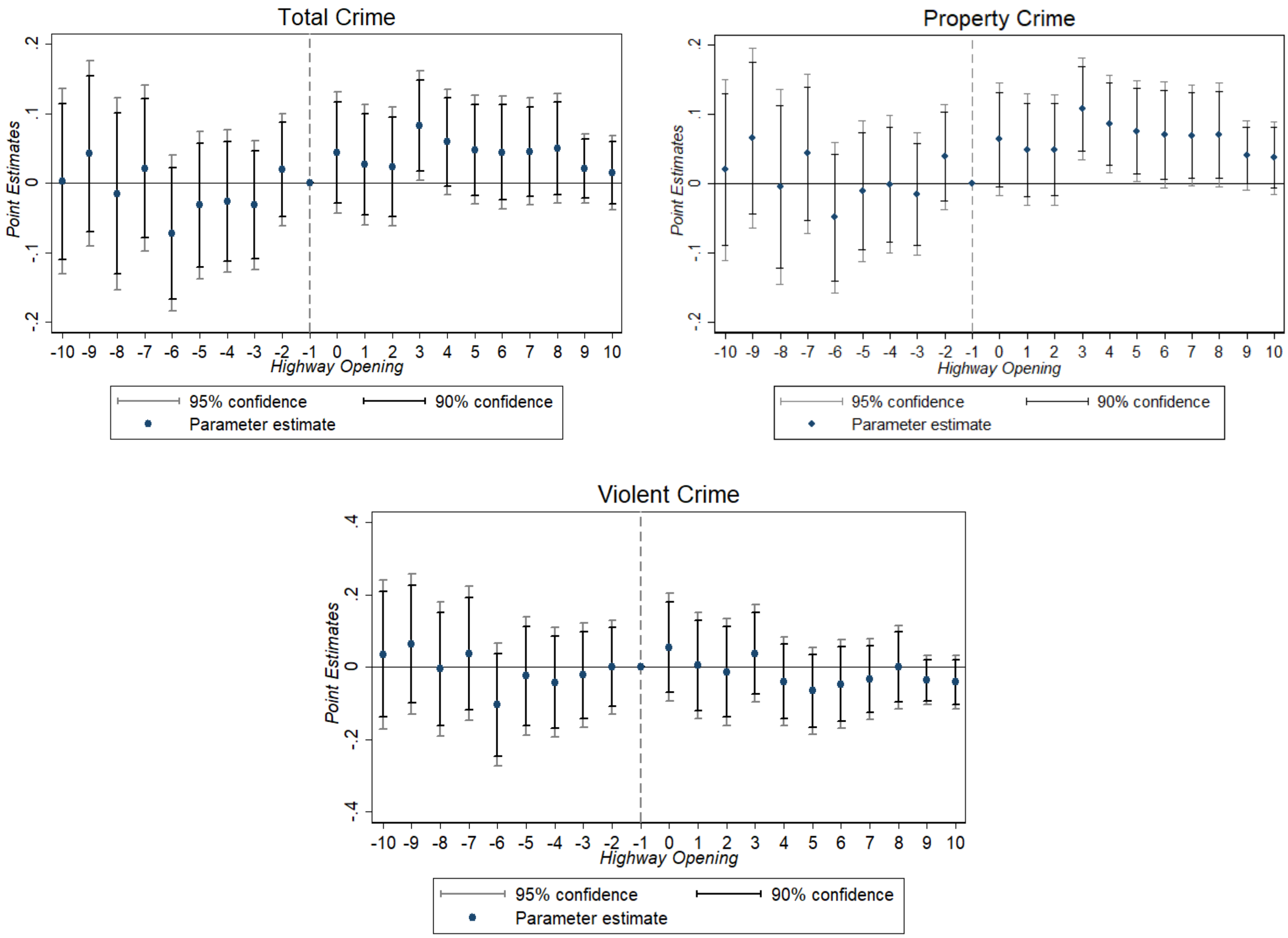
Notes - Source: Bureau of Public Roads.

Figure 4: Evolution of the US Interstate Highway System (1960-1990)



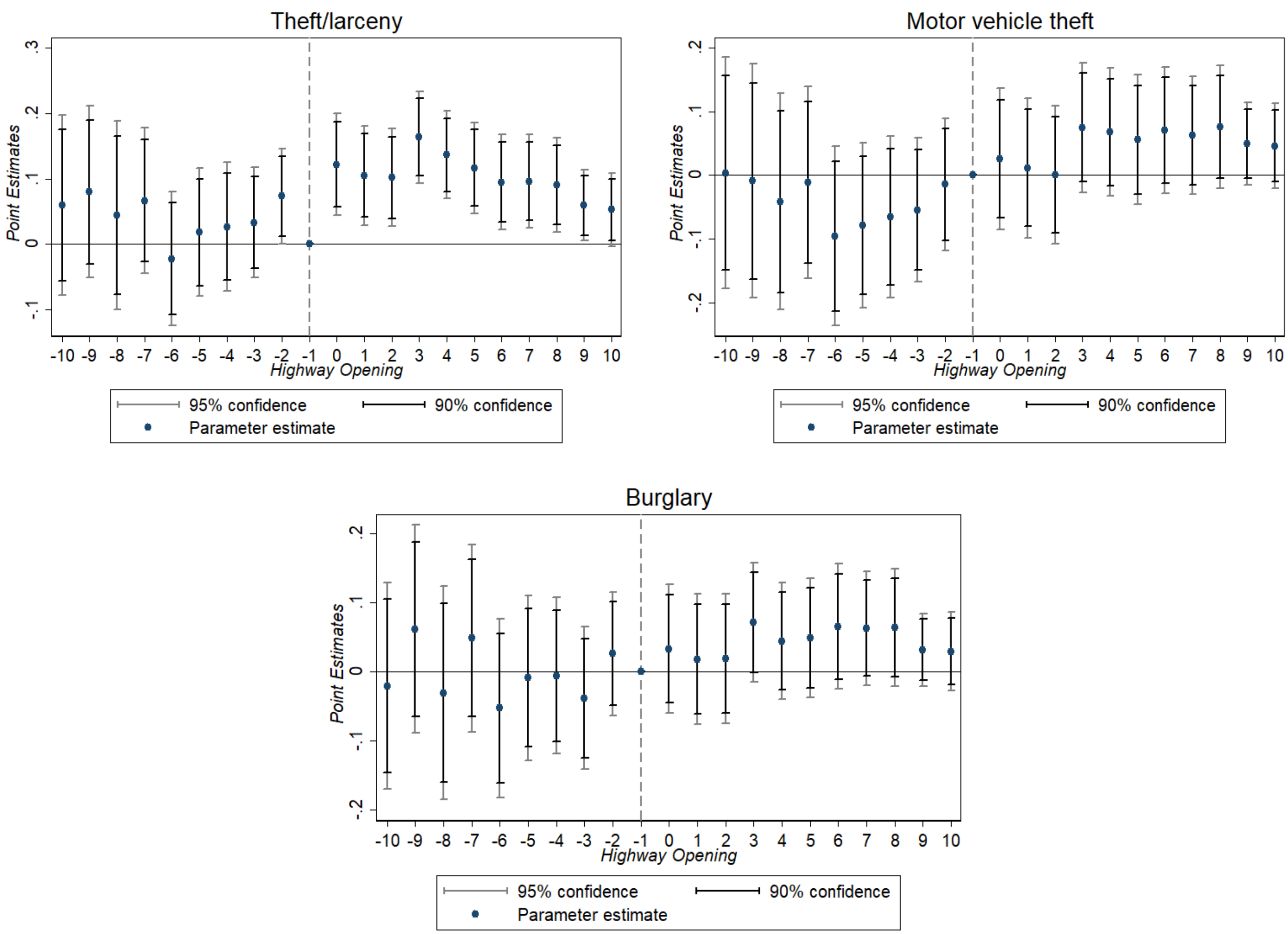
Notes - Km of IHS open as of 1960 (top-left); km of IHS open as of 1970 (top-right); km of IHS open as of 1980 (bottom-left); km of IHS open as of 1990 (bottom-right). Data comes from the Baum-Snow (2007). Duranton, Morrow and Turner (2014), and the US Census Bureau's Cartographic Boundary Files.

Figure 5: Event study – Interstate Highway System and local crime



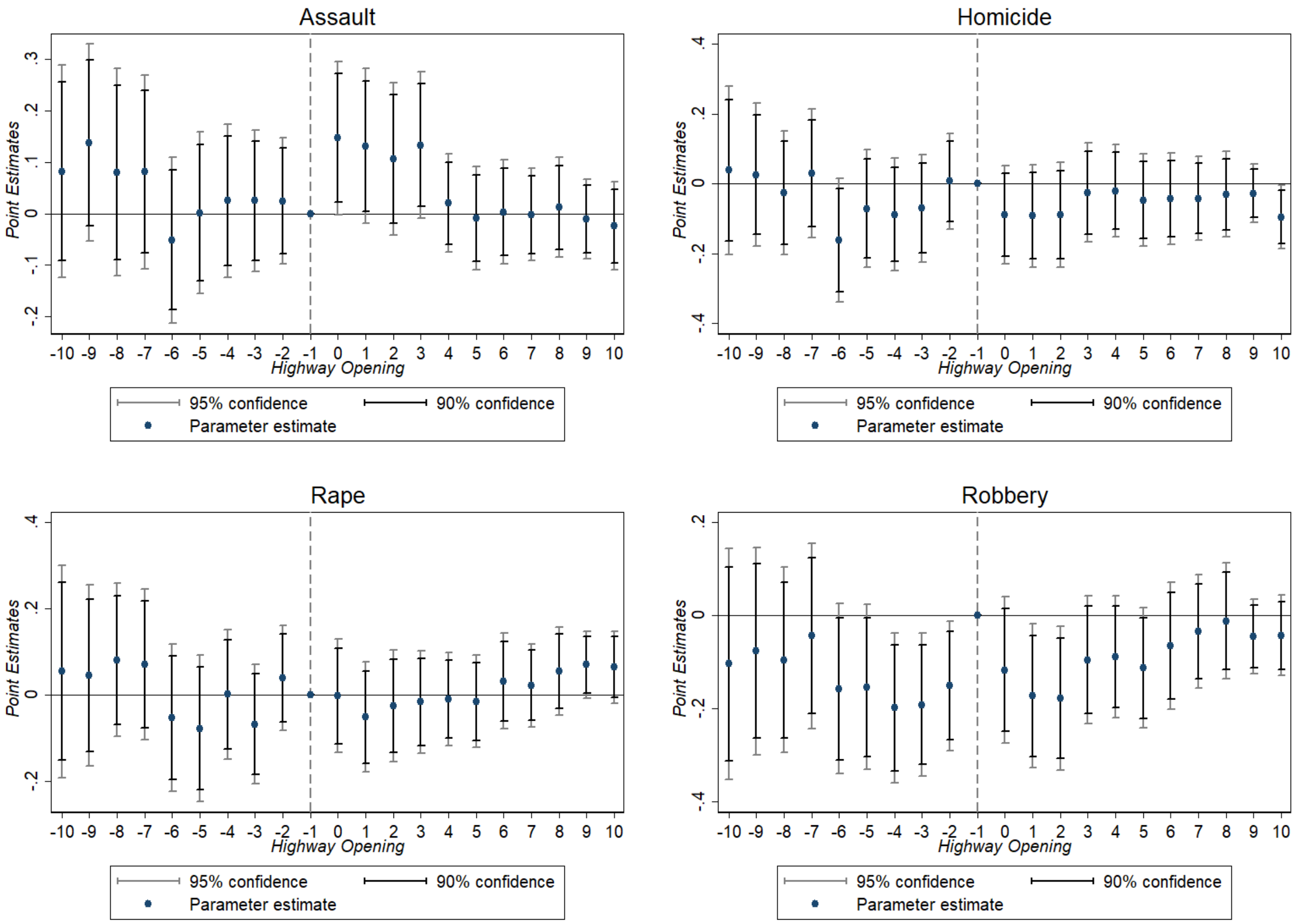
Notes - The graphs depict the event study results implemented with TWFE OLS estimator. Dependent variables: *Total Crime* – natural log of total # of index crimes per 100,000 pop.; *Property Crime* – natural log of total # of property crimes per 100,000 pop.; *Violent Crime* – natural log of total # of violent crimes per 100,000 pop. Coefficient estimates are provided together with the 90% (black) and 95% (gray) confidence intervals. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007).

Figure 6: Event study – Interstate Highway System and property crime



Notes - The graphs depict the event study results implemented with TWFE OLS estimator. Dependent variables: *Theft/larceny* – natural log of # of thefts (larcenies) per 100,000 pop.; *Motor vehicle theft* – natural log of # of motor vehicle thefts per 100,000 pop.; *Burglary* – natural log of # of burglaries per 100,000 pop. Coefficient estimates are provided together with the 90% (black) and 95% (gray) confidence intervals. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007).

Figure 7: Event study – Interstate Highway System and violent crime



Notes - The graphs depict the event study results implemented with TWFE OLS estimator. Dependent variables: *Assault* – natural log of # of assaults per 100,000 pop.; *Homicide* – natural log of # of homicides per 100,000 pop.; *Rape* – natural log of # of rapes per 100,000 pop. *Robbery* – natural log of # of robberies per 100,000 pop. Coefficient estimates are provided together with the 90% (black) and 95% (gray) confidence intervals. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007).

Table 1: Descriptive statistics

Variable	No. of observations	Mean	Standard deviation
Any highway	105,651	0.33	0.47
Total index crime rate	105,651	2,544.3	3,033.7
Property crime rate	105,651	2,334.7	2,828.7
Violent crime rate	105,651	209.8	303.1
Burglary rate	105,651	714.4	1,017.8
Motor vehicle theft rate	105,651	152.5	254.6
Theft (larceny) rate	105,651	1,467.8	1,786.4
Assault rate	105,651	383.9	539.9
Robbery rate	105,651	36.19	96.90
Rape rate	105,651	15.58	27.03
Homicide rate	105,651	9.10	44.05
Total drug-related arrest rate	62,478	215.7	502.4
Drug sale/manufacturing arrest rate	56,240	55.14	134.1
Drug possession arrest rate	56,240	154.2	438.2
Driving under the influence (DUI) arrest rate	62,478	889.8	2,202.7
Annual earnings per worker	62,173	13,573.5	53,380.3
Working share	93,166	0.20	0.11
No. of firms per 1,000 pop.	93,308	19.60	8.37
No. of firms per 100 km^2	93,392	531.5	8,046.8
No. of employees per firm	93,392	10.45	4.76
Police officers per 10,000 pop.	103,325	11.13	11.51
No. of patrols per officer	92,597	0.78	2.23
No. of car patrols per officer	92,597	0.71	2.05
No. of foot patrols per officer	92,597	0.05	0.26

Notes: Any highway – binary var. equal to 1 if county has at least 1km of interstate highway open; *Total index crime rate* – total # of index crimes per 100,000 pop.; *Property crime rate* – total # of property crimes per 100,000 pop.; *Violent crime rate* – total # of violent crimes per 100,000 pop.; *Burglary rate* – # of burglaries per 100,000 pop.; *Motor vehicle theft rate* – # of motor vehicle thefts per 100,000 pop.; *Theft (larceny) rate* – # of thefts (larcenies) per 100,000 pop.; *Assault rate* – # of assaults per 100,000 pop.; *Robbery rate* – # of robberies per 100,000 pop.; *Rape rate* – # of rapes per 100,000 pop.; *Homicide rate* – # of homicides per 100,000 pop.; *Total drug-related arrest rate* – total # of drug-related arrests per 100,000 pop.; *Drug sale/manufacturing arrest rate* – # of arrests for drug sale or manufacturing per 100,000 pop.; *Drug possession arrest rate* – # of arrests for drug possession per 100,000 pop.; *Driving under the influence (DUI) arrest rate* – # arrests for driving under the influence (DUI) per 100,000 pop.; *Annual earnings per employee* – total annual earnings (payroll) per employee; *Working share* – # of employees in the county (mid-March) as % of the total county population; *No. of firms per 1,000 pop.* – # of business establishments per 1,000 county population; *No. of firms per 100 km^2* – # of business establishments per 100 km^2 of county geographical area; *No. of employees per firm)* – # of employees per business establishment; *Police officers per 10,000 pop.* – # of local law enforcement officers per 10,000 pop.; *No. of patrols per officer* – total # of patrols (per officer) conducted by local law enforcement; *No. of car patrols per officer* – total # of vehicular patrols (per officer) conducted by local law enforcement; *No. of foot patrols per officer* – total # of foot patrols (per officer) conducted by local law enforcement. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019 (Kaplan, 2021b); Uniform Crime Reporting Program: Arrests by Age, Sex, and Race, 1974-2016 (Kaplan, 2018); Uniform Crime Reporting Program: Law Enforcement Officers Killed and Assaulted (LEOKA), 1960-2019 (Kaplan, 2021a);U.S. Census Bureau's County Business Patterns, 1964-1993 (Manson et al., 2022; Eckert et al., 2022a,b); and Interstate Highway System county-by-year panel data (Baum-Snow, 2007).

Table 2: Interstate Highway System and total index crime

	Ln (total crime)		
	(1)	(2)	(3)
Any highway	0.080**	0.046*	0.051**
	(0.038)	(0.025)	(0.023)
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
State-by-year FE	No	Yes	Yes
Population density	No	Yes	Yes
Commuting zone linear time trends	No	No	Yes
Observations	105,651	105,651	105,651
No. of counties	3,131	3,131	3,131
Adjusted R-squared	0.395	0.772	0.789

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1993) county population. *Ln (total crime)* – natural log of total # of index crimes per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 3: Interstate Highway System and property vs. violent crime

	Ln (property crime)		
Panel A	(1)	(2)	(3)
Any highway	0.105***	0.052**	0.055**
	(0.039)	(0.026)	(0.023)
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
State-by-year FE	No	Yes	Yes
Population density	No	Yes	Yes
Commuting zone linear time trends	No	No	Yes
Observations	105,651	105,651	105,651
No. of counties	3,131	3,131	3,131
Adjusted R-squared	0.381	0.758	0.777

	Ln (violent crime)		
Panel B	(4)	(5)	(6)
Any highway	-0.107**	0.004	0.000
	(0.053)	(0.033)	(0.031)
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes
State-by-year FE	No	Yes	Yes
Population density	No	Yes	Yes
Commuting zone linear time trends	No	No	Yes
Observations	105,651	105,651	105,651
No. of counties	3,131	3,131	3,131
Adjusted R-squared	0.528	0.694	0.713

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1993) county population. *Ln (property crime)* – natural log of total # of property crimes per 100,000 pop.; *Ln (violent crime)* – natural log of total # of violent crimes per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 4: Interstate Highway System and individual index crimes

	(1) Ln (burglary)	(2) Ln (motor vehicle theft)	(3) Ln (theft/larceny)	(4) Ln (assault)	(5) Ln (robbery)	(6) Ln (rape)	(7) Ln (homicide)
Any highway	0.039	0.077***	0.067***	0.030	0.034	-0.031	-0.017
	(0.026)	(0.029)	(0.025)	(0.037)	(0.031)	(0.036)	(0.038)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	105,651	105,651	105,651	105,651	105,651	105,651	105,651
No. of counties	3,131	3,131	3,131	3,131	3,131	3,131	3,131
Adjusted R-squared	0.725	0.592	0.727	0.811	0.621	0.586	0.256

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1993) county population. *Ln (burglary rate)* – natural log of # of burglaries per 100,000 pop.; *Ln (motor vehicle theft)* – natural log of # of motor vehicle thefts per 100,000 pop.; *Ln (theft/larceny)* – natural log of # of thefts (larcenies) per 100,000 pop.; *Ln (assault)* – natural log of # of assaults per 100,000 pop.; *Ln (robbery)* – natural log of # of robberies per 100,000 pop.; *Ln (rape)* – natural log of # of rapes per 100,000 pop.; *Ln (homicide)* – natural log of # of homicides per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 5: Interstate Highway System and local crime: 1960-1980 period

	(1) Ln (total crime)	(2) Ln (property crime)	(3) Ln (violent crime)	(4) Ln (burglary)	(5) Ln (motor vehicle theft)
Any highway	0.047**	0.051**	0.005	0.061**	0.087***
	(0.022)	(0.022)	(0.028)	(0.024)	(0.026)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
County linear time trends	Yes	Yes	Yes	Yes	Yes
Observations	65,016	65,016	65,016	65,016	65,016
No. of counties	3,124	3,124	3,124	3,124	3,124
Adjusted R-squared	0.686	0.668	0.642	0.659	0.497

	(6) Ln (theft/larceny)	(7) Ln (assault)	(8) Ln (robbery)	(9) Ln (rape)	(10) Ln (homicide)
Any highway	0.048*	0.027	0.058**	-0.003	0.021
	(0.025)	(0.040)	(0.026)	(0.032)	(0.034)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
County linear time trends	Yes	Yes	Yes	Yes	Yes
Observations	65,016	65,016	65,016	65,016	65,016
No. of counties	3,124	3,124	3,124	3,124	3,124
Adjusted R-squared	0.596	0.762	0.605	0.459	0.235

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1980) county population. *Ln (total crime)* – natural log of total # of index crimes per 100,000 pop.; *Ln (property crime)* – natural log of total # of property crimes per 100,000 pop.; *Ln (violent crime)* – natural log of total # of violent crimes per 100,000 pop.; *Ln (burglary)* – natural log of # of burglaries per 100,000 pop.; *Ln (motor vehicle theft)* – natural log of # of motor vehicle thefts per 100,000 pop.; *Ln (theft/larceny)* – natural log of # of thefts (larcenies) per 100,000 pop.; *Ln (assault)* – natural log of # of assaults per 100,000 pop.; *Ln (robbery)* – natural log of # of robberies per 100,000 pop.; *Ln (rape)* – natural log of # of rapes per 100,000 pop.; *Ln (homicide)* – natural log of # of homicides per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 6: Interstate Highway System and local economic development (1964-1993)

	(1) Ln (earnings per employee)	(2) Ln (working share)	(3) Ln (# firms per 1,000 pop.)	(4) Ln (# firms per 100 km^2)	(5) Ln (# employees per firm)
Any highway	-0.003	0.021*	0.005	0.046**	0.021**
	(0.010)	(0.013)	(0.011)	(0.021)	(0.009)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
Commuting Zone Trend	Yes	Yes	Yes	Yes	Yes
Observations	62,102	93,166	93,308	93,323	93,207
No. of counties	3,126	3,128	3,129	3,129	3,129
Adjusted R-squared	0.989	0.697	0.739	0.823	0.497

Notes: Data for regression in column (1) restricted to 1974-1993. Standard errors in parentheses, clustered at the county level. Regressions in cols. (2)-(5) are weighted by the average (1964-1993) county population. Regression in col. (1) is weighted by the average (1974-1993) county population. *Ln (earnings per employee)* – natural log of total annual earnings (payroll) per employee. *Ln (working share)* – natural log of # of employees in the county (mid-March) as % of the total county population; *Ln (# of firms per 1,000 pop.)* – natural log of # of business establishments per 1,000 county population; *Ln (# of firms per 100 km^2)* – natural log of # of business establishments per 100 km^2 of county geographical area; *Ln (# employees per firm)* – natural log of # of employees per business establishment. *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the U.S. Census Bureau's County Business Patterns (1964-1993), compiled by Manson et al. (2022), Eckert et al. (2022a), and Eckert et al. (2022b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

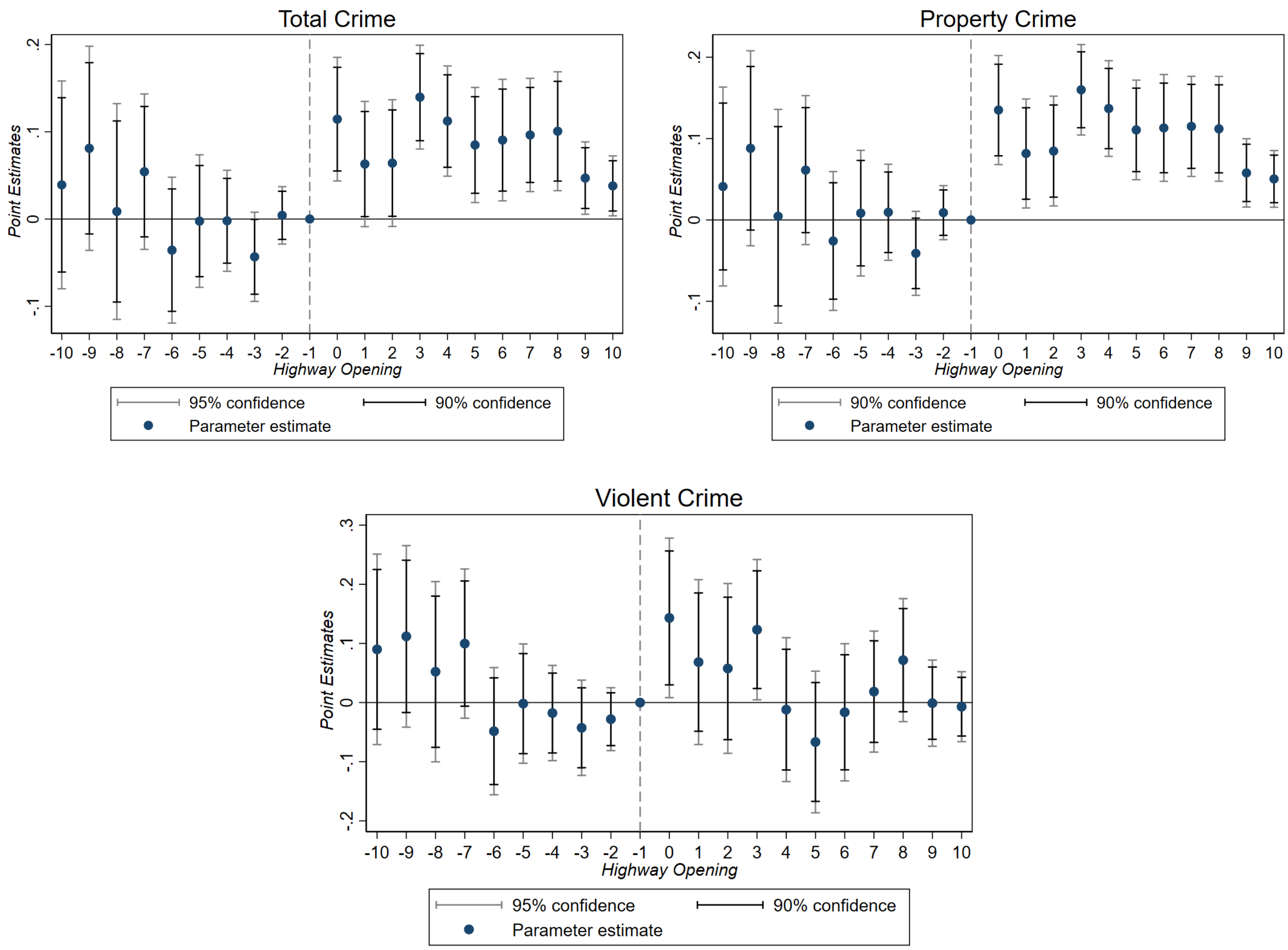
Table 7: Interstate Highway System and law enforcement size and community presence

	(1) Ln (officers per 10,000 pop.)	(2) Ln (patrols per officer)	(3) Ln (car patrols per officer)	(4) Ln (foot patrols per officer)
Any highway	0.056**	0.025**	0.031***	-0.004
	(0.025)	(0.010)	(0.010)	(0.005)
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes
Observations	103,325	92,562	92,562	92,562
No. of counties	3,131	3,131	3,131	3,131
Adjusted R-squared	0.619	0.880	0.866	0.607

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1993) county population. *Ln (officers per 10,000 pop.)* – natural log of total # of local law enforcement officers per 10,000 pop.; *Ln (patrols per officer)* – natural log of total # of patrols (per officer) conducted by local law enforcement; *Ln (car patrols per officer)* – natural log of total # of car patrols (per officer) conducted by local law enforcement; *Ln (foot patrols per officer)* – natural log of total # of foot patrols (per officer) conducted by local law enforcement; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the FBI's Uniform Crime Reporting Program: Law Enforcement Officers Killed and Assaulted (LEOKA), 1960-2019, compiled by Kaplan (2021a). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

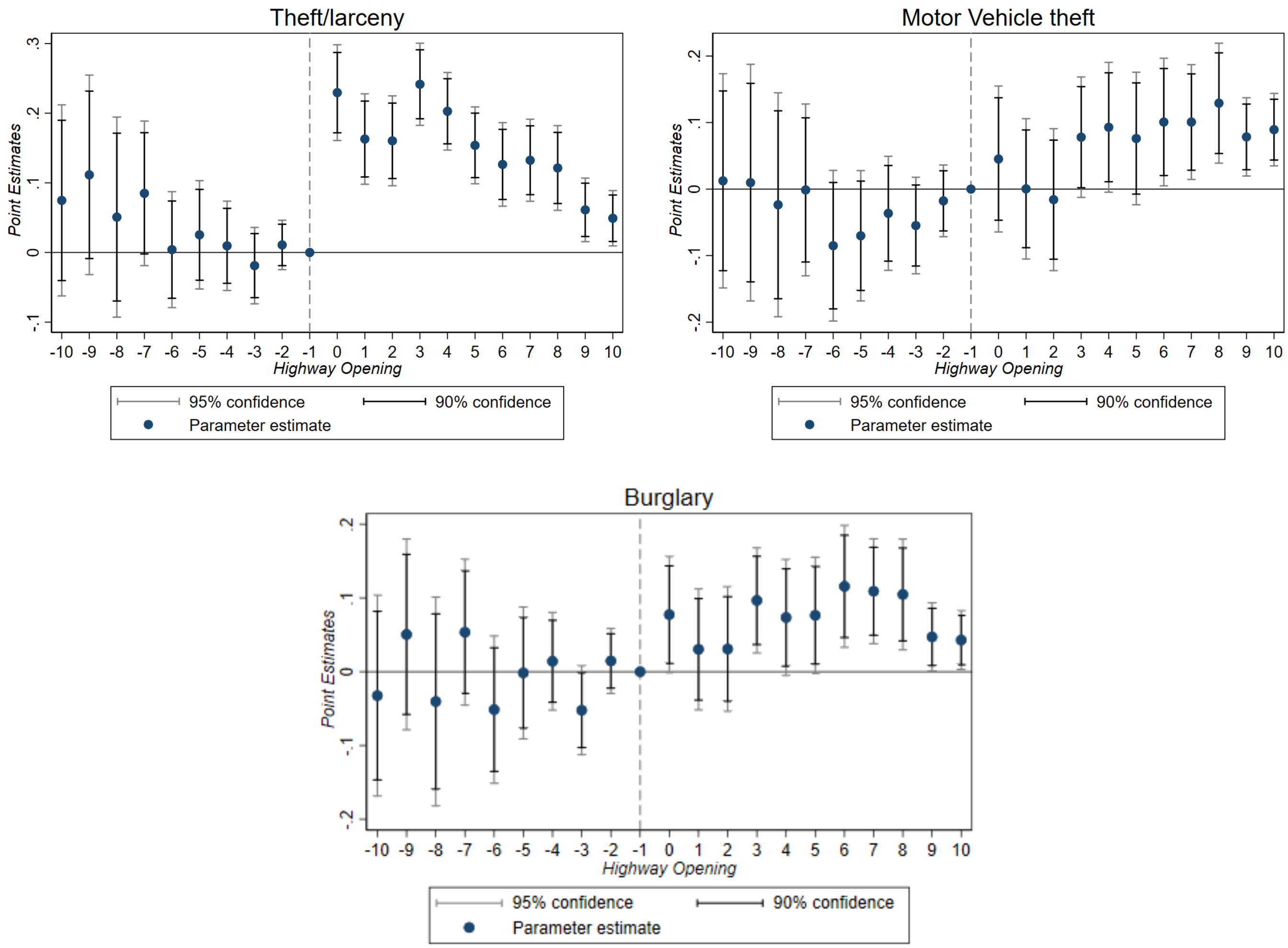
Appendix

Figure A.1: Sun and Abraham (2020) event study – IHS and local crime



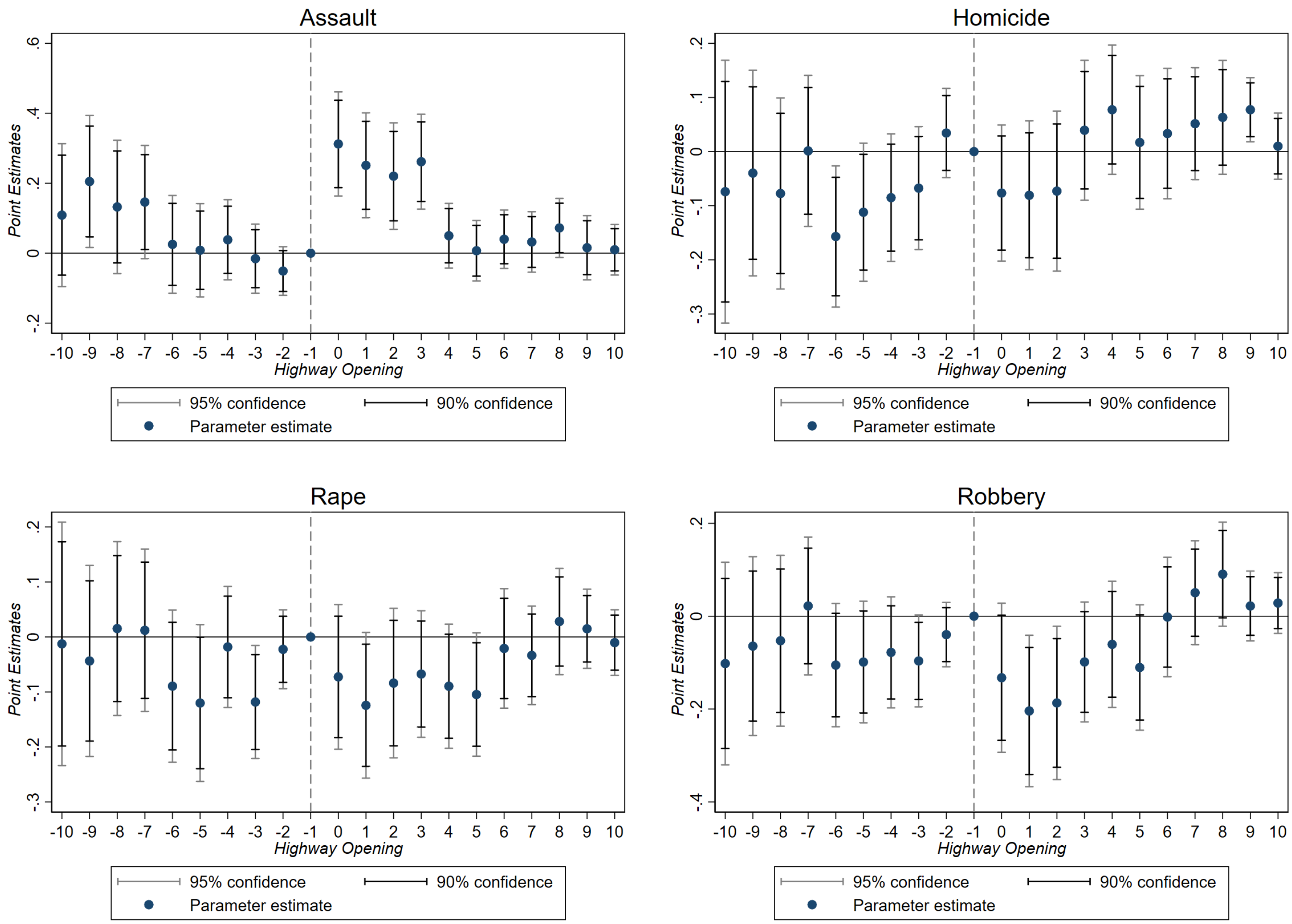
Notes - The graphs depict the event study results implemented with estimator developed by Sun and Abraham (2020). Dependent variables: *Total Crime* – natural log of total # of index crimes per 100,000 pop.; *Property Crime* – natural log of total # of property crimes per 100,000 pop.; *Violent Crime* – natural log of total # of violent crimes per 100,000 pop. Coefficient estimates are provided together with the 90% (black) and 95% (gray) confidence intervals. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007).

Figure A.2: Sun and Abraham (2020) event study – IHS and property crime



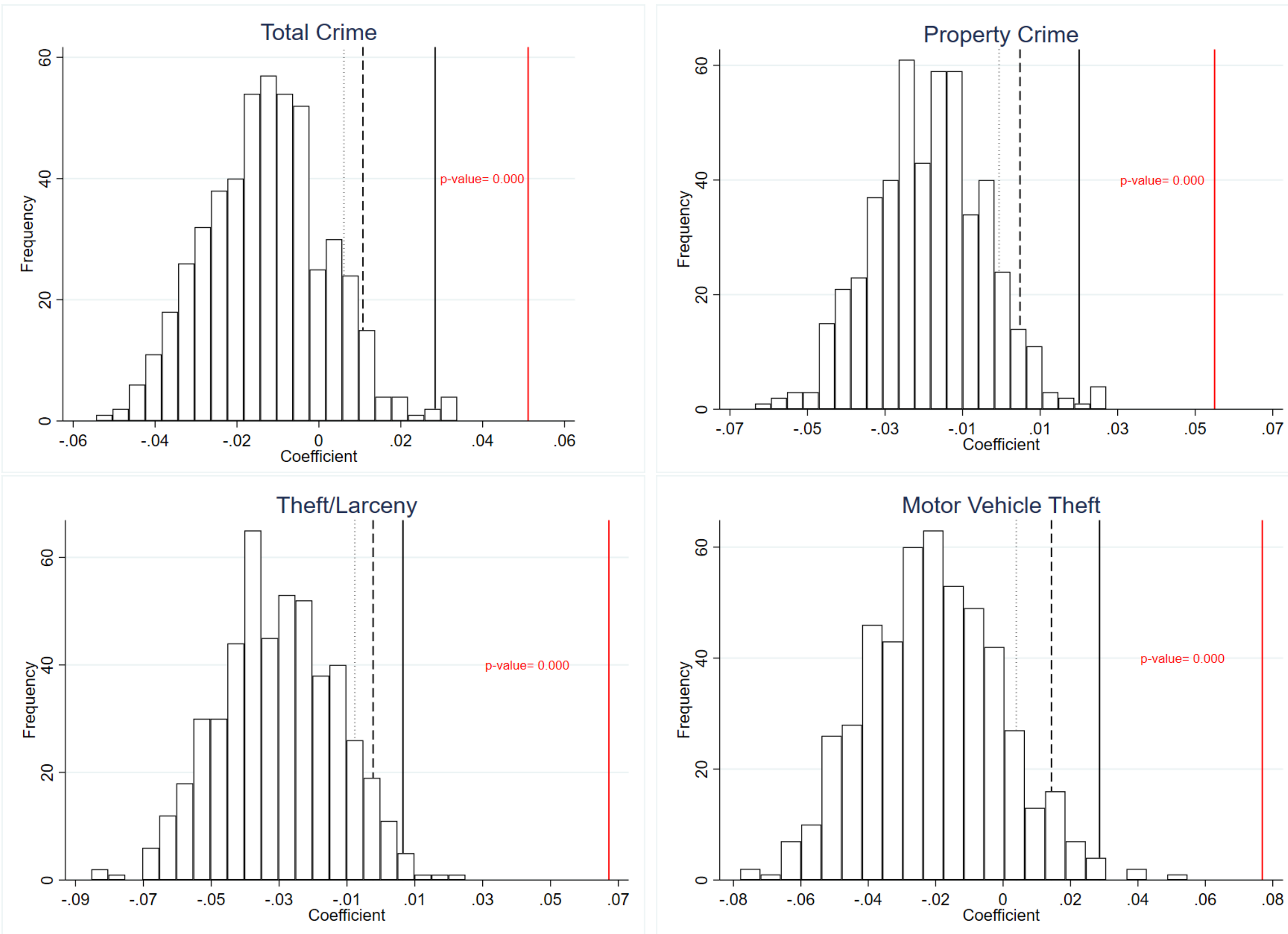
Notes - The graphs depict the event study results implemented with estimator developed by Sun and Abraham (2020). Dependent variables: *Theft/larceny* – natural log of # of thefts (larcenies) per 100,000 pop.; *Motor vehicle theft* – natural log of # of motor vehicle thefts per 100,000 pop.; *Burglary* – natural log of # of burglaries per 100,000 pop. Coefficient estimates are provided together with the 90% (black) and 95% (gray) confidence intervals. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007).

Figure A.3: Sun and Abraham (2020) event study – IHS and violent crime



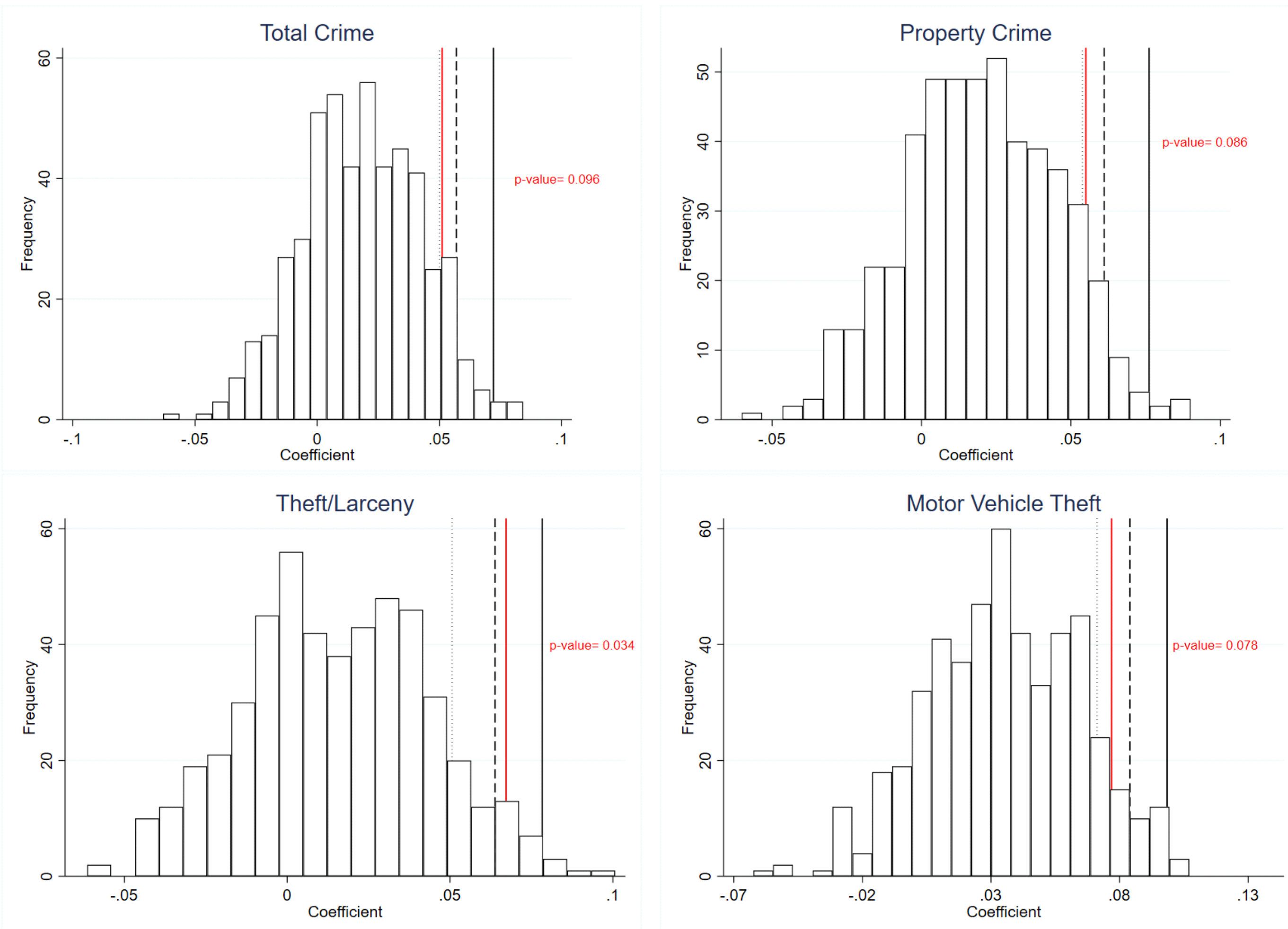
Notes - The graphs depict the event study results implemented with estimator developed by Sun and Abraham (2020). Dependent variables: *Assault* – natural log of # of assaults per 100,000 pop.; *Homicide* – natural log of # of homicides per 100,000 pop.; *Rape* – natural log of # of rapes per 100,000 pop. *Robbery* – natural log of # of robberies per 100,000 pop. Coefficient estimates are provided together with the 90% (black) and 95% (gray) confidence intervals. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007).

Figure A.4: Random inference test – randomized time treatment



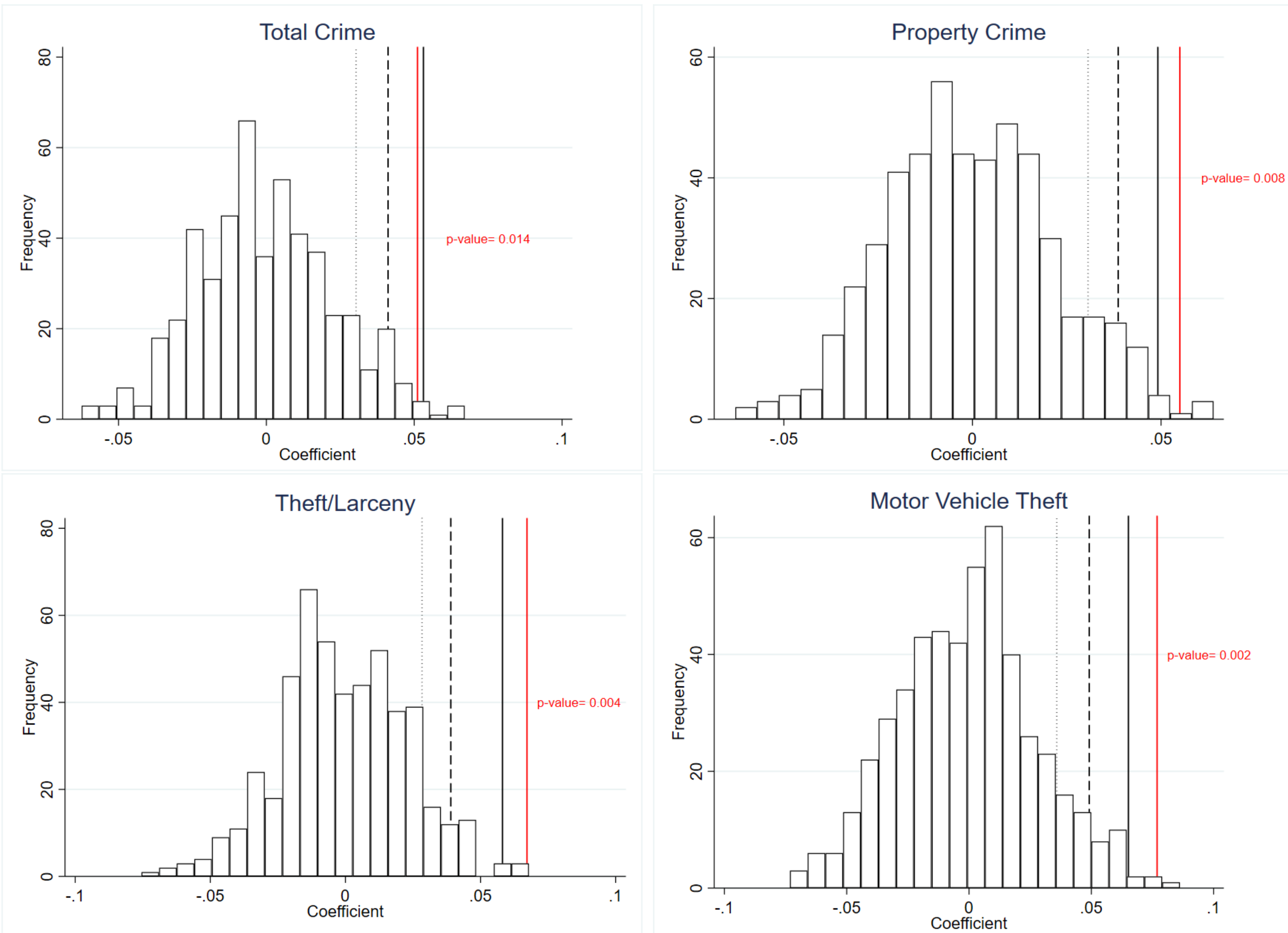
Notes - The figure shows results from a random inference test comparing the estimated effect of IHS opening to placebo estimates from 500 samples in which year of highway opening is randomly assigned. The distribution of placebo estimates is depicted. Distribution cutoff points for p-values are reported as solid black lines (p-value of 0.01), dashed lines (p-value of 0.05), and dotted lines (p-value of 0.10), respectively. The actual DID estimate is represented by the vertical solid red line. The actual DID estimate is represented by the vertical red line. Dependent variables: *Total Crime* – natural log of total # of index crimes per 100,000 pop.; *Property Crime* – natural log of total # of property crimes per 100,000 pop.; *Theft/Larceny* – natural log of # of thefts (larcenies) per 100,000 pop.; *Motor Vehicle Theft* – natural log of # of motor vehicle thefts per 100,000 pop. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007).

Figure A.5: Random inference test – randomized group treatment



Notes - The figure shows results from a random inference test comparing the estimated effect of IHS opening to placebo estimates from 500 samples in which treatment across counties is randomly assigned. The distribution of placebo estimates is depicted. Distribution cutoff points for p-values are reported as solid black lines (p-value of 0.01), dashed lines (p-value of 0.05), and dotted lines (p-value of 0.10), respectively. The actual DID estimate is represented by the vertical solid red line. The actual DID estimate is represented by the vertical red line. Dependent variables: *Total Crime* – natural log of total # of index crimes per 100,000 pop.; *Property Crime* – natural log of total # of property crimes per 100,000 pop.; *Theft/Larceny* – natural log of # of thefts (larcenies) per 100,000 pop.; *Motor Vehicle Theft* – natural log of # of motor vehicle thefts per 100,000 pop. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007).

Figure A.6: Random inference test – randomized time and group treatment



Notes - The figure shows results from a random inference test comparing the estimated effect of IHS opening to placebo estimates from 500 samples in which both year of highway opening and treatment across counties are randomly assigned. The distribution of placebo estimates is depicted. Distribution cutoff points for p-values are reported as solid black lines (p-value of 0.01), dashed lines (p-value of 0.05), and dotted lines (p-value of 0.10), respectively. The actual DID estimate is represented by the vertical solid red line. Dependent variables: *Total Crime* – natural log of total # of index crimes per 100,000 pop.; *Property Crime* – natural log of total # of property crimes per 100,000 pop.; *Theft/Larceny* – natural log of # of thefts (larcenies) per 100,000 pop.; *Motor Vehicle Theft* – natural log of # of motor vehicle thefts per 100,000 pop. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007).

Table A.1: Robustness check – inverse hyperbolic sine transformation

	(1) Total crime	(2) Property crime	(3) Violent crime	(4) Burglary	(5) Motor vehicle theft
Any highway	0.051**	0.055**	-0.001	0.039	0.078***
	(0.023)	(0.023)	(0.032)	(0.026)	(0.030)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes
Observations	105,651	105,651	105,651	105,651	105,651
No. of counties	3,131	3,131	3,131	3,131	3,131
Adjusted R-squared	0.790	0.777	0.698	0.724	0.577

	(6) Theft/larceny	(7) Assault	(8) Robbery	(9) Rape	(10) Homicide
Any highway	0.067**	0.026	0.050	-0.021	-0.012
	(0.026)	(0.040)	(0.033)	(0.039)	(0.043)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes
Observations	105,651	105,651	105,651	105,651	105,651
No. of counties	3,131	3,131	3,131	3,131	3,131
Adjusted R-squared	0.722	0.801	0.584	0.567	0.238

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1993) county population. *Total crime* – inverse hyperbolic sine transformation of total # of index crimes per 100,000 pop.; *Property crime* – inverse hyperbolic sine transformation of total # of property crimes per 100,000 pop.; *Violent crime* – inverse hyperbolic sine transformation of total # of violent crimes per 100,000 pop.; *Burglary* – inverse hyperbolic sine transformation of # of burglaries per 100,000 pop.; *Motor vehicle theft* – inverse hyperbolic sine transformation of # of motor vehicle thefts per 100,000 pop.; *Theft/larceny* – inverse hyperbolic sine transformation of # of thefts (larcenies) per 100,000 pop.; *Assault* – inverse hyperbolic sine transformation of # of assaults per 100,000 pop.; *Robbery)* – inverse hyperbolic sine transformation of # of robberies per 100,000 pop.; *Rape* – inverse hyperbolic sine transformation of # of rapes per 100,000 pop.; *Homicide* – inverse hyperbolic sine transformation of # of homicides per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open; Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.2: Robustness check – eliminating potential outliers

	(1) Ln (total crime)	(2) Ln (property crime)	(3) Ln (violent crime)	(4) Ln (burglary)	(5) Ln (motor vehicle theft)
Any highway	0.049**	0.052**	-0.014	0.042	0.086***
	(0.023)	(0.024)	(0.029)	(0.026)	(0.029)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes
Observations	103,639	103,639	103,639	103,639	103,639
No. of counties	3,070	3,070	3,070	3,070	3,070
Adjusted R-squared	0.863	0.857	0.829	0.818	0.812

	(6) Ln (theft/larceny)	(7) Ln (assault)	(8) Ln (robbery)	(9) Ln (rape)	(10) Ln (homicide)
Any highway	0.054**	-0.021	0.049	-0.012	0.005
	(0.026)	(0.034)	(0.032)	(0.034)	(0.038)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes
Observations	103,639	103,639	103,639	103,639	103,639
No. of counties	3,070	3,070	3,070	3,070	3,070
Adjusted R-squared	0.834	0.856	0.847	0.703	0.591

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1993) county population. All counties with the average (1960-1993) population in the top and bottom 1% of the distribution are eliminated from the sample. *Ln (total crime)* – natural log of total # of index crimes per 100,000 pop.; *Ln (property crime)* – natural log of total # of property crimes per 100,000 pop.; *Ln (violent crime)* – natural log of total # of violent crimes per 100,000 pop.; *Ln (burglary)* – natural log of # of burglaries per 100,000 pop.; *Ln (motor vehicle theft)* – natural log of # of motor vehicle thefts per 100,000 pop.; *Ln (theft/larceny)* – natural log of # of thefts (larcenies) per 100,000 pop.; *Ln (assault)* – natural log of # of assaults per 100,000 pop.; *Ln (robbery)* – natural log of # of robberies per 100,000 pop.; *Ln (rape)* – natural log of # of rapes per 100,000 pop.; *Ln (homicide)* – natural log of # of homicides per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open; Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.3: Robustness check – county-specific linear time trends

	(1) Ln (total crime)	(2) Ln (property crime)	(3) Ln (violent crime)	(4) Ln (burglary)	(5) Ln (motor vehicle theft)
Any highway	0.038	0.043*	-0.011	0.045	0.072**
	(0.023)	(0.024)	(0.030)	(0.027)	(0.031)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
County linear time trends	Yes	Yes	Yes	Yes	Yes
Observations	105,651	105,651	105,651	105,651	105,651
No. of counties	3,131	3,131	3,131	3,131	3,131
R-squared	0.829	0.820	0.754	0.771	0.649

	(6) Ln (theft/larceny)	(7) Ln (assault)	(8) Ln (robbery)	(9) Ln (rape)	(10) Ln (homicide)
Any highway	0.042*	-0.008	0.0391	-0.038	0.011
	(0.025)	(0.041)	(0.027)	(0.033)	(0.032)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
County linear time trends	Yes	Yes	Yes	Yes	Yes
Observations	105,651	105,651	105,651	105,651	105,651
No. of counties	3,131	3,131	3,131	3,131	3,131
R-squared	0.780	0.841	0.668	0.627	0.323

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1993) county population. *Ln (total crime)* – natural log of total # of index crimes per 100,000 pop.; *Ln (property crime)* – natural log of total # of property crimes per 100,000 pop.; *Ln (violent crime)* – natural log of total # of violent crimes per 100,000 pop.; *Ln (burglary)* – natural log of # of burglaries per 100,000 pop.; *Ln (motor vehicle theft)* – natural log of # of motor vehicle thefts per 100,000 pop.; *Ln (theft/larceny)* – natural log of # of thefts (larcenies) per 100,000 pop.; *Ln (assault)* – natural log of # of assaults per 100,000 pop.; *Ln (robbery)* – natural log of # of robberies per 100,000 pop.; *Ln (rape)* – natural log of # of rapes per 100,000 pop.; *Ln (homicide)* – natural log of # of homicides per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.4: Heterogeneity by the size of county area

	(1) Ln (total crime)	(2) Ln (property crime)	(3) Ln (violent crime)	(4) Ln (burglary)	(5) Ln (motor vehicle theft)
Any highway: above 50p	0.050*	0.054*	-0.030	0.017	0.053
	(0.031)	(0.031)	(0.034)	(0.031)	(0.035)
Observation	52,790	52,790	52,790	52,790	52,790
No. of counties	1,568	1,568	1,568	1,568	1,568
Adjusted R-squared	0.911	0.905	0.886	0.878	0.882
Any highway: below 50p	0.051*	0.056*	-0.004	0.056	0.064
	(0.030)	(0.031)	(0.047)	(0.036)	(0.040)
Observation	52,640	52,640	52,640	52,640	52,640
No. of counties	1,557	1,557	1,557	1,557	1,557
Adjusted R-squared	0.871	0.862	0.866	0.824	0.859
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes

	(6) Ln (theft/larceny)	(7) Ln (assault)	(8) Ln (robbery)	(9) Ln (rape)	(10) Ln (homicide)
Any highway: above 50p	0.080**	0.016	-0.025	-0.084**	-0.006
	(0.036)	(0.044)	(0.036)	(0.044)	(0.039)
Observation	52,790	52,790	52,790	52,790	52,790
No. of counties	1,568	1,568	1,568	1,568	1,568
Adjusted R-squared	0.879	0.893	0.904	0.788	0.689
Any highway: below 50p	0.059*	0.015	0.060	0.010	-0.044
	(0.033)	(0.056)	(0.048)	(0.054)	(0.063)
Observation	52,640	52,640	52,640	52,640	52,640
No. of counties	1,557	1,557	1,557	1,557	1,557
Adjusted R-squared	0.835	0.855	0.895	0.748	0.658
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1993) county population. *Ln (total crime)* – natural log of total # of index crimes per 100,000 pop.; *Ln (property crime)* – natural log of total # of property crimes per 100,000 pop.; *Ln (violent crime)* – natural log of total # of violent crimes per 100,000 pop.; *Ln (burglary)* – natural log of # of burglaries per 100,000 pop.; *Ln (motor vehicle theft)* – natural log of # of motor vehicle thefts per 100,000 pop.; *Ln (theft/larceny)* – natural log of # of thefts (larcenies) per 100,000 pop.; *Ln (assault)* – natural log of # of assaults per 100,000 pop.; *Ln (robbery)* – natural log of # of robberies per 100,000 pop.; *Ln (rape)* – natural log of # of rapes per 100,000 pop.; *Ln (homicide)* – natural log of # of homicides per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. *Above 50p* – indicates counties with above-median (50th perc.) size of the county area. *Below 50p* – indicates counties with below-median (50th perc.) size of the county area. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.5: IHS opening and drug/alcohol-related arrests (1974-1993)

	(1) Ln (drugs total)	(2) Ln (drug sale/manufacturing)	(3) Ln (drug possession)	(4) Ln (DUI)
Any highway	0.010	0.001	-0.011	0.018
	(0.108)	(0.129)	(0.119)	(0.067)
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes
Observations	62,478	56,240	56,240	62,478
No. of counties	3,131	3,131	3,131	3,131
Adjusted R-squared	0.627	0.484	0.665	0.809

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1974-1993) county population. *Ln (drugs total)* – natural log of total # of drug-related arrests per 100,000 pop.; *Ln (drug sale/manufacturing)* – natural log of # of arrests for drug sale or manufacturing per 100,000 pop.; *Ln (drug possession)* – natural log of # of arrests for drug possession per 100,000 pop.; *Ln (DUI)* – natural log of # arrests for driving under the influence (DUI) per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the FBI's Uniform Crime Reporting (UCR) Program Data: Arrests by Age, Sex, and Race, 1974-2016, compiled by Kaplan (2018). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.6: IHS and drug-related arrests (1974-1993) by type of drug

	Ln (heroin/cocaine arrests)		Ln (marijuana arrests)		Ln (synthetic drugs arrests)	
	Sale/manufacturing	*Possession*	*Sale/manufacturing*	*Possession*	*Sale/manufacturing*	*Possession*
	(1)	(2)	(3)	(4)	(5)	(6)
Any highway	-0.010	-0.304	0.067	0.007	0.103	-0.152
	(0.189)	(0.261)	(0.114)	(0.124)	(0.156)	(0.265)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes	Yes
Observations	62,478	56,240	62,478	56,240	62,478	56,240
No. of counties	3,131	3,131	3,131	3,131	3,131	3,131
Adjusted R-squared	0.602	0.689	0.616	0.632	0.375	0.270

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1974-1993) county population. *Ln (heroin/cocaine arrests)* – natural log of # of arrests per 100,000 pop. for sale/manufacturing (possession, resp.) of heroin, cocaine, or opium (and its other derivatives such as morphine or codeine). *Ln (marijuana arrests)* – natural log of # of arrests per 100,000 pop. for sale/manufacturing (possession, resp.) of marijuana. *Ln (synthetic drugs arrests)* – natural log of # of arrests per 100,000 pop. for sale/manufacturing (possession, resp.) of synthetic narcotics which can cause true drug addiction (e.g. Demerol, methadones, etc.). *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the FBI's Uniform Crime Reporting (UCR) Program Data: Arrests by Age, Sex, and Race, 1974-2016, compiled by Kaplan (2018). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.7: Static Average Effect: Sun and Abraham (2020)

	(1) Ln (total crime)	(2) Ln (property crime)	(3) Ln (violent crime)	(4) Ln (burglary)	(5) Ln (motor vehicle theft)
Any highway	0.025***	0.030***	0.029	0.020**	0.017
	(0.007)	(0.007)	(0.041)	(0.008)	(0.011)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
Commuting zone time trends	Yes	Yes	Yes	Yes	Yes
Observations	105,617	105,617	105,617	105,617	105,617
No. of counties	3,130	3,130	3,130	3,130	3,130

	(6) Ln (theft/larceny)	(7) Ln (assault)	(8) Ln (robbery)	(9) Ln (rape)	(10) Ln (homicide)
Any highway	0.045***	0.038***	-0.024	-0.018	0.001
	(0.007)	(0.012)	(0.015)	(0.013)	(0.014)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
Commuting zone time trends	Yes	Yes	Yes	Yes	Yes
Observations	105,617	105,617	105,617	105,617	105,617
No. of counties	3,130	3,130	3,130	3,130	3,130

Notes: Table presents estimates of the static average effect using the interaction-weighted (IW) estimator developed by Sun and Abraham (2020). Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1993) county population. *Ln (total crime)* – natural log of total # of index crimes per 100,000 pop.; *Ln (property crime)* – natural log of total # of property crimes per 100,000 pop.; *Ln (violent crime)* – natural log of total # of violent crimes per 100,000 pop.; *Ln (burglary)* – natural log of # of burglaries per 100,000 pop.; *Ln (motor vehicle theft)* – natural log of # of motor vehicle thefts per 100,000 pop.; *Ln (theft/larceny)* – natural log of # of thefts (larcenies) per 100,000 pop.; *Ln (assault)* – natural log of # of assaults per 100,000 pop.; *Ln (robbery)* – natural log of # of robberies per 100,000 pop.; *Ln (rape)* – natural log of # of rapes per 100,000 pop.; *Ln (homicide)* – natural log of # of homicides per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.8: Propensity score test: treated vs. control counties

Variable	Mean Treated	Mean Control	% bias	t-value	p> $\|t\|$
Panel A: PSM (one-to-one matching)					
County area (km^2)	1,058.1	979.3	5.4	1.29	0.196
Birth rate (per 1,000 pop.)	37.95	37.71	2.3	0.55	0.580
% white population	87.40	87.99	-3.2	-0.77	0.444
% black population	11.95	11.42	2.9	0.69	0.488
Median years of schooling (male)	7.86	7.79	6.0	1.43	0.152
Median years of schooling (female)	8.43	8.34	6.6	1.59	0.113
Unemployment rate (white)	3.60	3.59	0.5	0.11	0.911
Unemployment rate (black)	6.13	6.71	-4.4	-1.05	0.292
Panel B: PSM (5 nearest neighbors)					
County area (km^2)	1,058.1	1,162.7	-7.6	-1.52	0.128
Birth rate (per 1,000 pop.)	18.64	18.64	0.2	0.04	0.967
% white population	87.40	87.34	0.4	0.09	0.931
% black population	11.95	11.94	0.0	0.00	0.996
Median years of schooling (male)	7.86	7.83	1.5	0.67	0.503
Median years of schooling (female)	8.43	8.40	1.2	0.47	0.635
Unemployment rate (white)	3.60	3.57	2.1	0.51	0.608
Unemployment rate (black)	6.13	7.01	-7.6	-1.40	0.161
Panel C: PSM (Kernel matching)					
County area (km^2)	1,058.1	1,079.5	-1.5	-0.32	0.746
Birth rate (per 1,000 pop.)	18.64	18.58	1.3	0.31	0.760
% white population	87.40	87.65	-1.4	-0.32	0.746
% black population	11.95	11.69	1.4	0.33	0.740
Median years of schooling (male)	7.86	7.82	1.8	0.79	0.431
Median years of schooling (female)	8.43	8.39	1.7	0.70	0.481
Unemployment rate (white)	3.60	3.56	2.7	0.65	0.517
Unemployment rate (black)	6.13	6.43	-2.6	-0.53	0.598

Notes: Matching characteristics observed in 1940. Data comes from the IPUMS: National Historical Geographic Information System (Manson et al., 2022).

Table A.9: Propensity score matching

	(1) Ln (total)	(2) Ln (property)	(3) Ln (violent)	(4) Ln (burglary)	(5) Ln (motor vehicle theft)	(6) Ln (larceny)	(7) Ln (assault)	(8) Ln (robbery)	(9) Ln (rape)	(10) Ln (homicide)
Panel A: PSM (one-to-one matching)										
Any highway	0.054**	0.060***	-0.006	0.042*	0.084***	0.077***	0.029	0.006	-0.069*	-0.027
	(0.023)	(0.023)	(0.032)	(0.026)	(0.029)	(0.025)	(0.039)	(0.032)	(0.037)	(0.040)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	77,159	77,159	77,159	77,159	77,159	77,159	77,159	77,159	77,159	77,159
No. of counties	2,278	2,278	2,278	2,278	2,278	2,278	2,278	2,278	2,278	2,278
Adjusted R-squared	0.896	0.889	0.883	0.859	0.876	0.866	0.881	0.903	0.782	0.677
Panel B: PSM (5 nearest neighbors)										
Any highway	0.049**	0.053***	-0.006	0.037	0.076***	0.066***	0.023	0.016	-0.051	-0.024
	(0.023)	(0.023)	(0.031)	(0.026)	(0.030)	(0.026)	(0.038)	(0.032)	(0.036)	(0.039)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	88,678	88,678	88,678	88,678	88,678	88,678	88,678	88,678	88,678	88,678
No. of counties	2,619	2,619	2,619	2,619	2,619	2,619	2,619	2,619	2,619	2,619
Adjusted R-squared	0.889	0.883	0.876	0.851	0.871	0.859	0.873	0.898	0.769	0.664
Panel D: PSM (Kernel matching)										
Any highway	0.049**	0.053***	-0.003	0.036	0.075***	0.063**	0.025	0.025	-0.041	-0.019
	(0.023)	(0.023)	(0.031)	(0.026)	(0.029)	(0.025)	(0.038)	(0.032)	(0.036)	(0.039)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Czone linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	93,669	93,669	93,669	93,669	93,669	93,669	93,669	93,669	93,669	93,669
No. of counties	2,767	2,767	2,767	2,767	2,767	2,767	2,767	2,767	2,767	2,767
Adjusted R-squared	0.887	0.881	0.874	0.848	0.869	0.857	0.872	0.896	0.765	0.659

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1960-1993) county population. *Ln (total)* – natural log of total # of index crimes per 100,000 pop.; *Ln (property)* – natural log of total # of property crimes per 100,000 pop.; *Ln (violent)* – natural log of total # of violent crimes per 100,000 pop.; *Ln (burglary)* – natural log of # of burglaries per 100,000 pop.; *Ln (motor vehicle theft)* – natural log of # of motor vehicle thefts per 100,000 pop.; *Ln (larceny)* – natural log of # of thefts (larcenies) per 100,000 pop.; *Ln (assault)* – natural log of # of assaults per 100,000 pop.; *Ln (robbery)* – natural log of # of robberies per 100,000 pop.; *Ln (rape)* – natural log of # of rapes per 100,000 pop.; *Ln (homicide)* – natural log of # of homicides per 100,000 pop.; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the FBI's Uniform Crime Reporting Program: Offenses Known and Clearances by Arrest, 1960-2019, compiled by Kaplan (2021b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). 1940 matching characteristics data comes from the IPUMS: National Historical Geographic Information System (Manson et al., 2022). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.10: Interstate Highway System and sectoral employment (1964-1993)

	(1) Ln (agriculture sh.)	(2) Ln (mining sh.)	(3) Ln (construction sh.)	(4) Ln (manufacturing sh.)	(5) Ln (transportation sh.)
Any highway	0.002	-0.012	0.003	0.063***	0.003
	(0.005)	(0.011)	(0.015)	(0.020)	(0.015)
Year FE	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes	Yes
County linear time trends	Yes	Yes	Yes	Yes	Yes
Observations	84,139	70,918	92,606	92,031	92,391
No. of counties	3,093	2,969	3,129	3,123	3,128
Adjusted R-squared	0.415	0.217	0.398	0.371	0.364

	(6) Ln (wholesale sh.)	(7) Ln (retail sh.)	(8) Ln (financial services sh.)	(9) Ln (non-financial services sh.)
Any highway	0.012	0.011	-0.016	-0.005
	(0.013)	(0.010)	(0.012)	(0.012)
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
State-by-year FE	Yes	Yes	Yes	Yes
Population density	Yes	Yes	Yes	Yes
County linear time trends	Yes	Yes	Yes	Yes
Observations	92,128	93,231	92,625	93,020
No. of counties	3,126	3,128	3,123	3,129
Adjusted R-squared	0.501	0.755	0.680	0.884

Notes: Standard errors in parentheses, clustered at the county level. All regressions are weighted by the average (1964-1993) county population. *Ln (agriculture sh.)* – natural log of # of employees in agriculture (mid-March) as % of the total county population; *Ln (mining sh.)* – natural log of # of employees in mining (mid-March) as % of the total county population; *Ln (construction sh.)* – natural log of # of employees in construction (mid-March) as % of the total county population; *Ln (manufacturing sh.)* – natural log of # of employees in manufacturing (mid-March) as % of the total county population; *Ln (transportation sh.)* – natural log of # of employees in transportation (mid-March) as % of the total county population; *Ln (wholesale sh.)* – natural log of # of employees in wholesale (mid-March) as % of the total county population; *Ln (retail sh.)* – natural log of # of employees in retail (mid-March) as % of the total county population; *Ln (financial services sh.)* – natural log of # of employees in financial services (mid-March) as % of the total county population; *Ln (non-financial services sh.)* – natural log of # of employees in non-financial services (mid-March) as % of the total county population; *Any highway* – binary var. equal to 1 if county has at least 1km of interstate highway open. Data comes from the U.S. Census Bureau's County Business Patterns (1964-1993), compiled by Eckert et al. (2022a) and Eckert et al. (2022b). Interstate Highway System county-by-year panel data was compiled by Baum-Snow (2007). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.