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Trade Networks, Heroin Markets, and the Labor Market Outcomes of Vietnam Veterans

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Abstract

The role of ethnic immigrant networks in facilitating international trade is a well-established phenomenon in the literature. However, it is less clear whether this relationship extends to illegal trade and unauthorized immigrants. In this paper, we tackle this question by focusing on the case of the heroin trade and unauthorized Chinese immigrants in the early 1990s United States. Between mid-1980s and mid-1990s, Southeast Asia became the dominant source of heroin in the US. Heroin from this region was trafficked into the US by Chinese organized criminals, whose presence across the country can be approximated by the location of unauthorized Chinese immigrants. Instrumenting for the unauthorized Chinese immigrant enclaves in 1990 with their 1900 counterpart, we first show that Chinese presence in a community led to a sizeable increase in local opiates-related arrests, a proxy for local heroin markets. This effect is driven by arrests for sale/manufacturing of the drugs. Next, we examine the consequences of Chinese-trafficked heroin by looking at its impact on US Vietnam-era veterans – a group particularly vulnerable to heroin addiction in the early 1990s. Using a triple-difference estimation, we find mostly small but statistically significant detrimental effects on labor market outcomes of Vietnam veterans residing in unauthorized Chinese enclaves in 1990.

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Keywords: Trade networks, heroin markets, Vietnam veterans, labor market outcomes

1 Introduction

The role of ethnic immigrant networks in facilitating international trade is a well-documented phenomenon in the literature. As [Gould \(1994\)](#) explains, the presence of immigrants can reduce the transaction costs of trade and change demand preferences, thus boosting bilateral trade flows between immigrants’ host and destination countries. Recent studies have provided compelling empirical evidence in support of this hypothesis ([Parsons and Vezina, 2017](#); [Ottaviano, Peri and Wright, 2018](#); [Rauch and Trindade, 2002](#)). However, does this relationship extend to illegal trade and unauthorized immigrant networks? With the exception of a recent study by [McCully \(2021\)](#) for the case of Spain, the empirical evidence is quite limited.

In the first part of this paper, we shed more light on this question by focusing on the case of international heroin trade and unauthorized Chinese immigrant enclaves in the early 1990s United States. Between mid-1980s and mid-1990s, upward of 70% of all heroin entering the US originated in Southeast Asia – in an area near the joint borders of Myanmar, Laos, and Thailand known as the “Golden Triangle” (Figs. [1](#) and [2](#)). From the Golden Triangle, the heroin was subsequently smuggled into the US through Hong Kong, Macau, and Taiwan, the entire trafficking operation being controlled by ethnic Chinese criminals ([Huang et al., 2012](#); [Tracy, 1993](#)). In the US, Chinese organized criminals – based in ethnic Chinese communities – dominated the wholesale heroin business and parts of the retail sale ([U.S. Senate, 1992](#); [Drug Enforcement Administration, 1992](#)). Thus, we first examine the relationship between the unauthorized Chinese immigrant enclaves and the local opiate-related¹ arrests in the early 1990s US. Since no local data on heroin imports exist, we rely on the FBI’s Uniform Crime Reporting county-level arrest data which – with its coverage of the entire US – provide arguably the best proxy available for local heroin markets.²

In the second part of the paper, we examine the consequences of Chinese-trafficked heroin by looking at its impact on US Vietnam-era veterans – a group particularly vulnerable to heroin addiction in the early 1990s. Early 1970s saw an epidemic of heroin addiction among US soldiers serving in the Vietnam War ([Angrist et al., 2010](#); [Frenkel et al., 1977](#); [US Senate, 1972](#)). The cheap, high-

¹This definition includes all arrests related to heroin (and other natural opium derivatives) as well as cocaine (and its derivatives). All synthetic opioids (e.g. hydrocodone, fentanyl, etc.) are excluded. Unfortunately, no data on heroin arrests alone is available for the US (source: FBI’s Uniform Crime Reporting Program).

²The DEA’s STRIDE database – which contains data on heroin seizures (i.e. quantities and street-level prices) across the country – has been heavily criticized for its unreliability ([Horowitz, 2001](#); [National Research Council, 2001](#)), and therefore does not appear suitable for our analysis

purity heroin which made its debut on the streets of Saigon (the capital of the Republic of Vietnam, RVN) in June of 1970, was essentially the same product – manufactured in the Golden Triangle – that would later appear in the US (U.S. Senate, 1992). During the height of this epidemic in the summer of 1971, up to 34% of US soldiers returning from South Vietnam reported having used heroin while in the RVN (Robins, Davis and Nurco, 1974). Given the highly addictive nature of heroin, a relatively young age of exposure among US soldiers serving in the Vietnam War, a high incidence of post-traumatic stress disorder (PTSD) among these individuals (Kulka et al., 1988), and their poor post-war labor market outcomes (Angrist, 1990), Vietnam-era veterans comprise a group particularly at risk for heroin addiction in the early 1990s. Furthermore, since habitual use of hard drugs in general and heroin in particular have been linked to lower wages as well as employment and labor force participation rates (DeSimone, 2002; Mezza and Buchinsky, 2021; Cho et al., 2021), we focus on the labor market outcomes of Vietnam veterans residing in communities with greater heroin supply in the early 1990s US.

The analysis in this paper is therefore twofold. First, we estimate the impact of Chinese unauthorized enclaves on opiates-related arrests using a cross section of 726 commuting zones.³ The unauthorized immigrants are identified from the 1990 US Census of Population using a so-called residual method (Passel and Cohn, 2014; Borjas and Cassidy, 2019). In order to account for the endogeneity in the concentration of unauthorized Chinese immigrants across the country, we instrument for 1990 Chinese enclaves with their 1900 counterpart. The historical enclaves are constructed using publicly available full-count data from the 1900 US Census of Population. Our identification strategy takes advantage of the strong restrictions that the US government imposed on immigration from China in the period 1882-1965, during which there was virtually no immigration from China into the US. It is unlikely that the factors that determined the location choices of Chinese immigrants in the second half of the 19th century could have driven the settlement choices of Chinese arrivals after 1965.

Second, we conduct a triple-difference analysis, comparing (1) Vietnam-era veterans with comparable non-veterans; (2) in 1990 versus 1980; and (3) those who lived in unauthorized Chinese enclaves versus those who did not. To keep the underlying groups as similar to each other as pos-

³We omit the 15 commuting zones covering Alaska due to the lack of data on the instrumental variable (see Section 3 for more details). Commuting zones are essentially county groupings which approximate local US labor markets (Autor and Dorn, 2013).

sible, we follow Angrist (1990) and Angrist and Chen (2011) and restrict the estimation sample to all men born in 1948-1953 (i.e. those most at risk of conscription through the Vietnam-era lottery draft). However, to increase the external validity of our results, we also re-estimate the triple-difference specification using a sample of all men in prime working age (25-54). The identifying assumption in the triple-difference estimation is relatively weak. The estimator requires that there be no contemporaneous shock that affects the relative outcomes of the Vietnam-era veterans in the commuting zones with unauthorized Chinese immigrants in 1990.

The aggregate-level results show that the presence of unauthorized Chinese immigrant enclaves had a strong positive impact on the number of local opiates arrests, especially those related to the drug sale and/or manufacturing (as opposed to possession). In particular, a 1 percentage point increase in the share of unauthorized Chinese immigrants⁴ in a given commuting zone led to 7 more arrests for opiates' sale/manufacturing per 100,000 residents (0.2 standard deviations). Considering the impact on Vietnam-era veterans born in 1948-1953, we find that those living in unauthorized Chinese enclaves in 1990 had worse labor market outcomes, although the estimated coefficients are small in magnitude. More specifically, we find a 1% decrease (with respect to the sample mean) in their labor force participation, probability of working, number of hours worked per week, and their total annual personal income. We also observe a 14% increase in their likelihood of receiving any Social Security income⁵ coupled with a 17% increase in the total Social Security income collected. Finally, results indicate a 4% reduction in home ownership rates among the Vietnam veterans residing in unauthorized Chinese enclaves in 1990. Considering the sample of all prime working age men, we find qualitatively similar results for Vietnam veterans living in Chinese enclaves in 1990. However, instead of the increase in Social Security income take-up, we observe an increase in the welfare income take-up.⁶

Our paper makes several contributions to the existing economics literature. First, we broaden the understanding of the role of ethnic immigrant networks in facilitating international trade. While previous studies showed that ethnic enclaves increase legal bilateral trade flows between immigrants' home and destination countries (Parsons and Vezina, 2017; Ottaviano, Peri and Wright,

⁴Measured with respect to the total Chinese population in the US in 1990.

⁵This includes income from the Social Security Disability Income (SSDI) – one of the two main disability assistance programs in the US.

⁶This variable captures income from various public assistance programs including that from the Supplemental Security Income (SSI) – the other main disability assistance program in the US.

2018; Rauch and Trindade, 2002), we show that the presence of unauthorized immigrants increase illegal imports – namely smuggling of illegal drugs. This result is broadly consistent with recent findings in McCully (2021) who – using drug confiscation data – shows that immigrants without legal status drive illegal drug imports into Spain. Our result is particularly appealing given that the legal trade effect of immigrant networks is found to be stronger for differentiated products (Rauch and Trindade, 2002). In fact, heroin imported into the US from the Golden Triangle was clearly differentiable from other types of heroin available in the US at that time. Colloquially known on the streets as “China White”, Southeast Asian heroin had a characteristically white color and its purity was unmatched by any heroin imported from other source countries – namely Mexico and Afghanistan (McCoy, 2000; Drug Enforcement Administration, 1992).

Second, we contribute to the literature studying the labor (and non-labor) market outcomes of Vietnam-era veterans in the US, and their future trajectories with respect to comparable non-veterans. Previous studies found significant earnings losses for Vietnam veterans in the 1970s and 1980s, compared to similar non-veterans (Angrist, 1990; Angrist and Chen, 2011; Angrist, Chen and Song, 2011). However, there was a rapid convergence in earnings throughout the 1990s, partially due to increased schooling among veterans who took advantage of the GI Bill (Angrist and Chen, 2011). Recent studies have also shown a remarkable rise in veterans’ disability compensation (Duggan, Rosenheck and Singleton, 2010; Autor, Duggan and Lyle, 2011; Angrist, Chen and Frandsen, 2010) and social security disability insurance (Davies, Purcell and Engelhardt, 2015) since the late 1990s, though these were not necessarily driven by increased incidence of work-related disability (Angrist, Chen and Frandsen, 2010). We extend this literature by looking at the consequences of the Vietnam veterans’ exposure to the heroin markets in the early 1990s US. Although our findings indicate only small negative impact on most labor market outcomes considered, we do observe a fairly substantial up-take in Social Security income, which was likely driven by an increase in the disability income.

Finally, our study also adds to the already established literature on the impact of immigration on local crime in the destination countries. Most studies find no or minimal increase in local crime (Bell, Fasani and Machin, 2013; Bianchi, Pinotti and Buonanno, 2012; Nunziata, 2015; Butcher and Piehl, 1998), although Piopiunik and Ruhose (2017) do document a large increase in crime in Germany after the inflow of some 3 million ethnic Germans from the (former) Soviet Union in the

early 1990s. Contrary to the majority of these studies, our findings suggest that unauthorized immigrant enclaves can boost local crime, and in particular, drug-related offenses. Our sizeable effect on the arrests for sale/manufacturing of opiates (0.2 standard deviations) suggests an important role of unauthorized Chinese enclaves in facilitating heroin trade in the early 1990s US.

The rest of the paper is organized as follows: Section 2 discusses the background. In Section 3, we describe the data, empirical specifications, and the identification strategies. Results and robustness checks are presented in Section 4. Section 5 concludes.

2 Background

There are four important aspects to consider in our analysis: (1) early restrictions on Chinese immigration into the United States; (2) the role of Chinese networks in the international heroin trade; (3) demand for heroin in the 1990s US; and (4) Vietnam War and the heroin addiction among US soldiers serving in Southeast Asia. The first two sections below discuss the background necessary to explain the supply side of our argument. That is, the role of trade networks and the association between unauthorized Chinese enclaves and the supply of heroin in the US in late-1980s/early-1990s. The latter two sections then focus on the demand side of the equation. As explained in more detail below, the target group for this study are the Vietnam-era veterans of the US armed forces.

2.1 Restrictions on early Chinese immigration into the United States

There was substantial immigration from China into the United States from the mid-1800s until 1882.⁷ Most of these arrivals were economic migrants seeking work in mining, agriculture, and railroad building. In response to a perceived negative effect of Chinese workers on natives' labor market outcomes, the US Congress passed the Chinese Exclusion Act of 1882, severely limiting Chinese immigration into the country (Chen, 2015; Kanazawa, 2005). As Figure 3 shows, Chinese immigrant inflows dropped nearly to zero right after the passage of the bill and remained low for the next half a century. Similarly, the stock of Chinese-born population dropped after 1882 and did not recover until 1960 (Fig. 3). During this period, only a few groups of Chinese, such as

⁷For the purpose of our analysis, we include in the definition of Chinese immigrants also individuals from Macau, Honk Kong, and present-day Taiwan.

merchants, teachers, students, diplomats, and travellers were allowed to enter the country (Lee, 2003).

The Chinese Exclusion Act was not repealed until 1943 (Lee, 2003). However, even after the repeal, the Chinese immigrant inflow remained low due to strict country of origin quotas put in place by the Emergency Quota Act of 1921. As Fig. 3 confirms, Chinese immigration into the US did not take off until the repeal of the National Origins Formula by the Immigration Nationality Act of 1965. The first groups to start arriving after 1965 were citizens of Hong Kong and Taiwan. Immigrants from the People’s Republic of China were not permitted leaving the country until 1978, when the Chinese government lifted its emigration restrictions (Hooper and Batalova, 2015). The 1980s then saw a massive increase in the number of immigrants from mainland China entering the US. In contrast with the mostly low-skilled Chinese immigration before 1882, the majority of Chinese migrants entering the US since 1965 have been high-skilled individuals (Hooper and Batalova, 2015).

As shown in Fig. 3, the end result of these different immigration policy regimes is that there was almost no Chinese immigration into the US between 1882 and 1965. We use this fact in our identification strategy.

2.2 Global heroin trade and the US heroin market

2.2.1 Southeast Asian heroin and the Golden Triangle

Heroin is a highly addictive opioid drug made from morphine – a natural substance extracted from the seed pod of an opium poppy plant (DEA, 2017). China has long history of production and addiction to various opium derivatives – including heroin – and by the beginning of the 20th century, the country had over 10 million addicts (Fernandez and Libby, 1989). Over time, China restricted opium production and the industry moved south of the Chinese border into an area known as the “Golden Triangle” (Chin, 2009). In this mountainous and heavily forested region, stretching across parts of Thailand, Laos, and Myanmar (Fig. 2), opium production was controlled by Chinese immigrants or by their descendants (i.e. ethnic Chinese).⁸ As depicted in Fig. 1, the Golden Triangle became the dominant source of heroin in the United States from the mid-

⁸Famously, it is argued that the drug lord Khun Sa – known as the “Opium King” – at one point controlled around half of the world’s total heroin supply (McCoy, 1999; Chouvy, 2013)

1980s until the mid-1990s, when Colombian drug cartels started supplying the US with heroin in addition to cocaine (Ciccarone, 2009; Gibson, Degenhardt and McKetin, 2005; Rosenblum, Unick and Ciccarone, 2014). The increased inflow of Southeast Asian heroin into the US quickly raised street-level purity from around 7% to more than 60% in some areas, causing a decline in intravenous injection and changing the demographics of American heroin use (McCoy, 2000). At the same time, the retail-level price of heroin per gram pure dropped markedly, from \$3,000 in 1983 to under \$1,000 in 1993 (DEA Strategic Intelligence Section, 2016).

2.2.2 Chinese enclaves & US heroin supply in the early 1990s

Commonly referred to as the “China White” on US streets, Southeast Asian heroin was trafficked into the country via the so-called China Route. Starting in the Golden Triangle, heroin entered China via Yunnan Province, then continuing through Guangxi and Guangdong provinces on its way to Hong Kong, Macau, or Taiwan (Huang et al., 2012; United Nations Office on Drugs and Crime, 2013). An alternate direct shipping route between Thailand and Hong Kong was also established to transport larger quantities (Dobinson, 1993). From Macau, Hong Kong, and Taiwan, the heroin was smuggled directly into the US on board of cargo ships and airplanes, or via international mail parcels. Main entry points were established in New York City, San Francisco, Seattle, and Los Angeles, though other cities such as Boston, Anchorage, and Houston were also used (Drug Enforcement Administration, 1992; Tracy, 1993).

The international trafficking operation was controlled by ethnic Chinese and Sino-Thai (i.e. Thai Chinese) organized crime groups. These groups had direct links with domestic ethnic Chinese criminals – based in Chinese enclaves and organized into triads, tongs, and gangs (described in more detail below) – who controlled the wholesale heroin distribution across the United States (U.S. Senate, 1992; Drug Enforcement Administration, 1992). Initially, the retail-level heroin sale was the domain of other groups, such as Italian, Hispanic or African-American dealers (Zhang and Chin, 2003). However, over time, Chinese criminals moved into the street-level sale as well (Drug Enforcement Administration, 1992).⁹

⁹It is important to note that a small fraction of heroin from the Golden Triangle was also smuggled into the US by Nigerian traffickers operating off Lagos. Their strategy was to use a large number of couriers who would fly on passenger airliners from Thailand into the US via one or more transit points. Smuggled quantities of heroin were small; couriers either concealed them in their baggage or ingested them in condoms. Upon entering the US, heroin was sold to various street gangs in cities with high presence of ethnic Nigerians, such as Chicago, Atlanta, or Dallas

2.2.3 History of organized crime in Chinatown

The history of organized crime in Chinese communities reaches all the way back to the period of the first Chinese immigration wave into the US between 1852-1882 (McIllwain, 2014). Starting in San Francisco in the 1850s, many Chinese neighborhoods came under the control of so-called tongs (Eng. “halls” or “gathering places”). These organizations coupled various illegal activities (such as extortion, gambling, prostitution, or labor racketeering) with legitimate roles within the community. In particular, they provided many newly-arrived immigrants with job referrals and housing assistance, or resolved community disputes (McIllwain, 1997; Zhang and Chin, 2003).

However, it was not until the surge in Chinese immigration after the passage of the 1965 Immigration Nationality Act that the organized crime in Chinese communities proliferated. Ethnic Chinese gangs began to form in the 1960s (Zhang and Chin, 2003). At first, their members served as enforcers for the illegal tongs’ operations. However, over time, gangs developed independent sources of income, most of it coming from extorting local businesses (Chin, Fagan and Kelly, 1992; McIllwain, 1997). In fact, according to some law enforcement estimates, by the 1980s, up to 90% of businesses across Chinatowns paid “protection” money to one or more street gangs (Chin, Fagan and Kelly, 1992).

The 1965 liberalization of immigration policy also led a growing influence of traditional Hong Kong-based triads in the United States. These mafia-type organizations – believed by some to be among the largest and most dangerous organized crime groups in the world – had a long history of activities in the mainland China before the rise of Maoism (Zhang and Chin, 2003; Booth, 1990; U.S. Senate, 1992). In the early 1990s, Triads’ illicit activities across China, North America, and Southeast Asia consisted of heroin trafficking, immigrant smuggling, extortion and racketeering, public corruption, gambling, and prostitution (Dubro, 1992; U.S. Senate, 1992).

By mid-1980s, the various organized crime groups described above began trafficking substantial amounts of heroin into the US (Zhang and Chin, 2003; Bryant, 1990; U.S. Senate, 1992).¹⁰ One reason for such a sudden change in the source of heroin supply was the successful US-Mexico government cooperation leading to the Operation Condor – a large-scale marijuana and opium poppy

(Drug Enforcement Administration, 2000, 1992).

¹⁰Although the Chinese tongs in the US did partake in opium trade as far back as the 19th century, these activities were limited and did not become a significant source of income until the 1980s (U.S. Senate, 1877, 1992).

plant eradication campaign – which began in Mexico in 1976 and continued well into the 1980s. This was accompanied by heightened interdiction (seizing drugs in transit) and immobilization (apprehending traffickers) activities by the US Drug Enforcement Administration (DEA) on both sides of the border (Craig, 1980; Toro, 1999). As a direct result of these policies, the estimated share of Mexican heroin in the US dropped from 89% in 1977 to 32% in 1984 (Drug Enforcement Administration, 2000), paving the way for Chinese suppliers to capture the lucrative market.

2.3 US heroin demand in the early 1990s

In most instances, heroin users inject it intravenously, but high-purity substance can also be smoked or snorted. Heroin’s ability to enter the brain (causing a surge of euphoria) quickly leads to addiction. In the US, heroin is classified as a Schedule I drug, with federal mandatory sentencing minimums ranging from 5 years for the first offence with up to 999 grams of the mixture, all the way up to life imprisonment, if caught with two prior offences and quantity of at least 1kg (DEA, 2017).

Producers of heroin have found a lucrative market in the US since at least the 1960s (Nicholas and Churchill, 2012). According to the Office of National Drug Control Policy (1997), by 1995, there were 810,000 hardcore heroin users and another 320,000 occasional heroin users in the country (almost 0.5% of the total population). Rates of heroin use varied across the US population in the early 1990s. In Table 1, we use pooled data from the 1991-93 National Household Survey on Drug Abuse to explore these differentials. Note that social desirability bias may lead to under-reporting of drug use in surveys. In addition, frequent drug users might be more difficult to sample appropriately. However, as long as these levels of under-reporting do not vary substantially across racial and ethnic categories, it is possible to use these data to make group comparisons. Table 1 yields some interesting results. First, note that even with the possibility of under-reporting, it is still the case that over 1% of respondents in the survey reported having used heroin at some point in their lives. Compared to the Whites, the shares are higher for African Americans, Hispanics, and Native Americans, but lower for the Asians. The differences across groups increase when we look at those who have used heroin during the previous month (i.e. active users). For instance, African Americans and Hispanics are close to four times more likely to report having used heroin during the previous month compared to the Whites. Native American share is over six times higher than

that of the Whites. On the other hand, almost no Asians reported having used heroin in the past month.

2.4 Heroin use among Vietnam-era veterans

One group was particularly vulnerable to addiction to high-purity heroin that appeared on US streets in the mid-1980s – the US military veterans who served in the Vietnam War (1964-1975). In 1965, the US sent combat forces into the Republic of Vietnam (RVN, or South Vietnam). While only 82,000 troops arrived in the country that year, by the end of the war, close to 2.7 million Americans have served in the RVN (many of whom had been enlisted via a lottery draft). Some 60,000 US soldiers were killed ([Hastings, 2018](#)). One prominent aspect of the war was widespread heroin use among the US military personnel. As The New York Times reported back in 1971:

“The use of heroin by American troops in Vietnam has reached epidemic proportions. [...] The epidemic is seen by many here as the Army’s last great tragedy in Vietnam. ‘Tens of thousands of soldiers are going back as walking time bombs,’ says a military officer in the drug field. ‘And the sad thing is that there is no real program under way, despite what my superiors say, to salvage these guys.’ ” ([Shuster, 1971](#)).

This epidemic was primarily driven by the appearance of very pure and cheap heroin – sourced from the Golden Triangle – in the RVN in June 1970. The 94-97% pure heroin which sold for \$1–2 per vial became easily available to US servicemen, first in the greater Saigon area, and later across the entire country. For comparison, street heroin in New York City (no more than 10% pure) sold for some \$200 per vial at the time ([US Senate, 1972](#)). Heroin in the RVN was so pure, many soldiers snorted it or even smoked it, instead of injecting it intravenously ([Zinberg, 1972](#)).

Estimates of the share of US troops which used heroin during the Vietnam War vary, but most suggest that the share is high and certainly above 10%, which is noteworthy as drug use is typically under-reported. Studying the returnees from Vietnam in September 1971 – during the height of the epidemic – [Robins, Davis and Nurco \(1974\)](#) found that 34% reported using heroin while stationed in the RVN. Other estimates suggest even higher heroin use within some US Army units at that time. According to a US congressional testimony of Major Jerome Char, psychiatrist for the 101st Airborne Division located in I Corps, 40-50% of men in his division had either experimented with or were addicted to hard drugs, mainly heroin ([US Senate, 1972](#)). In a 1972 survey by [Frenkel,](#)

Morgan and Greden (1977), which was carried out at three separate locations in the RVN, 13.5% of soldiers, on average, reported using heroin. This decline – relative to the previous year – likely reflected the growing efforts of the US military command to curb the ongoing epidemic by targeting both demand and supply of heroin in the RVN (Siegel, 1973).¹¹

Given the highly addictive nature of heroin combined with young age of exposure to the drug, high post-war prevalence of PTSD (Kulka et al., 1988), and poor post-war labor market outcomes among Vietnam-era veterans (Angrist, 1990), the sudden appearance in the US of a virtually identical drug a decade later makes these veterans a particularly vulnerable group to heroin addiction in the early-1990s.

2.5 Heroin addiction, labor market outcomes, and the cost to society

Habitual use of hard drugs has been linked to lower wage rate, annual income, employment rate, and labor force participation rate (DeSimone, 2002; Mezza and Buchinsky, 2021; Buchmueller and Zuvekas, 1998). Focusing on the ongoing US heroin-fentanyl epidemic which began around 2010,¹² Cho et al. (2021) document a detrimental effect of heroin use on employment and labor force participation rates, while also observing an increased uptake of Social Security Disability Insurance (SSDI) income. Similarly, Park and Powell (2021) show a decline in state-level employment-to-population ratio, number of hours worked, and earnings, while also noting an increase in disability applications and beneficiaries.

A couple of studies have also attempted to estimate the overall societal cost of heroin addiction in the US. Considering the 1990s, Mark et al. (2001) suggest the annual cost to be around \$21.9 billion, or 0.3% of the total US GDP in 1996. The majority of this cost (53%) stemmed from the productivity losses due to addiction, including lost earnings due to premature mortality (\$5 billion; or 23% of the total cost), incarceration (\$1.8 billion; 8%), unemployment (\$4.6 billion; 21%), and lower earnings among employed individuals (\$0.1 billion; 0.5%). In light of the more recent heroin-fentanyl epidemic in the 2010s, Jiang et al. (2017) revisited Mark et al. (2001)’s estimates, recalculating the average annual cost of heroin to around \$51.2 billion (0.3% of US GDP in 2015).

¹¹For example, from 1969 to 1971, heroin seizures in RVN increased by 2,610% from 10 to 271 pounds, while drug arrests saw a 122% rise from 2,911 to 6,474 (US Senate, 1972).

¹²As reformulation of the prescription opioid OxyContin forced many OxyContin addicts to switch to heroin and fentanyl (a synthetic opioid more potent than heroin) instead (Park and Powell, 2021).

3 Empirical strategy

3.1 Construction of unauthorized Chinese immigrant enclaves

Since many of the Chinese organized criminals responsible for heroin smuggling into the US throughout the 1980s and the 1990s were also actively engaged in immigrant smuggling (Dubro, 1992; U.S. Senate, 1992), the 1990 distribution of unauthorized Chinese immigrants across the US provides the best available proxy for the local Chinese-supplied heroin. Another reason to focus on unauthorized immigrants – as opposed to their authorized counterparts – is their higher propensity to commit crimes due to factors such as the lack of formal labor market opportunities (Pinotti, 2017; Mastrobuoni and Pinotti, 2015; Gunadi, 2020). Indeed, as McCully (2021) shows, the illegal drug imports in Spain seem largely driven by the presence of unauthorized immigrants.

In order to construct the distribution of unauthorized Chinese immigrants across the US, we employ the so-called residual method developed by Passel and Cohn (2014), and modified by Borjas (2017) and Borjas and Cassidy (2019) for the use with public-use survey datasets. The method first identifies all individuals who are legally authorized to be in the US. The rest of the sample – the residual – then comprises the unauthorized immigrant population. Applying the residual method to the 5% random sample from the 1990 US Census of Population, we first single out all Chinese immigrants, that is, individuals born in China, Macau, or Hong Kong, who are either naturalized US citizens or non-citizens. Then, from this sub-sample, we eliminate all individuals who meet one (or more) of the following criteria:

- I. (S)he is a US citizen;
- II. (S)he arrived in the US before 1980;
- III. (S)he received Social Security benefits or income from any public assistance program (including SSI) during the previous calendar year;¹³
- IV. (S)he is a veteran, currently in the Armed Forces, or works in the government sector;
- V. (S)he is a worker in a licensed occupation (e.g. lawyer, physician, registered nurse);
- VI. (S)he is a householder and their spouse is an authorized immigrant or a US citizen;

¹³Unfortunately, participation in Medicaid, Medicare, or Military Insurance cannot be inferred from the 1990 Census. Furthermore, the census provides no information regarding public housing or rental subsidies. Lastly, the H-1B high-skilled non-immigrant visa correction used in Borjas and Cassidy (2019) cannot be implemented in this case, as the H-1B visas were not issued prior to the enactment of the Immigration Act of 1990 (signed by President Bush in November 1990).

VII. (S)he is a spouse, a child, or a grandchild of a householder who is an authorized immigrant or a US citizen.

The remaining sub-sample comprises the (likely) unauthorized Chinese immigrants residing in the US in 1990. This group is then distributed into the 1990 commuting zones using a probabilistic matching crosswalk provided by [Autor and Dorn \(2013\)](#).¹⁴ Commuting zones (CZs) are the appropriate geographical unit for our analysis as they not only approximate local labor markets, but also provide a complete geographical coverage of the United States ([Autor and Dorn, 2013](#)).¹⁵ The final variable of interest – the share of unauthorized Chinese immigrants (% of all unauthorized Chinese immigrants in the US) – determines the likely importance of each US community in the Chinese heroin distribution network in the early 1990s.

3.2 Unauthorized Chinese enclaves and local heroin markets in early 1990s

3.2.1 Baseline specification

The empirical analysis consists of two parts. First, we show that unauthorized Chinese immigrant share serves as a good proxy for the geographical distribution of Chinese-supplied heroin across the early 1990s US. For that purpose, we estimate the following cross-sectional specification:

$$\text{Opiates arrest rate}_c = \alpha + \beta_1 \text{Unauthorized Chinese share}_c + \gamma X_c + \lambda_s + \epsilon_c \quad (1)$$

where *Opiates arrest rate_c* is the number of arrests related to heroin or cocaine per 100,000 population in a commuting zone (CZ) *c* in 1992. These arrests can be further broken down into sale/manufacturing-related and possession-related.¹⁶ 1992 was chosen since it is the closest year to the peak of the Chinese-supplied heroin in the US (see Fig. 1) for which arrest data is available. *Unauthorized Chinese share_c* is the share of unauthorized immigrants born in China, Hong Kong, or Macau, in a commuting zone *c* (as % of all unauthorized Chinese immigrants in the US) in 1990. As explained in Section 3.1, the unauthorized Chinese immigrant population in each commuting zone is derived using the residual method ([Passel and Cohn, 2014](#); [Borjas and Cassidy,](#)

¹⁴The crosswalk can be downloaded from David Dorn’s data page.

¹⁵By contrast, Metropolitan Statistical Areas (MSAs), cover only places with relatively high population density.

¹⁶This dependent variable also includes arrests for other natural derivatives of opium (e.g. morphine, codeine) as well as the derivatives of cocaine (e.g. crack cocaine). Unfortunately, the UCR data do not distinguish between heroin-related and cocaine-related arrests.

2019). The specification in eq. (1) further controls for state fixed effects (λ_s) and a number of CZ-level socioeconomic characteristics (X_c)¹⁷ measured in 1990. Finally, ϵ_c is the idiosyncratic heteroskedasticity-robust error term. Eq. (1) is estimated using Ordinary Least Squares.

3.2.2 Identification strategy

To identify a plausibly causal effect of unauthorized Chinese share on local opiates arrests, we employ an instrumental variable strategy, instrumenting for the 1990 unauthorized Chinese immigrant distribution with the 1900 total Chinese immigrant distribution. The total distribution includes both unauthorized and authorized Chinese immigrants residing in the US in 1900. The instrument relies on the same basic premise as the more familiar “shift-share” IV (Card, 2001; Altonji and Card, 1991). In particular, immigrants tend to settle down in communities where people of the same ethnic and/or linguistic background are already residing. The obvious limitation of our instrument is the cross-sectional nature of the data. However, given that Chinese immigrant networks are arguably one of oldest and most persistent in the US (Hooper and Batalova, 2015), we are able to exploit a base year immigrant distribution which dates almost an entire century before the study period, that is, further into the past than most papers in the immigration literature that employ a shift-share design.¹⁸ Our instrument is defined as follows:

$$\text{1900 Share of Chinese}_c = \left(\frac{\# \text{ Chinese in } c \text{ in 1900}}{\# \text{ Chinese in US in 1900}} \right) * 100 \quad (2)$$

where *Chinese* are defined to be all individuals either born in China (including Hong Kong, Macau, and Taiwan) or those with Chinese ethnicity reported in the 1900 US Census. The 1900 Census is the first available census after the implementation of the 1882 Chinese Exclusion Act.¹⁹ It captures the Chinese enclaves as they were at the end of the first wave of Chinese migration into the US, which was cut abruptly for the decades to follow (Fig. 3). Importantly for our exclusion restriction, it is unlikely that any local economic factors which determined the settlement choices of Chinese immigrants in the 19th century could still affect the location choices of Chinese migrants arriving

¹⁷The following covariates are included: log of total population, % male, % white, % black % Hispanic, % Nigeria-born, % with less than high school degree, % with college degree, employment rate, labor force participation rate.

¹⁸A comprehensive list of the papers published in top general and field journals in economics is shown in Table A.1 in Jaeger, Ruist and Stuhler (2018).

¹⁹Since the 1890 Census schedules were destroyed by the fire of 1921 (Dorman, 2008).

after the passage of the Immigration and Nationality Services Act of 1965.

3.3 The supply of heroin and Vietnam veterans' labor market outcomes

3.3.1 Triple difference estimation

In the second part of the analysis, we employ a difference-in-difference-in-differences (DDD) framework to estimate the impact of Chinese-supplied heroin in 1990 on the labor market outcomes of Vietnam-era veterans exposed to it. In particular, pooling the 5% random samples from the 1980 and 1990 US Censuses, we estimate the following specification using Ordinary Least Squares:

$$\begin{aligned} \text{Outcome}_{i,c,t} = & \alpha + \beta_1 V_{i,c,t} * U_{i,c,t} * P_{i,c,t} + \beta_2 V_{i,c,t} * U_{i,c,t} + \beta_3 V_{i,c,t} * P_{i,c,t} + \beta_4 U_{i,c,t} * P_{i,c,t} + \\ & \beta_5 V_{i,c,t} + \beta_6 U_{i,c,t} + \beta_7 P_{i,c,t} + \gamma X_{i,c,t} + \delta W_{c,t} + \lambda_c + \mu_{i,c,t} \end{aligned} \quad (3)$$

where $\text{Outcome}_{i,c,t}$ is the value of a given labor market outcome of individual i in commuting zone c in year t . We consider the following labor market outcomes (capturing both extensive and intensive margin of labor market participation): (1) *In labor force* – binary variable equal to 1 if individual is currently employed or actively searching for a job; (2) *Working* – binary variable equal to 1 if individual is currently working; (3) *Worked last year* – binary variable equal to 1 if individual worked at some point during the past calendar year; (4) *Hours worked* – usual number of hours respondent worked per week during the past calendar year; (5) *Weeks worked* – number of weeks respondent worked during the past calendar year; (6) *IHS (income)* – the inverse hyperbolic sine transformation of individual's total pre-tax personal income (from past calendar year). In addition, we investigate the impact of Chinese-supplied heroin on Vietnam veterans' welfare income, social security, and disability income, as well as their home ownership rate. The following dependent variables are considered: (7) *Any welfare* – binary variable equal to 1 if individual received any pre-tax income from various public assistance programs (commonly referred to as "welfare") during the past calendar year. This includes disability income from the federal and/or state Supplemental Security Income (SSI) programs; (8) *IHS (welfare income)* – the inverse hyperbolic sine transformation of individual's total income from public assistant programs (during past calendar year); (9) *Any Social Security* – binary variable equal to 1 if the individual

received any pre-tax Social Security income during past year. This includes disability income from the Social Security Disability Insurance (SSDI) program; (10) *IHS (Social Security)* – the inverse hyperbolic sine transformation of individual’s total Social Security income from past year, including income from Social Security Disability Insurance (SSDI); *Home owner* – binary variable equal to 1 if individual is home owner (includes those with mortgage/loan).

The right hand side of Eq. (3) includes the following variables (and their interactions): $V_{i,c,t}$ – binary variable equal to 1 if individual is a Vietnam-era veteran (i.e. served in the US Armed Forces between August 1964 and April 1975); $U_{i,c,t}$ – binary variable equal to 1 if individual resided in a commuting zone with non-zero share of unauthorized Chinese immigrants in 1990; $P_{i,c,t}$ – binary variable equal to 1 if the observation comes from the 1990 Census. The coefficient of interest – β_1 – captures the variation in the outcome specific to the Vietnam veterans (relative to non-veterans) in the commuting zones with unauthorized Chinese immigrants (relative to those without any) in 1990 (relative to 1980). Eq. (3) further controls for individual-specific characteristics ($X_{i,c,t}$), time-varying commuting zone-level variables ($W_{c,t}$), and the commuting zone fixed effects (λ_c). Finally, $\mu_{i,c,t}$ is the idiosyncratic error term, clustered at the CZ level.

3.3.2 Estimation sample and identifying assumptions

In order to make our control group as comparable to the Vietnam veteran cohort as possible, we follow Angrist (1990) and Angrist and Chen (2011) and restrict the main estimation sample to all men born between 1948 and 1953 – those most at risk of conscription in the Vietnam-era draft lotteries.²⁰ In addition, we eliminate individuals who are still on active duty at the time of the census as well as all non-Vietnam-era veterans. Labor market outcomes of active-duty soldiers are not directly comparable to those of the veterans. Non-Vietnam veterans (especially those who served in combat during the Second World War or the Korean War) could suffer from PTSD and related drug dependence. Thus, they need to be eliminated from the control group as well.

Alternatively, we broaden the sample to all men in the prime working age (25-54). Again, we eliminate active-duty military personnel and non-Vietnam-era veterans. In addition, we drop all individuals born after 1955, as those were too young to be able to serve in South Vietnam.²¹ The

²⁰As a robustness check, we further restrict the cohort to those born in the period 1950-53.

²¹US withdrew all troops from RVN by March 1973. Thus, we eliminate all men under the age of 18 in 1973.

identifying assumption in the triple difference estimation is relatively weak. The DDD estimator requires that there be no contemporaneous shock that affects the relative outcomes of the Vietnam veterans in the commuting zones with unauthorized Chinese immigrants in 1990.

3.4 Data

Our analysis employs several data sources. First, we use the 5% sample from the 1990 US Census to construct the 1990 distribution of unauthorized Chinese immigrants across all 741 commuting zones (as defined in 1990). The 5% samples from both the 1990 and the 1980 censuses are then used to generate several socioeconomic characteristics at the commuting zone level. These census samples further identify almost one million U.S. military veterans engaged in active-duty service during the Vietnam War era (August 1964 – April 1975). The individual-level analysis focuses on the labor market outcomes of these veterans, which are captured in considerable detail in the decennial census. Using a probabilistic matching crosswalk provided by [Autor and Dorn \(2013\)](#), both census samples can be matched into the 1990 commuting zones. The census data was obtained from the University of Minnesota’s Integrated Public Use Microdata Series (IPUMS).

To construct the 1900 distribution of Chinese immigrants, we utilize the full count data from the 1900 US Census, which is also provided by the IPUMS. The data totals almost 76 million observations, enabling us to precisely identify the historical Chinese enclaves across 49 US states and the District of Columbia.²² Using another probabilistic matching crosswalk – constructed by [Eckert, Gvartz and Peters \(2018\)](#) – we were able to match all observations into the 1990 commuting zones. In total, 726 out of 741 commuting zones were identified (the 15 missing CZs are all from Alaska).

Finally, the drug arrest data came from the 1992 Uniform Crime Reporting (UCR) Program Data: County-Level Detailed Arrest and Offense Data, provided by the National Archive of Criminal Justice Data (NACJD). Since commuting zones are basically county groupings, we employed another crosswalk by [Autor and Dorn \(2013\)](#) to aggregate the county-level arrest data into the 1990 commuting zones. Table 2 reports the descriptive statistics for all commuting zone-level variables used in the aggregate-level analysis. Similarly, in Table 3, we show the descriptive statistics for all

²²No observations from Alaska are included in the 1900 Census, since Alaska did not become a US state until 1959.

individual-level variables used in the triple-difference estimation.

4 Results

Our empirical results are presented in two parts. First, we explore the impact of unauthorized Chinese immigrant enclaves on local heroin supply in the early-1990s US – proxied by opiate-related arrest rates. Then, focusing on the Vietnam veterans – many of whom used Southeast Asian heroin during the war – we explore the impact of the proximity to greater heroin supply on their labor market outcomes in 1990 (some 15 years after the end of the war).

4.1 Unauthorized Chinese immigrant enclaves and local heroin markets

Table 4 shows the OLS and IV estimates from our aggregate-level cross sectional analysis. We observe a statistically significant and economically meaningful increase in opiate-related arrests in unauthorized Chinese enclaves, driven primarily by arrests for the drug sale and/or manufacturing. In particular, as the IV estimate from col. (1) suggests, a 1 percentage point increase in the share of unauthorized Chinese immigrants in a commuting zone led to 11 more opiate-related arrests per 100,000 population in 1992 (0.1 standard deviation of the dependent variable). Unpacking this effect, we observe that 7 of these additional arrests (0.2 std. dev.) were related to the drug sale and/or manufacturing (Table 4, col. 2). The IV coefficient on arrests for possession – albeit positive – is not statistically significant (Table 4, col. 3). This is consistent with the idea that the enclaves serve as a good proxy for the local heroin supply. As far as the relevance of the instrument is concerned, the value of the [Montiel Olea and Pflueger \(2013\)](#)’s Effective F Statistic (12.59) does suggest a potential problem with weak instrument bias (the first-stage estimate can be found in Table A.1). To circumvent this issue, we report the weak instrument-robust Anderson-Rubin chi-sq. test p-values. The main point estimates remain statistically significant at 5%. It is also noteworthy that the differences between OLS and IV estimates are small and not significantly different from 0.

We conduct a further placebo test to see whether the presence of unauthorized Chinese enclaves drove arrests for other drugs in the early-1990s. Results are presented in Table 5. Reassuringly, enclaves presence does not appear to have affected arrests for the sale/manufacturing of marijuana, synthetic drugs, or other drugs (Table 5). Another potential problem arises from the fact that the

UCR data do not differentiate between heroin and cocaine-related arrests. However, it is unlikely that our main estimates are driven by an increase in cocaine-related arrests instead. Since its inception, the cocaine business has been dominated by traffickers from Colombia and Mexico, with minor roles also played by Jamaican and Dominican smugglers ([Drug Enforcement Administration, 2000](#)). In the main specification, we control for the share of Hispanics in a commuting zone. Moreover, the IV results are robust to re-estimating eq. (1) while specifically controlling for the shares of Mexicans, Colombians, Dominicans, and Jamaicans, as proxies for the presence of these drug trafficking groups (Table [A.2](#)).

4.2 Heroin supply and Vietnam veterans' labor market outcomes

A common perception in popular media and policy circles is that Vietnam veterans fare worse in the labor market than their contemporaries. The academic literature largely supports the idea that, on average, Vietnam veterans' labor market (and other) outcomes are systematically different from those of comparable non-veterans ([Angrist, 1990](#); [Autor, Duggan and Lyle, 2011](#); [Davies, Purcell and Engelhardt, 2015](#)). However, despite substantial gaps throughout the 1970s and 1980s, studies have shown a rapid convergence in earnings and schooling outcomes between the two groups throughout the 1990s ([Angrist and Chen, 2011](#); [Angrist, Chen and Song, 2011](#)).²³ Hence, our analysis takes place in a context in which the labor market outcomes of an average Vietnam veteran, relative to a comparable non-veteran, are already improving.

Tables [6](#) presents the results from our triple-difference estimation focusing on Vietnam veterans born in 1948-1953 and residing in unauthorized Chinese enclaves in 1990. Findings suggests mostly small but statistically significant impact of heroin markets on veteran's labor market outcomes. More specifically, we observe a 1% decline (with respect to sample mean) in labor force participation, likelihood of working, usual number of weeks worked per year, and the total annual personal income (Tables [6](#), cols. 1, 2, 5, and 6). The probability of working at some point in the past year as well as the usual number of hours worked per week also decline but the estimates are not statistically significant (Tables [6](#), cols. 3 and 4).

Vietnam veterans living in unauthorized Chinese enclaves in 1990 had also a significantly higher

²³Nevertheless, according to [Autor, Duggan and Lyle \(2011\)](#), this convergence seems to have been reversed during the 2000s.

Social Security income take-up. More specifically, we observe a 14% increase in the probability of receiving any Social Security income (Tables 6, col. 9) while the total Social Security income collected went up by about 17% relative to the sample mean. Given that the youngest individuals in this cohort are 42 years old in 1990 – and thus significantly below the retirement age – this effect is driven by an increase in the take-up of the Social Security Disability Insurance (SSDI) – one of the two main disability assistance programs in the US. Table 6 further suggests some increase in welfare income take-up, though the estimates are not statistically significant (cols. 7 and 8). Lastly, we also observe a non-negligible decline in home ownership rates (4%) among Vietnam veterans living in unauthorized Chinese enclaves in 1990 (Table 6, col. 11).

Re-estimating eq. (3) using the sample of all men in the prime working age (25-54) yields similar results (Table 7). However, the positive effect on Social Security take-up disappears while both estimates on welfare income increase in magnitude and become significant at 5% (Table 7, cols. 7 and 8). These variables capture, among other things, income collected from the Supplemental Security Income (SSI) program – the other major disability assistance program in the country. Overall, the estimated labor market effects on Vietnam veterans living in unauthorized Chinese enclaves in 1990 seem mostly small in magnitude. However, it is important to keep in mind that while anywhere between 13.5–34% of US soldiers used heroin while in Vietnam (Robins, Davis and Nurco, 1974; Frenkel, Morgan and Greden, 1977), the share of those still using it after returning to the States likely fell below 10% (Robins, Davis and Nurco, 1974). Our estimates are therefore likely capturing these marginal effects.

4.3 Additional robustness checks

We have conducted a battery of additional robustness checks to test the sensitivity of our IV and DDD estimates. Table A.3 shows that the aggregate-level results are robust to weighting commuting zones by their total 1990 population. Moreover, changing the definition of unauthorized Chinese enclaves to include ethnic Chinese individuals born in one of the Golden Triangle countries (i.e. Myanmar, Laos, Thailand), if anything, somewhat increases the magnitude of our IV estimates (Table A.4). The same is true for using the total Chinese enclaves (constructed using unauthorized and authorized immigrants) as the main independent variable (Table A.5).

Similarly, the individual-level triple-difference estimates are robust to using alternative definition

of unauthorized Chinese enclaves (Table A.6) as well as the total Chinese enclaves (Table A.7). In addition, consistent with Angrist (1990), we re-estimated the triple-difference analysis on a more restricted sample, focusing only on men born in 1950-1953 (Table A.8). Results are robust across all the outcomes although some of the outcomes do lose statistical significance. Finally, using a continuous measure of unauthorized Chinese immigrant presence as opposed to the binary variable does not qualitatively alter the results either (Table A.9).

5 Conclusion

The relationship between immigrant networks and international trade has only recently received substantial attention from the economists. Moreover, most existing studies focus solely on the role of immigrant enclaves in boosting legal imports into the host country (Parsons and Vezina, 2017; Ottaviano, Peri and Wright, 2018; Rauch and Trindade, 2002). Consistent with a concurrent work on Spain by McCully (2021), we extend this framework to the case of illegal drug imports, focusing specifically on the role of unauthorized immigrant enclaves in facilitating heroin imports. In particular, we study the case of unauthorized Chinese immigrant networks and heroin smuggling in the early-1990s United States. Using an instrumental variable approach which exploits early restrictions on Chinese immigration into the US, we find that a 1 percentage point increase in the share of unauthorized Chinese immigrants in a commuting zone increased local arrests for sale and/or manufacturing of opiates by 7 arrests per 100,000 population (0.2 std. deviations).

In the second part of the paper, we explore the consequences of Chinese-supplied heroin by studying the impact on Vietnam-era veterans, a group particularly vulnerable to heroin addiction in the early-1990s US. Using a triple-difference framework, we find mostly small but significant negative impact on labor market outcomes of Vietnam veterans living in unauthorized Chinese enclaves in 1990.

Overall, our results suggest that policies aimed at regularizing immigrants – such as the 2012 Deferred Action for Childhood Arrivals (DACA) in the US – could potentially help curb the smuggling of hard drugs into the country. Further research should explore whether the relationship between unauthorized immigrant enclaves and illegal drug imports into the US extends beyond Chinese communities, especially given the prominent role Mexican drug cartels have played in

fueling the present-day US opioid epidemic – one of the most serious public health crises in US history. What began as an epidemic of prescription opioids in the late-1990s eventually mutated into an epidemic of heroin and later fentanyl (Nature, 2019). With Mexican drug cartels currently believed to be supplying the US with upwards of 90% of all heroin, as well as a growing share of fentanyl (DEA, 2020), the role of unauthorized Mexican immigrant networks in facilitating these illegal imports needs to be better understood.

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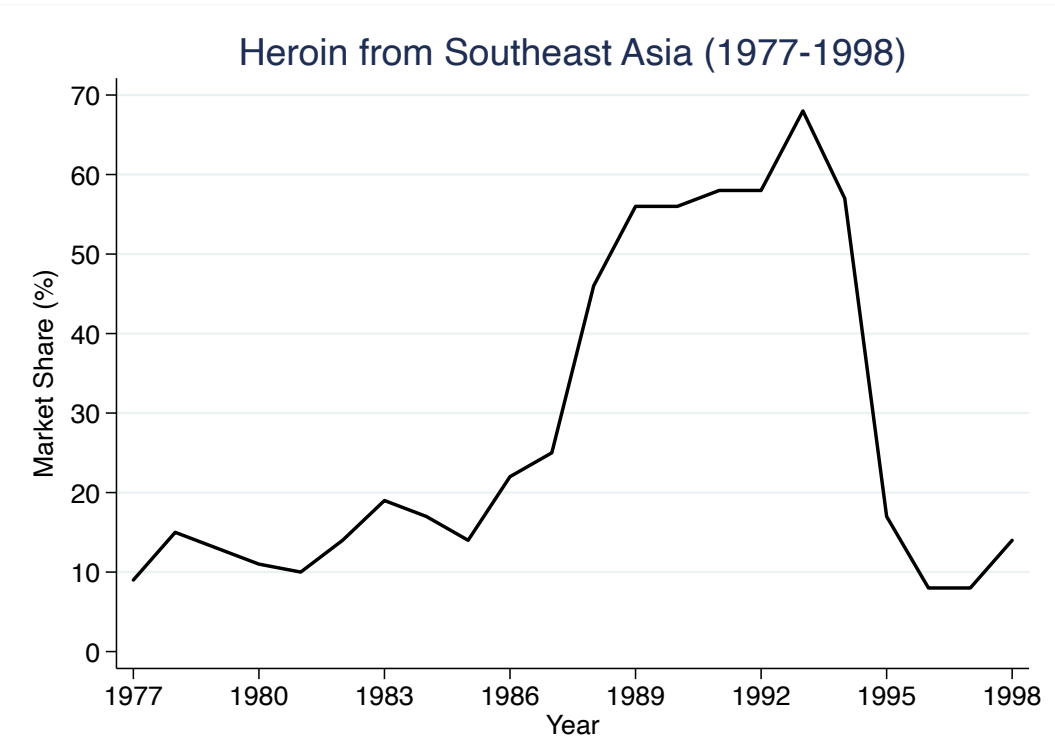
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Figure 1: US Market Share of Heroin Originating in the Golden Triangle



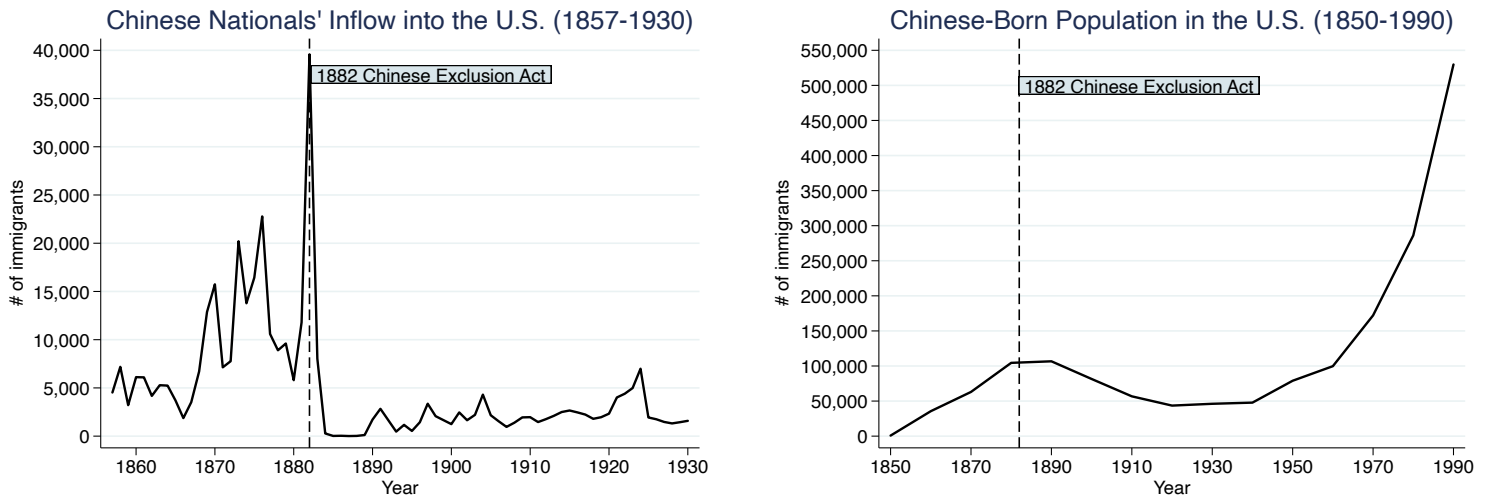
Notes - Data come from [Drug Enforcement Administration \(2000\)](#).

Figure 2: Area of the Golden Triangle in Southeast Asia



Notes - Southeast Asia's Golden Triangle (i.e. the yellow triangle on the map) is a mountainous and heavily forested area stretching between eastern Myanmar in the west, northwestern Laos in the east, and northern Thailand in the south (Chouvy, 2013; Lyttleton, 2004; Chalk, 2000).

Figure 3: Stock and Inflow of Chinese Immigrants into the US



Notes - Data come from 1850-1990 Decennial US Censuses, the Annual reports of the Commissioner of Naturalization to the Secretary of Labor (1891/92, 1901/02), the Annual reports of the Commissioner-General of Immigration to the Secretary of Commerce and Labor (1896/97-1900/01), and the Annual reports of the Superintendent of Immigration to the Secretary of the Treasury (1891/92-1901/02).

Table 1: Heroin Usage in the U.S. Population (1991-1993)

Group	% Ever Used Heroin	% Used Heroin in Past Month
All	1.10	0.04
Male	1.49	0.06
Female	0.75	0.03
White	1.03	0.03
African American	1.67	0.13
Hispanic	1.22	0.11
Native American	2.27	0.19
Asian	0.41	0.00
Age 25–54	1.80	0.04
Less Than HS Diploma	1.02	0.09

Notes - Data comes from the 1991-1993 *National Household Survey of Drug Abuse*. The pooled sample contains 87,915 observations in total.

Table 2: Descriptive Statistics – Aggregate-Level Analysis

	Mean	Standard Deviation
Total opiates arrest rate	70.35	98.59
Opiates sale/manufacturing arrest rate	27.13	42.09
Opiates possession arrest rate	43.23	65.42
Share of Chinese (% all US Chinese)	0.14%	1.26%
Total population	340,984	940,045
% male	49.0%	0.99%
% white	86.7%	12.5%
% black	7.73%	11.6%
% Hispanic	5.76%	11.7%
% Nigerian-born	0.01%	0.02%
% less than HS degree	44.5%	6.11%
% college degree	10.0%	3.18%
Employment rate	57.6%	5.48%
Labor force participation rate	61.6%	4.85%
<i>Observations</i>	726	

Notes - Data comes from 1900 U.S. Census, 1992 U.S. Census of Governments, 1992 Uniform Crime Reporting Program Data: County-Level Detailed Arrest and Offense Data, and 1992 Uniform Crime Reporting Program Data: Law Enforcement Officers Killed and Assaulted (LEOKA). The 726 commuting zones cover all of the US except for Alaska. *Total opiates arrest rate* – # of arrests per 100,000 for manufacturing, sale, or possession of heroin, cocaine, or opium (and its other derivatives such as morphine or codeine) in 1992. *Opiates sale/manufacturing arrest rate* – # of arrests per 100,000 for sale and/or manufacturing of heroin, cocaine, or opium (and its other derivatives such as morphine or codeine) in 1992. *Opiates possession arrest rate* – # of arrests per 100,000 for possession of heroin, cocaine, or opium (and its other derivatives such as morphine or codeine) in 1992. *Share of Chinese (% all US Chinese)* – share of Chinese as % of all Chinese in the US in 1990.

Table 3: Descriptive Statistics – Triple-Difference Analysis

	Mean	Standard Deviation
In labor force	0.93	0.26
Working	0.87	0.33
Worked last year	0.94	0.24
Hours worked	41.64	15.34
Weeks worked	44.26	15.11
IHS (income)	10.03	2.10
Any welfare	0.022	0.15
IHS (welfare inc.)	0.18	1.21
Any Social Security	0.019	0.14
IHS (Social Security)	0.16	1.17
Home owner	0.69	0.46
Married	0.72	0.45
Age	34.04	5.65
Experience	15.05	6.39
Less than high school	0.32	0.47
HS degree	0.14	0.35
College degree	0.18	0.39
White	0.87	0.34
Black	0.08	0.27
Native American/Alaskan Native	0.01	0.11
Asian	0.02	0.13
Hispanic	0.06	0.24
Born out of the U.S.	0.07	0.25
<i>Observations</i>	1,628,924	

Notes - Data comes from the 1990 U.S. Census. Sample consists of all Vietnam veterans identified in the 5% census random sample (except for those from Alaska). *In labor force* – binary var. equal 1 if individual currently employed or actively searching for job. *Working* – binary var. equal 1 if individual currently working. *Worked last year* – binary var. equal 1 if individual worked at some point during the past calendar year. *Hours worked* – # of usual hours worked per week during past year. *Weeks worked* – # of weeks worked during past year. *Total personal income* – individual’s total pre-tax personal income (from past year). *Any welfare* – binary var. equal 1 if individual received any pre-tax income from various public assistance programs (commonly referred to as “welfare”) during past year. *Total welfare income* – individual’s total income from public assistant programs (during past year). *Any Social Security* – binary var. equal 1 if individual received any pre-tax Social Security income during past year, including income from Social Security Disability Insurance (SSDI). *Total Social Security* – individual’s total Social Security income from past year, including income from Social Security Disability Insurance (SSDI). *Male* – binary var. equal 1 if individual is male, 0 otherwise. *Married* – binary var. equal 1 if individual is married, 0 otherwise. *Experience* – total work experience defined as *Age* – *Years of education* – 6. *Less than high school* – binary var. equal 1 if individual has less than a high school diploma, 0 otherwise. *HS degree* – binary var. equal 1 if individual has exactly a high school diploma, 0 otherwise. *Some college* – binary var. equal 1 if individual has some college education (including associate degree), 0 otherwise. *College degree* – binary var. equal 1 if individual has BA/BS degree or above, 0 otherwise. *White* – binary var. equal 1 if individual is identified as white in 1990 US Census, 0 otherwise. *Black* – binary var. equal 1 if individual is identified as African American in 1990 US Census, 0 otherwise. *Native American/Alaskan Native* – binary var. equal 1 if individual is identified as Native American or Alaskan Native in 1990 US Census, 0 otherwise. *Asian* – binary var. equal 1 if individual is identified as Asian in 1990 US Census, 0 otherwise. *Hispanic* – binary var. equal 1 if individual is identified as Hispanic in 1990 US Census, 0 otherwise. *Born out of the U.S.* – binary var. equal 1 if individual was born outside of U.S. (and its territories), 0 otherwise.

Table 4: Unauthorized Chinese Enclaves and Opiates Arrests in 1992 (OLS & IV)

	(1)	(2)	(3)
OLS	Total	Sale/manufacturing	Possession
Share unauthorized Chinese in 1990 (% unauthorized Chinese in US)	9.808*** (3.038)	7.351*** (2.078)	2.457* (1.334)
Observations	726	726	726
Adjusted R-squared	0.662	0.577	0.609
Mean of dependent variable	70.35	27.13	43.23
Standard deviation of dep. variable	98.59	42.09	65.42
<hr/>			
IV	Total	Sale/manufacturing	Possession
Share unauthorized Chinese in 1990 (% unauthorized Chinese in US)	11.13*** (3.878)	6.665*** (1.647)	4.464 (3.239)
Observations	726	726	726
Mean of dependent variable	70.35	27.13	43.23
Standard deviation of dep. variable	98.59	42.09	65.42
Effective F Statistic	12.59	12.59	12.59
Anderson-Rubin chi-sq. test p-val.	0.019	0.023	0.148

Notes - Robust standard errors in parentheses. Effective F Statistic comes from [Montiel Olea and Pflueger \(2013\)](#). Critical values (% of worst case bias) are as follows: 37.42 ($\tau = 5\%$), 23.11 ($\tau = 10\%$), 15.06 ($\tau = 20\%$), 12.04 ($\tau = 30\%$). *Share unauthorized Chinese in 1990* - # of unauthorized Chinese immigrants in commuting zone in 1990 (as % of all unauthorized Chinese immigrants in the U.S. in 1990). Chinese immigrants are defined as all individuals born in China, Macau, or Hong Kong. Unauthorized Chinese immigrant population in each commuting zone was determined using the residual method ([Passel and Cohn, 2014](#); [Borjas and Cassidy, 2019](#)). *Total* - # of arrests per 100,000 for manufacturing, sale, or possession of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. *Sale/manufacturing* - # of arrests per 100,000 for sale and/or manufacturing of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. *Possession* - # of arrests per 100,000 for possession of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. All specifications control for state fixed effects and the following 1990 commuting zone level characteristics: log of total population, % male, % white, % black, % Hispanic, % Nigerian, % less than HS diploma (or equivalent), % college degree, employment rate, and labor force participation rate. Data comes from the 1990 and 1990 U.S. Censuses and the 1992 Uniform Crime Reporting Program Data: County-Level Detailed Arrest and Offense Data. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 5: Placebo Test – Sale/Manufacturing of Marijuana, Synthetics, Other Drugs (IV)

	(1)	(2)	(3)
IV	Sale/manufacturing <i>marijuana</i>	Sale/manufacturing <i>synthetics</i>	Sale/manufacturing <i>other</i>
Share unauthorized Chinese in 1990 (% unauthorized Chinese in US)	1.083 (0.783)	-0.130 (0.084)	-0.557 (0.711)
Observations	726	726	726
Mean of dependent variable	26.39	2.047	8.388
Standard deviation of dep. variable	30.22	4.870	25.39
Effective F Statistic	12.59	12.59	12.59
Anderson-Rubin chi-sq. test p-val.	0.245	0.076	0.442

Notes - Robust standard errors in parentheses. Effective F Statistic comes from [Montiel Olea and Pflueger \(2013\)](#). Critical values (% of worst case bias) are as follows: 37.42 ($\tau = 5\%$), 23.11 ($\tau = 10\%$), 15.06 ($\tau = 20\%$), 12.04 ($\tau = 30\%$). *Share unauthorized Chinese in 1990* – # of unauthorized Chinese immigrants in commuting zone in 1990 (as % of all unauthorized Chinese immigrants in the U.S. in 1990). Chinese immigrants are defined as all individuals born in China, Macau, or Hong Kong. Unauthorized Chinese immigrant population in each commuting zone was determined using the residual method ([Passel and Cohn, 2014](#); [Borjas and Cassidy, 2019](#)). *Sale/manufacturing (marijuana)* – # of arrests per 100,000 for sale and/or manufacturing of marijuana in 1992. *Sale/manufacturing (synthetics)* – # of arrests per 100,000 for sale and/or manufacturing of synthetic narcotics which can cause true drug addiction (Demerol, methadones, etc.) in 1992. *Sale/manufacturing (other)* – # of arrests per 100,000 for sale and/or manufacturing of other dangerous non-narcotic drugs (barbiturates, benzedrine, etc.) in 1992. All specifications also control for state fixed effects and the following 1990 commuting zone level characteristics: log of total population, % male, % white, % black, % Nigerian, % less than HS diploma (or equivalent), % college degree, employment rate, and labor force participation rate. Data comes from the 1900 and 1990 U.S. Censuses, the 1992 Uniform Crime Reporting Program Data: County-Level Detailed Arrest and Offense Data, and the 1992 U.S. Census of Governments. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 6: Heroin Exposure & Vietnam Veterans' Labor Market Outcomes (DDD): Born 1948-1953

OLS	(1) In labor force	(2) Working	(3) Worked last year	(4) Hours worked	(5) Weeks worked	(6) IHS (income)
Vietnam vet * Unauthorized Chinese enclave * Post	-0.0082*** (0.0027)	-0.0076** (0.0034)	-0.0038 (0.0025)	-0.267 (0.164)	-0.437*** (0.163)	-0.0573** (0.0228)
Observations	1,628,861	1,628,861	1,628,861	1,628,861	1,628,861	1,628,861
Adjusted R-squared	0.079	0.100	0.085	0.095	0.123	0.141
Mean of dependent variable	0.924	0.873	0.935	40.81	44.18	10.06
Standard deviation of dep. variable	0.264	0.333	0.247	14.92	15.29	2.150

OLS	(7) Any welfare	(8) IHS (welfare inc.)	(9) Any Social Security	(10) IHS (Social Security)	(11) Home owner
Vietnam vet * Unauthorized Chinese enclave * Post	0.0017 (0.0016)	0.0118 (0.0130)	0.0025* (0.0015)	0.0251** (0.0125)	-0.0240*** (0.0050)
Observations	1,628,861	1,628,861	1,628,861	1,628,861	1,601,468
Adjusted R-squared	0.038	0.037	0.020	0.021	0.133
Mean of dependent variable	0.022	0.181	0.018	0.151	0.657
Standard deviation of dep. variable	0.148	1.213	0.132	1.136	0.475

Notes - Standard errors in parentheses, clustered at 1990 commuting zone level (726 clusters in total). *Vietnam vet* – binary var. equal to 1 if individual is Vietnam-era veteran. *Post* – binary var. equal to 1 if the observation comes from 1990 Census. *Unauthorized Chinese enclave* – binary var. equal to 1 if individual resided in commuting zone with non-zero share of unauthorized Chinese immigrants in 1990. Chinese immigrants are defined as all individuals born in China, Macau, or Hong Kong. Unauthorized Chinese immigrant population in each commuting zone was determined using the residual method (Passel and Cohn, 2014; Borjas and Cassidy, 2019). *In labor force* – binary var. equal 1 if individual currently employed or actively searching for job. *Working* – binary var. equal 1 if individual currently working. *Worked last year* – binary var. equal 1 if individual worked at some point during the past calendar year. *Hours worked* – # of usual hours worked per week during past year. *Weeks worked* – # of weeks worked during past year. *IHS (income)* – Inverse Hyperbolic Sine transformation of individual's total pre-tax personal income (from past year). *Any welfare* – binary var. equal 1 if individual received any pre-tax income from various public assistance programs (commonly referred to as “welfare”) during past year, including the federal/state Supplemental Security Income (SSI). *IHS (welfare inc.)* – Inverse Hyperbolic Sine transformation of individual's total income from public assistant programs (during past year). *Any Social Security* – binary var. equal 1 if individual received any pre-tax Social Security income during past year, including income from Social Security Disability Insurance (SSDI). *IHS (Social Security)* – Inverse Hyperbolic Sine transformation of individual's total Social Security income from past year, including income from Social Security Disability Insurance (SSDI). *Home owner* – binary var. equal to 1 if individual is home owner (includes those with mortgage/loan). Data comes from the 1980 and 1990 U.S. Censuses. Estimation sample is restricted to all men born in 1948-1953 (i.e. those eligible for Vietnam War draft lottery). Those currently on active duty military service as well as all non-Vietnam era veterans are excluded from the sample. All specifications include *Vietnam vet*, *Post*, and *Unauthorized Chinese enclave* binary variables, as well as all pairwise interaction terms among these binary variables. Finally, all specifications also control for year & commuting zone fixed effects, individual-level demographics (age, age-squared, experience, and binary vars. for marital status, education, race/ethnicity, birth place outside the U.S.), as well as commuting zone level characteristics (log of total population, % male, % white, % black, % less than HS diploma, % college degree, employment rate, labor force participation rate, % Nigerian, % Mexican, % Colombian, % Dominican, % Jamaican). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table 7: Heroin Exposure & Vietnam Veterans' Labor Market Outcomes (DDD): Prime Working Age (25-54) Sample

	(1)	(2)	(3)	(4)	(5)	(6)
OLS	In labor force	Working	Worked last year	Hours worked	Weeks worked	IHS (income)
Vietnam vet * Unauthorized Chinese enclave * Post	-0.0061*** (0.0020)	-0.0059*** (0.0023)	-0.0026 (0.0018)	-0.308*** (0.114)	-0.407*** (0.119)	-0.0234 (0.0143)
Observations	4,429,120	4,429,120	4,429,120	4,429,120	4,429,120	4,429,120
Adjusted R-squared	0.088	0.102	0.091	0.101	0.125	0.138
Mean of dependent variable	0.918	0.871	0.925	40.56	44.10	10.11
Standard deviation of dep. variable	0.275	0.335	0.263	15.50	15.68	2.143

	(7)	(8)	(9)	(10)	(11)
OLS	Any welfare	IHS (welfare inc.)	Any Social Security	IHS (Social Security)	Home owner
Vietnam vet * Unauthorized Chinese enclave * Post	0.0026*** (0.0010)	0.0194** (0.0085)	-0.0005 (0.0010)	-0.0007 (0.0093)	-0.0075** (0.0032)
Observations	4,429,120	4,429,120	4,429,120	4,429,120	4,363,245
Adjusted R-squared	0.041	0.040	0.030	0.030	0.151
Mean of dependent variable	0.024	0.196	0.024	0.206	0.707
Standard deviation of dep. variable	0.153	1.264	0.153	1.327	0.455

Notes - Standard errors in parentheses, clustered at 1990 commuting zone level (726 clusters in total). *Vietnam vet* – binary var. equal to 1 if individual is Vietnam-era veteran. *Post* – binary var. equal to 1 if the observation comes from 1990 Census. *Unauthorized Chinese enclave* – binary var. equal to 1 if individual resided in commuting zone with non-zero share of unauthorized Chinese immigrants in 1990. Chinese immigrants are defined as all individuals born in China, Macau, or Hong Kong. Unauthorized Chinese immigrant population in each commuting zone was determined using the residual method (Passel and Cohn, 2014; Borjas and Cassidy, 2019). *In labor force* – binary var. equal 1 if individual currently employed or actively searching for job. *Working* – binary var. equal 1 if individual currently working. *Worked last year* – binary var. equal 1 if individual worked at some point during the past calendar year. *Hours worked* – # of usual hours worked per week during past year. *Weeks worked* – # of weeks worked during past year. *IHS (income)* – Inverse Hyperbolic Sine transformation of individual's total pre-tax personal income (from past year). *Any welfare* – binary var. equal 1 if individual received any pre-tax income from various public assistance programs (commonly referred to as “welfare”) during past year, including the federal/state Supplemental Security Income (SSI). *IHS (welfare inc.)* – Inverse Hyperbolic Sine transformation of individual's total income from public assistant programs (during past year). *Any Social Security* – binary var. equal 1 if individual received any pre-tax Social Security income during past year, including income from Social Security Disability Insurance (SSDI). *IHS (Social Security)* – Inverse Hyperbolic Sine transformation of individual's total Social Security income from past year, including income from Social Security Disability Insurance (SSDI). *Home owner* – binary var. equal to 1 if individual is home owner (includes those with mortgage/loan). Data comes from the 1980 and 1990 U.S. Censuses. Estimation sample is restricted to all men born in prime working age (25-54). Those currently on active duty military service, all non-Vietnam era veterans, and all men born after 1955 are excluded from the sample. All specifications include *Vietnam vet*, *Post*, and *Unauthorized Chinese enclave* binary variables, as well as all pairwise interaction terms among these binary variables. Finally, all specifications also control for year & commuting zone fixed effects, individual-level demographics (age, age-squared, experience, and binary vars. for marital status, education, race/ethnicity, birth place outside the U.S.), as well as commuting zone level characteristics (log of total population, % male, % white, % black, % less than HS diploma, % college degree, employment rate, labor force participation rate, % Nigerian, % Mexican, % Colombian, % Dominican, % Jamaican). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Appendix A

Table A.1: First Stage IV Estimate – Chinese Enclaves in 1900

(1)	
OLS	Share unauthorized Chinese in 1990
Share all Chinese in 1900	1.032*** (0.291)
Observations	726
Effective F Statistic	12.59

Notes - Robust standard errors in parentheses. Effective F Statistic comes from [Montiel Olea and Pflueger \(2013\)](#). Critical values (% of worst case bias) are as follows: 37.42 ($\tau = 5\%$), 23.11 ($\tau = 10\%$), 15.06 ($\tau = 20\%$), 12.04 ($\tau = 30\%$). *Share unauthorized Chinese in 1990* – # of unauthorized Chinese immigrants in commuting zone in 1990 (as % of all unauthorized Chinese immigrants in the U.S. in 1990). Chinese immigrants are defined as all individuals born in China, Macau, or Hong Kong. Unauthorized Chinese immigrant population in each commuting zone in 1990 was determined using the residual method ([Passel and Cohn, 2014](#); [Borjas and Cassidy, 2019](#)). *Share all Chinese in 1900* – # of Chinese immigrants in commuting zone in 1900 (as % of all Chinese immigrants in the U.S. in 1900). All specifications control for state fixed effects and the following 1990 commuting zone level characteristics: log of total population, % male, % white, % black, % Hispanic, % Nigerian, % less than HS diploma, % college degree, employment rate, labor force participation rate. Data comes from the 1900 and 1990 U.S. Censuses. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.2: Opiates Arrests – Controlling for Major Drug Trafficking Groups

IV	(1) Total	(2) Sale/manufacturing	(3) Possession
Share unauthorized Chinese in 1990 (% unauthorized Chinese in US)	13.54** (6.167)	5.496*** (1.554)	8.039 (5.692)
% Mexican	YES	YES	YES
% Colombian	YES	YES	YES
% Dominican	YES	YES	YES
% Jamaican	YES	YES	YES
Observations	726	726	726
Mean of dependent variable	70.35	27.13	43.23
Standard deviation of dep. variable	98.59	42.09	65.42
Effective F Statistic	9.586	9.586	9.586
Anderson-Rubin chi-sq. test p-val.	0.009	0.026	0.074

Notes - Robust standard errors in parentheses. Effective F Statistic comes from [Montiel Olea and Pflueger \(2013\)](#). Critical values (% of worst case bias) are as follows: 37.42 ($\tau = 5\%$), 23.11 ($\tau = 10\%$), 15.06 ($\tau = 20\%$), 12.04 ($\tau = 30\%$). *Share unauthorized Chinese in 1990* – # of unauthorized Chinese immigrants in commuting zone in 1990 (as % of all unauthorized Chinese immigrants in the U.S. in 1990). Chinese immigrants are defined as all individuals born in China, Macau, or Hong Kong. Unauthorized Chinese immigrant population in each commuting zone in 1990 was determined using the residual method ([Passel and Cohn, 2014](#); [Borjas and Cassidy, 2019](#)). *Total* – # of arrests per 100,000 for manufacturing, sale, or possession of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. *Sale/manufacturing* – # of arrests per 100,000 for sale and/or manufacturing of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. *Possession* – # of arrests per 100,000 for possession of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. All specifications also control for state fixed effects and the following 1990 commuting zone level characteristics: % male, % white, % black, % Nigerian, % less than HS diploma (or equivalent), % college degree, employment rate, and labor force participation rate. Data comes from the 1900 and 1990 U.S. Censuses, and the 1992 Uniform Crime Reporting Program Data: County-Level Detailed Arrest and Offense Data. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.3: Unauthorized Chinese Enclaves & Opiates Arrests in 1992: Population-Weighted (IV)

IV	(1) Total	(2) Sale/manufacturing	(3) Possession
Share unauthorized Chinese in 1990 (% unauthorized Chinese in US)	9.549*** (3.154)	8.582*** (1.536)	0.968 (2.302)
Observations	726	726	726
Mean of dependent variable	196.5	76.13	120.4
Standard deviation of dep. variable	172.5	82.54	105.7
Effective F statistic	9.823	9.823	9.823
Anderson-Rubin chi-sq. test p-val.	0.003	0.000	0.663

Notes - Robust standard errors in parentheses. Analytic weights using 1990 total CZ population are applied in all specifications. Effective F Statistic comes from [Montiel Olea and Pflueger \(2013\)](#). Critical values (% of worst case bias) are as follows: 37.42 ($\tau = 5\%$), 23.11 ($\tau = 10\%$), 15.06 ($\tau = 20\%$), 12.04 ($\tau = 30\%$). *Share unauthorized Chinese in 1990* – # of unauthorized Chinese immigrants in commuting zone in 1990 (as % of all unauthorized Chinese immigrants in the U.S. in 1990). Chinese immigrants are defined as all individuals born in China, Macau, or Hong Kong. Unauthorized Chinese immigrant population in each commuting zone in 1990 was determined using the residual method ([Passel and Cohn, 2014](#); [Borjas and Cassidy, 2019](#)). *Total* – # of arrests per 100,000 for manufacturing, sale, or possession of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. *Sale/manufacturing* – # of arrests per 100,000 for sale and/or manufacturing of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. *Possession* – # of arrests per 100,000 for possession of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. All specifications control for state fixed effects and the following 1990 commuting zone level characteristics: % male, % white, % black, % Hispanic, % Nigerian, % less than HS diploma (or equivalent), % college degree, employment rate, and labor force participation rate. Data comes from the 1900 and 1990 U.S. Censuses and the 1992 Uniform Crime Reporting Program Data: County-Level Detailed Arrest and Offense Data. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.4: Opiates Sale Arrests – Alternative Definition of Unauthorized Chinese Enclaves (IV)

IV	(1) Total	(2) Sale/manufacturing	(3) Possession
Alternative Chinese unauthorized share	14.09*** (4.696)	7.420*** (1.715)	6.673* (3.885)
Observations	726	726	726
Mean of dependent variable	70.35	27.13	43.23
Standard deviation of dep. variable	98.59	42.09	65.42
Effective F Statistic	12.76	12.76	12.76
Anderson-Rubin chi-sq. test p-val.	0.006	0.013	0.053

Notes - Robust standard errors in parentheses. Effective F Statistic comes from [Montiel Olea and Pflueger \(2013\)](#). Critical values (% of worst case bias) are as follows: 37.42 ($\tau = 5\%$), 23.11 ($\tau = 10\%$), 15.06 ($\tau = 20\%$), 12.04 ($\tau = 30\%$). *Alternative Chinese unauthorized share* – # of unauthorized Chinese immigrants in commuting zone in 1990 (as % of all unauthorized Chinese immigrants in the U.S. in 1990). Chinese immigrants are defined as all individuals either born in China, Macau, Hong Kong, or those of Chinese ethnicity born in the Golden Triangle (Thailand, Laos, Myanmar). Unauthorized Chinese immigrant population in each commuting zone in 1990 was determined using the residual method ([Passel and Cohn, 2014](#); [Borjas and Cassidy, 2019](#)). *Total* – # of arrests per 100,000 for manufacturing, sale, or possession of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. *Sale/manufacturing* – # of arrests per 100,000 for sale and/or manufacturing of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. *Possession* – # of arrests per 100,000 for possession of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. All specifications also control for state fixed effects and the following 1990 commuting zone level characteristics: % male, % white, % black, % Nigerian, % Hispanic (only col. 1), % less than HS diploma (or equivalent), % college degree, employment rate, and labor force participation rate. Data comes from the 1900 and 1990 U.S. Censuses, and the 1992 Uniform Crime Reporting Program Data: County-Level Detailed Arrest and Offense Data. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.5: Opiates Sale Arrests – Total Chinese Enclaves (Authorized & Unauthorized)

IV	(1) Total	(2) Sale/manufacturing	(3) Possession
Total Chinese share	13.92*** (4.838)	7.326*** (1.851)	6.589* (3.888)
Observations	726	726	726
Mean of dependent variable	70.35	27.13	43.23
Standard deviation of dep. variable	98.59	42.09	65.42
Effective F Statistic	13.83	13.83	13.83
Anderson-Rubin chi-sq. test p-val.	0.006	0.013	0.053

Notes - Robust standard errors in parentheses. Effective F Statistic comes from [Montiel Olea and Pflueger \(2013\)](#). Critical values (% of worst case bias) are as follows: 37.42 ($\tau = 5\%$), 23.11 ($\tau = 10\%$), 15.06 ($\tau = 20\%$), 12.04 ($\tau = 30\%$). *Total Chinese share* – # of all Chinese immigrants in commuting zone in 1990 (as % of all Chinese immigrants in the U.S. in 1990). Chinese immigrants are defined as all individuals born in either China, Macau, or Hong Kong, regardless of their current immigration or citizenship status. *Total* – # of arrests per 100,000 for manufacturing, sale, or possession of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. *Sale/manufacturing* – # of arrests per 100,000 for sale and/or manufacturing of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. *Possession* – # of arrests per 100,000 for possession of Heroin, Cocaine, or Opium (and its other derivatives such as morphine or codeine) in 1992. All specifications also control for state fixed effects and the following 1990 commuting zone level characteristics: % male, % white, % black, % Nigerian, % Hispanic (only col. 1), % less than HS diploma (or equivalent), % college degree, employment rate, and labor force participation rate. Data comes from the 1900 and 1990 U.S. Censuses, and the 1992 Uniform Crime Reporting Program Data: County-Level Detailed Arrest and Offense Data. *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.6: Heroin Exposure & Vietnam Veterans' Labor Market Outcomes (DDD):
Alternative Definition of Unauthorized Chinese Enclaves

OLS	(1) In labor force	(2) Working	(3) Worked last year	(4) Hours worked	(5) Weeks worked	(6) IHS (income)
Vietnam vet * Unauthorized alt. Chinese enclave * Post	-0.0082*** (0.0027)	-0.0076** (0.0034)	-0.0038 (0.0025)	-0.272* (0.164)	-0.438*** (0.164)	0.0577** (0.0229)
Observations	1,628,861	1,628,861	1,628,861	1,628,861	1,628,861	1,628,861
Adjusted R-squared	0.079	0.100	0.085	0.095	0.123	0.141
Mean of dependent variable	0.924	0.873	0.935	40.81	44.18	10.06
Standard deviation of dep. variable	0.264	0.333	0.247	14.92	15.29	2.150
OLS	(7) Any welfare	(8) IHS (welfare inc.)	(9) Any Social Security	(10) IHS (Social Security)	(11) Home owner	
Vietnam vet * Unauthorized alt. Chinese enclave * Post	0.0018 (0.0016)	0.0117 (0.0130)	0.0024 (0.0015)	0.0244* (0.0125)	-0.0238*** (0.0050)	
Observations	1,628,861	1,628,861	1,628,861	1,628,861	1,601,468	
Adjusted R-squared	0.038	0.037	0.020	0.021	0.133	
Mean of dependent variable	0.022	0.181	0.018	0.151	0.657	
Standard deviation of dep. variable	0.148	1.213	0.132	1.136	0.475	

Notes - Standard errors in parentheses, clustered at 1990 commuting zone level (726 clusters in total). *Vietnam vet* – binary var. equal to 1 if individual is Vietnam-era veteran. *Post* – binary var. equal to 1 if the observation comes from 1990 Census. *Unauthorized alt. Chinese enclave* – binary var. equal to 1 if individual resided in commuting zone with non-zero share of unauthorized Chinese immigrants in 1990. Chinese immigrants are defined as all individuals either born in China, Macau, Hong Kong, or those of Chinese ethnicity born in the Golden Triangle (Thailand, Laos, Myanmar). Unauthorized Chinese immigrant population in each commuting zone was determined using the residual method (Passel and Cohn, 2014; Borjas and Cassidy, 2019). *In labor force* – binary var. equal 1 if individual currently employed or actively searching for job. *Working* – binary var. equal 1 if individual currently working. *Worked last year* – binary var. equal 1 if individual worked at some point during the past calendar year. *Hours worked* – # of usual hours worked per week during past year. *Weeks worked* – # of weeks worked during past year. *IHS (income)* – Inverse Hyperbolic Sine transformation of individual's total pre-tax personal income (from past year). Data comes from the 1980 and 1990 U.S. Censuses. *Any welfare* – binary var. equal 1 if individual received any pre-tax income from various public assistance programs (commonly referred to as “welfare”) during past year, including the federal/state Supplemental Security Income (SSI). *IHS (welfare inc.)* – Inverse Hyperbolic Sine transformation of individual's total income from public assistant programs (during past year). *Any Social Security* – binary var. equal 1 if individual received any pre-tax Social Security income during past year, including income from Social Security Disability Insurance (SSDI). *IHS (Social Security)* – Inverse Hyperbolic Sine transformation of individual's total Social Security income from past year, including income from Social Security Disability Insurance (SSDI). *Home owner* – binary var. equal to 1 if individual is home owner (includes those with mortgage/loan). Estimation sample is restricted to all men born in 1948-1953 (i.e. those eligible for Vietnam War draft lottery). Those currently on active duty military service as well as all non-Vietnam era veterans are excluded from the sample. All specifications include *Vietnam vet*, *Post*, and *Unauthorized alt. Chinese enclave* binary variables, as well as all pairwise interaction terms among these binary variables. Finally, all specifications also control for year & commuting zone fixed effects, individual-level demographics (age, age-squared, experience, and binary vars. for marital status, education, race/ethnicity, birth place outside the U.S.), as well as commuting zone level characteristics (log of total population, % male, % white, % black, % less than HS diploma, % college degree, employment rate, labor force participation rate, % Nigerian, % Mexican, % Colombian, % Dominican, % Jamaican). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.7: Heroin Exposure & Vietnam Veterans' Labor Market Outcomes (DDD):
Total Chinese Enclaves (Authorized & Unauthorized)

OLS	(1) In labor force	(2) Working	(3) Worked last year	(4) Hours worked	(5) Weeks worked	(6) IHS (income)
Vietnam vet * Total Chinese enclave * Post	-0.0051 (0.0047)	-0.0092* (0.0056)	-0.0046 (0.0035)	-0.105 (0.243)	-0.396 (0.269)	-0.0661* (0.0365)
Observations	1,628,861	1,628,861	1,628,861	1,628,861	1,628,861	1,628,861
Adjusted R-squared	0.079	0.100	0.085	0.095	0.123	0.141
Mean of dependent variable	0.924	0.873	0.935	40.81	44.18	10.06
Standard deviation of dep. variable	0.264	0.333	0.247	14.92	15.29	2.150

OLS	(7) Any welfare	(8) IHS (welfare inc.)	(9) Any Social Security	(10) IHS (Social Security)	(11) Home owner
Vietnam vet * Total Chinese enclave * Post	0.0045* (0.0023)	0.0299 (0.0191)	0.0031 (0.0022)	0.0314* (0.0190)	-0.0310*** (0.0053)
Observations	1,628,861	1,628,861	1,628,861	1,628,861	1,601,468
Adjusted R-squared	0.038	0.037	0.020	0.021	0.133
Mean of dependent variable	0.022	0.181	0.018	0.151	0.657
Standard deviation of dep. variable	0.148	1.213	0.132	1.136	0.475

Notes - Standard errors in parentheses, clustered at 1990 commuting zone level (726 clusters in total). *Vietnam vet* – binary var. equal to 1 if individual is Vietnam-era veteran. *Post* – binary var. equal to 1 if the observation comes from 1990 Census. *Total Chinese enclave* – binary var. equal to 1 if individual resided in commuting zone with non-zero share of Chinese immigrants in 1990. Chinese immigrants are defined as all individuals born in either China, Macau, or Hong Kong, regardless of their current immigration or citizenship status. *In labor force* – binary var. equal 1 if individual currently employed or actively searching for job. *Working* – binary var. equal 1 if individual currently working. *Worked last year* – binary var. equal 1 if individual worked at some point during the past calendar year. *Hours worked* – # of usual hours worked per week during past year. *Weeks worked* – # of weeks worked during past year. *IHS (income)* – Inverse Hyperbolic Sine transformation of individual's total pre-tax personal income (from past year). Data comes from the 1980 and 1990 U.S. Censuses. *Any welfare* – binary var. equal 1 if individual received any pre-tax income from various public assistance programs (commonly referred to as “welfare”) during past year, including the federal/state Supplemental Security Income (SSI). *IHS (welfare inc.)* – Inverse Hyperbolic Sine transformation of individual's total income from public assistant programs (during past year). *Any Social Security* – binary var. equal 1 if individual received any pre-tax Social Security income during past year, including income from Social Security Disability Insurance (SSDI). *IHS (Social Security)* – Inverse Hyperbolic Sine transformation of individual's total Social Security income from past year, including income from Social Security Disability Insurance (SSDI). *Home owner* – binary var. equal to 1 if individual is home owner (includes those with mortgage/loan). Estimation sample is restricted to all men born in 1948-1953 (i.e. those eligible for Vietnam War draft lottery). Those currently on active duty military service as well as all non-Vietnam era veterans are excluded from the sample. All specifications include *Vietnam vet*, *Post*, and *Total Chinese enclave* binary variables, as well as all pairwise interaction terms among these binary variables. Finally, all specifications also control for year & commuting zone fixed effects, individual-level demographics (age, age-squared, experience, and binary vars. for marital status, education, race/ethnicity, birth place outside the U.S.), as well as commuting zone level characteristics (log of total population, % male, % white, % black, % less than HS diploma, % college degree, employment rate, labor force participation rate, % Nigerian, % Mexican, % Colombian, % Dominican, % Jamaican). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.8: Heroin Exposure & Vietnam Veterans' Labor Market Outcomes (DDD):
Individuals Born in 1950-1953

	(1)	(2)	(3)	(4)	(5)	(6)
OLS	In labor force	Working	Worked last year	Hours worked	Weeks worked	IHS (income)
Vietnam vet * Unauthorized Chinese enclave * Post	-0.0075* (0.0040)	-0.0107** (0.0048)	-0.0032 (0.0036)	-0.150 (0.231)	-0.480** (0.211)	-0.0356 (0.0315)
Observations	1,104,472	1,104,472	1,104,472	1,104,472	1,104,472	1,104,472
Adjusted R-squared	0.078	0.100	0.084	0.095	0.122	0.142
Mean of dependent variable	0.922	0.868	0.934	40.68	43.92	10.01
Standard deviation of dep. variable	0.268	0.338	0.249	15.01	15.46	2.188

	(7)	(8)	(9)	(10)	(11)
OLS	Any welfare	IHS (welfare inc.)	Any Social Security	IHS (Social Security)	Home owner
Vietnam vet * Unauthorized Chinese enclave * Post	0.012 (0.0020)	0.0076 (0.0164)	0.0013 (0.0019)	0.0134 (0.0167)	-0.0304*** (0.0070)
Observations	1,104,472	1,104,472	1,104,472	1,104,472	1,084,783
Adjusted R-squared	0.038	0.037	0.020	0.020	0.127
Mean of dependent variable	0.023	0.184	0.017	0.146	0.637
Standard deviation of dep. variable	0.149	1.221	0.130	1.117	0.481

Notes - Standard errors in parentheses, clustered at 1990 commuting zone level (726 clusters in total). *Vietnam vet* – binary var. equal to 1 if individual is Vietnam-era veteran. *Post* – binary var. equal to 1 if the observation comes from 1990 Census. *Unauthorized Chinese enclave* – binary var. equal to 1 if individual resided in commuting zone with non-zero share of unauthorized Chinese immigrants in 1990. Chinese immigrants are defined as all individuals born in China, Macau, or Hong Kong. Unauthorized Chinese immigrant population in each commuting zone was determined using the residual method (Passel and Cohn, 2014; Borjas and Cassidy, 2019). *In labor force* – binary var. equal 1 if individual currently employed or actively searching for job. *Working* – binary var. equal 1 if individual currently working. *Worked last year* – binary var. equal 1 if individual worked at some point during the past calendar year. *Hours worked* – # of usual hours worked per week during past year. *Weeks worked* – # of weeks worked during past year. *IHS (income)* – Inverse Hyperbolic Sine transformation of individual's total pre-tax personal income (from past year). Data comes from the 1980 and 1990 U.S. Censuses. *Any welfare* – binary var. equal 1 if individual received any pre-tax income from various public assistance programs (commonly referred to as “welfare”) during past year, including the federal/state Supplemental Security Income (SSI). *IHS (welfare inc.)* – Inverse Hyperbolic Sine transformation of individual's total income from public assistant programs (during past year). *Any Social Security* – binary var. equal 1 if individual received any pre-tax Social Security income during past year, including income from Social Security Disability Insurance (SSDI). *IHS (Social Security)* – Inverse Hyperbolic Sine transformation of individual's total Social Security income from past year, including income from Social Security Disability Insurance (SSDI). *Home owner* – binary var. equal to 1 if individual is home owner (includes those with mortgage/loan). Estimation sample is restricted to all men born in 1950-1953 (i.e. those eligible for Vietnam War draft lottery). Those currently on active duty military service as well as all non-Vietnam era veterans are excluded from the sample. All specifications include *Vietnam vet*, *Post*, and *Unauthorized Chinese enclave* binary variables, as well as all pairwise interaction terms among these binary variables. Finally, all specifications also control for year & commuting zone fixed effects, individual-level demographics (age, age-squared, experience, and binary vars. for marital status, education, race/ethnicity, birth place outside the U.S.), as well as commuting zone level characteristics (log of total population, % male, % white, % black, % less than HS diploma, % college degree, employment rate, labor force participation rate, % Nigerian, % Mexican, % Colombian, % Dominican, % Jamaican). *** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.

Table A.9: Heroin Exposure & Vietnam Veterans' Labor Market Outcomes (DDD):
Continuous Measure of Unauthorized Chinese Presence

	(1)	(2)	(3)	(4)	(5)	(6)
OLS	In labor force	Working	Worked last year	Hours worked	Weeks worked	IHS (income)
Vietnam vet * Unauthorized Chinese share * Post	-0.0008*** (00003)	-0.0011** (0.0004)	-0.0004 (0.0002)	-0.016 (0.011)	-0.054*** (0.021)	-0.0005 (0.0031)
Observations	1,628,861	1,628,861	1,628,861	1,628,861	1,628,861	1,628,861
Adjusted R-squared	0.079	0.100	0.085	0.095	0.123	0.141
Mean of dependent variable	0.924	0.873	0.935	40.81	44.18	10.06
Standard deviation of dep. variable	0.264	0.333	0.247	14.92	15.29	2.150

	(7)	(8)	(9)	(10)	(11)
OLS	Any welfare	IHS (welfare inc.)	Any Social Security	IHS (Social Security)	Home owner
Vietnam vet * Unauthorized Chinese enclave * Post	0.0001 (0.0002)	0.0004 (0.0021)	0.0002 (0.0001)	0.0018 (0.0012)	-0.0002 (0.0005)
Observations	1,628,861	1,628,861	1,628,861	1,628,861	1,601,468
Adjusted R-squared	0.038	0.037	0.020	0.021	0.133
Mean of dependent variable	0.022	0.181	0.018	0.151	0.657
Standard deviation of dep. variable	0.148	1.213	0.132	1.136	0.475

Notes - Standard errors in parentheses, clustered at 1990 commuting zone level (726 clusters in total). *Vietnam vet* – binary var. equal to 1 if individual is Vietnam-era veteran. *Post* – binary var. equal to 1 if the observation comes from 1990 Census. *Unauthorized Chinese share* – # of unauthorized Chinese immigrants in commuting zone in 1990 (as % of all unauthorized Chinese immigrants in the U.S. in 1990). Chinese immigrants are defined as all individuals born in China, Macau, or Hong Kong. Unauthorized Chinese immigrant population in each commuting zone was determined using the residual method (Passel and Cohn, 2014; Borjas and Cassidy, 2019). *In labor force* – binary var. equal 1 if individual currently employed or actively searching for job. *Working* – binary var. equal 1 if individual currently working. *Worked last year* – binary var. equal 1 if individual worked at some point during the past calendar year. *Hours worked* – # of usual hours worked per week during past year. *Weeks worked* – # of weeks worked during past year. *IHS (income)* – Inverse Hyperbolic Sine transformation of individual's total pre-tax personal income (from past year). Data comes from the 1980 and 1990 U.S. Censuses. *Any welfare* – binary var. equal 1 if individual received any pre-tax income from various public assistance programs (commonly referred to as “welfare”) during past year, including the federal/state Supplemental Security Income (SSI). *IHS (welfare inc.)* – Inverse Hyperbolic Sine transformation of individual's total income from public assistant programs (during past year). *Any Social Security* – binary var. equal 1 if individual received any pre-tax Social Security income during past year, including income from Social Security Disability Insurance (SSDI). *IHS (Social Security)* – Inverse Hyperbolic Sine transformation of individual's total Social Security income from past year, including income from Social Security Disability Insurance (SSDI). *Home owner* – binary var. equal to 1 if individual is home owner (includes those with mortgage/loan). Estimation sample is restricted to all men born in 1948-1953 (i.e. those eligible for Vietnam War draft lottery). Those currently on active duty military service as well as all non-Vietnam era veterans are excluded from the sample. All specifications include the continuous variable *Unauthorized Chinese share*, binary variables *Vietnam vet* and *Post*, as well as all pairwise interaction terms among these three variables. Finally, all specifications also control for year & commuting zone fixed effects, individual-level demographics (age, age-squared, experience, and binary vars. for marital status, education, race/ethnicity, birth place outside the U.S.), as well as commuting zone level characteristics (log of total population, % male, % white, % black, % less than HS diploma, % college degree, employment rate, labor force participation rate, % Nigerian, % Mexican, % Colombian, % Dominican, % Jamaican).
*** Significant at the 1% level. ** Significant at the 5% level. * Significant at the 10% level.