The Effect of Stolen Goods Markets on Crime: Evidence from a Quasi-Natural Experiment

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I investigate the effects of stolen goods markets on crime by focusing on pawnshops, a legal business often associated with illicit trade. In a fixed effects framework, the analysis of 2,176 US counties from 1997 to 2010 reveals an elasticity of pawnshops to theft crimes of 0.8 to 1.5. I then show that the predetermined concentration of pawnshops in a county strengthens the expected benefits deriving from illegal activity, amplifying the effect that the rise in gold prices has on the proliferation of burglaries. Reassuringly, no effect is ever detected on motor-vehicle thefts and on violent crimes.

Keywords: stolen goods markets, pawnshops, gold prices, crime's benefits

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I. Introduction

Theft crimes represent a substantial social cost to society. In 2010, the United States experienced one theft every 40.5 seconds, with a total of 9.5 million crimes and an estimated economic loss for victims of almost $16 billions (FBI, 2010). Personal items were stolen in 85% of cases, strongly suggesting that burglars need a market in which to convert these goods into cash. In particular, the local availability of stolen goods markets may affect criminal behaviour by reducing theft-related transaction costs, lowering burglars' probability of arrest, and by raising the expected benefits deriving from illegal activity (Sutton, 2010).

Despite the critical importance of this phenomenon, there has been no systematic empirical investigation of the effect of stolen goods markets on crime. Two main obstacles hinder such an analysis. First, markets for stolen properties are hard to identify. Secondly, these markets are not randomly assigned to geographic locations.

This paper contributes to the existing literature on the determinants of crime by analysing this issue through the lens of *pawnshops*, a widespread legal business often associated with illicit trade.

I build a comprehensive panel dataset for the analysis: 2,176 US counties in 50 states, from 1997 to 2010, including in the analysis a rich set of county, time-varying, socio-economic controls.[1] I focus on the effects of the number of pawnshops on eight different FBI reported crimes. I address the endogeneity of pawnshops to crime in multiple ways. First, exploiting a fixed effects framework, then, using the rise in gold prices as a quasi–natural experiment, where the intensity of the treatment is given by the initial concentration of pawnshops in the county, fixed to the first year of the sample.

[1] Please refer to the Data section for a detailed description of all controls used in the analysis.

The structure of the panel allows for the inclusion of county fixed effects, which control for unobserved time-invariant heterogeneity across counties. Year fixed effects and states linear trends capture nationwide and state specific confounding shocks. I rely on within-county variation in the number of pawnshops to explain within-county variation in the number of reported crimes.

Ordinary least squares estimates show a strong effect of pawnshops only on two specific theft-related crimes: larceny and burglary. I detect an elasticity of 1.5 and 0.8, respectively. These findings are robust to extensive checks, the clustering of standard errors at different levels, the sensitivity to outliers, weighting the regression by a measure of the quality of the information on reported crimes, using different functional forms and excluding from the sample counties highly populated.

Falsification tests strengthen the hypothesis of the paper. In particular, motor-vehicle thefts are insensitive to the variation of pawnshops in the county, plausibly because pawnshops do not accept this type of items. Moreover, no effect is ever detected on any other violent crime.

Several burglars' interviews indicate that, while criminals typically prefer to commit thefts at a maximum distance of half an hour by car from the predetermined resale point, (because the probability of arrest increases while stolen property is in possession), sometimes they might be willing to travel far from the crime scene, plausibly to avoid suspects about the origin of the item (Sutton, 2010). I hence extend the analysis in the attempt of detecting geographical spill over effects on crime. I construct two measures of pawnshops' concentration: in bordering counties and in the state. Results partially validate burglars' interviews: within-county changes in larcenies and burglaries are significantly affected by the variation in the number of pawnshops in the same county and in the same state, but not by relative changes in bordering counties.

The lack of random assignment of pawnshops to counties poses two different threats to the identification of a causal parameter. First, results might be driven by the omission of time-variant confounding unobservables. Nevertheless, the Altonjii ratio exceeds 16 for theft crimes, suggesting that there is little concern that selection on unobservables is the main driver of the results.[2]

A second econometric concern is instead related to the bias arising due to reverse causality. Despite the interesting implications related to the positive sorting of pawnshops in counties with high levels of larcenies and burglaries, I exclude this channel in the last section of the paper, by introducing gold prices and the quasi-natural experiment.

Gold is the major determinant of pawnbrokers' profits, roughly representing 80 per cent of the value of all pledges (Bos et al, 2012). The demand for gold materializes through the request of jewelry, which is usually melted down by pawnbrokers through the "refinement" process. During this process, professional outfits remove impurities from metal until they get something close to pure gold. Stolen jewelry might hence disappear forever from pawnshops' counter, after being transformed into a bar of precious metal.

Underlying hypothesis is that shifts in the resale value of gold, exogenously determined by changes in the macroeconomic conditions, while potentially increasing burglars' expected benefits deriving from criminal activity in all counties, might cause relatively more theft crimes in counties with a higher predetermined concentration of markets potentially interested in buying gold products.

Results strongly support this hypothesis. A one standard deviation increase in the initial concentration of pawnshops in a county increases the effect of gold prices on burglaries by 0.05 to 0.10 standard deviations. As in the earlier analysis,

[2] A detailed description of the Altonjii Ratio can be found in the "Selection on Unobservables" subsection.

no effect is detected on motor-vehicle thefts and on all other crimes. As a further falsification test, I repeat the same exercise including the interaction between the initial concentration of pawnshops and copper prices. Reassuringly, I do not detect any positive effect on burglaries, plausibly because pawnshops typically do not accept objects containing copper, even if criminals heavily target this particular metal.

These findings have the power to inform policy. Despite the difficulty to implement an accurate welfare analysis on the possible social effects of the opening of a new shop, (due to the lack of data on the financial services provided by these business), a closer monitoring from local authorities seems to be warranted. This monitoring, by reducing the latent demand for stolen properties, should reduce the consequent supply of crime in pawnshops' proximity. On this note, numerous municipalities in the Unites States have started to implement stricter rules, tightening pawnshops' opening times and increasing the penalties in case of poor documentation of all transactions made.[3] In particular, new policies have been implemented.[4] These require pawnbrokers to share their records with authorities daily, using a free online reporting system, including those selling jewelry and used electronic goods that can be tracked by serial numbers. This improved monitoring, by increasing the likelihood of apprehension and the possibility of retrieve-stolen items, aims to reduce both burglars' propensity to use theses businesses as a resale market and pawnbrokers' willingness to accept items of uncertain origins.

[3] See the next section for more background information on pawnshops' regulation.

[4] See for example http://www.statesman.com/news/news/local/plan-would-require-some-secondhand-stores-to-sha-1/nRkKz/?__federated=1 or http://thetimes-tribune.com/news/scranton-to-require-stricter-rules-for-pawn-shops-1.1658773

Related Literature

This paper adds to the existing literature on crime in two ways.

First, despite the increasing amount of research with an exclusive focus on the determinants of crime, this is one the first papers offering a systematic empirical investigation on the effects of stolen goods markets on criminal activity.[5]

Various investigative reporters have focused on the criminal histories of the most frequent pawnshops' clients. Glover and Larrubia (1996), after gathering all 70,000 pawn slips in Ft. Lauderdale, ranked pawnshops clients by the number of transactions made in that year. Thirty-nine of the top fifty clients had criminal arrest records, often related to burglary, theft, or related offenses.[6] Fass and Francis (2005) used a similar approach to analyse a database of all pawn transactions recorded by the Dallas Police Department (DPD) during the six-year period from January 1, 1991, through December 31, 1996.[7] The 14,500 people pawning 30 times or more during the period "*were two to three times more likely to have been convicted for theft, larceny, burglary, or robbery than those who*

[5] Different studies have analysed a wide set of crime's potential determinants. Among these: the effect of police and incarceration (Levitt 1997, Di Tella and Schargrodsky 2004, Klick and Tabarrok 2005, Levitt 1996, Levitt 1998, Helland and Tabarrok 2007, Drago, Galbiati and Vertova 2009, Lee and McCrary 2009, Draca, Machin and Witt 2011), conditions in prisons (Katz, Levitt and Shustorovich 2003), parole and bail institutions (Kuziemko 2007), education (Western, Kling and Weiman 2001, Lochner and Moretti 2004), social interactions and peer effects (Case and Katz 1991, Glaeser, Sacerdote and Scheinkman 1996, Gaviria and Raphael 2001, Kling, Ludwig and Katz 2005, Jacob and Lefgren 2003, Bayer, Hjalmarsson and Pozen 2009), family circumstances (Glaeser and Sacerdote 1999, Donohue and Levitt 2001). Economists have also focused on the effect of criminal histories on labour market outcomes (Grogger 1995, Kling 2006), the impact of unemployment and wages on crime (Grogger 1998, Raphael andWinter- Ebmer 2001), the strategic interplay between violent and property crime (Silverman 2004), the optimal law enforcement (Polinsky and Shavell 2000, Eeckhout, Persico and Todd 2009), the immigration status (Bianchi, Buonanno and Pinotti 2012), the impact of violent movies and pornography on violent crimes (Dahl and Della Vigna 2009 and Bhuller, Havnes, Leuven and Mogstad 2011).

[6] In a subsequent study Wallace (1997) describes how pawnshops may enable few highly motivated criminals to commit many offenses. For example, an unemployed man visited a single pawnshop 38 times in less than two months and pawned, among other items, thirteen women's rings, ten men's rings, eleven necklaces, nine cameras, six watches, three VCRs, and two televisions. The day after his last visit to the pawnshop, the man was arrested for burglary. Another police survey of frequent pawners produced like findings in Portland, Oregon. 90 per cent of these pawners were chronic drug users with long criminal records (Hammond 1997).

[7] Each transaction shows a pawn ticket number, a client's identification number, shop's identification number, transaction date, and classification code for items pawned.

pawned once or twice."[8] This paper is closely related to an unpublished PhD dissertation chapter by Thomas J. Miles, who finds a positive effect of pawnshops on crime on a cross section of US counties, in the year 1996. He addresses endogeneity issues using state level variation in the maximum interest rate allowed to pawnbrokers, an interesting approach nevertheless characterized by different econometrics shortcomings.[9]

Second, this is also one of the first papers analysing the effects of a change in *crime's expected benefits*, exploiting the rise in gold prices as a quasi-natural experiment.

Starting from Becker's seminal work (1968), economists have analysed the determinants of crime using of a cost-benefit analysis, with an almost unique focus on the cost side of crime's production function, giving particular emphasis to the deterrence effect of police or to other related aspects.[10] This paper instead, by looking at crime's expected benefits is closely related to the work of Draca et al. (2014). Their findings support the hypothesis that crimes are highly responsive to consumer and scrap metal prices, suggesting that, as potential takings from crime rise with prices, criminals switch into crimes that yield a higher return.

This paper unfolds as follows. Section II provides some institutional background on pawnshops. Section III presents the data and lays out the initial econometric framework, it reports the findings for that framework and provides various robustness checks and heterogeneity in the results. Section IV introduces

[8] Within the sample of the top 100 pawnshops' clients, 83 individuals had arrest records. "Of these, 58 had accumulated 300 convictions for property as well as other offenses, or an average of 5.2 arrests per individual. Most property crime arrests, 74 per cent, were for theft, 11 per cent for burglary of vehicles, 7 per cent for burglary of homes or businesses, 5 per cent for robbery, and the rest for forgery and car theft. Other infractions mainly involved drug possession (23 per cent) or driving without a license (23 per cent)." A similar analysis, conducted by Comeau and Klofas (2012) for the city of Rochester, NY shows equivalent evidence.

[9] The first limit relates to the analysis of only one year of data (1996). The lack of a long time dimension, along side the use of a state-level instrument, does not allow for the inclusion of any fixed effects. In practice, any time invariant unobservable related to the number of pawnshops, the presence of crime in a county and the state's decision of setting a particular interest rate might be a confounding factor.

[10] See Chalfin and McCrary (2013) for a detailed literature review.

the role of gold in the quasi-natural experiment, outlines the research design and presents the results. Section V concludes.

II. Institutional Background

Pawnshops, payday loans and check-cashing outlets are all businesses that provide credit to "unbanked" clients at very high interest rates.[11] Among these businesses, pawnbrokers offer a unique service: the supply of instant cash to their clients, only through the exchange of personal property's items. The standard procedure begins with an assessment of the monetary value of the client's item. If the client accepts the offer, she can either directly sell the item to the pawnbroker or she can ask for a loan, using the pledge as a collateral. Usually, the offer ranges from 30 to 75 per cent of the market value of the pledge, with the average loan value being $100. The pawnbroker holds the personal item in custody until the maturity date of the loan, typically two months later. If the client does not return to reclaim the pledged item, this becomes pawnbroker's property.[12]

Given that pawnbrokers assume the risk that an item might have been stolen, laws in many jurisdictions protect the brokers from unknowingly handling stolen goods.[13] These laws usually require, for each transaction, a photo identification of the client (such as a driver's license or government-issued identity document), as well as a "holding" period on the item purchased by the pawnbroker, to allow

[11] U.S. households purchased more than $40 billion in high-cost short-term loans using the "fringe banking sector" in 2007, Fellowes and Mabanta (2008). Even if there is no official and reliable estimate of the total number of clients, industry reports suggest that 34 million adults demanded the services of these companies. The sector consists of several types of high-cost lenders, but two comprise the dominant portion: payday lenders and pawnshops. In 2007 pawnshops made 42 million transactions for an overall value of 2.5 billion dollars. The maximum interest rate set by pawnbrokers and payday lenders is generally regulated at the state level. For a complete review of pawnshops' operating system see Shackman and Tenney (2006).

[12] Alternatively, the pawnbroker becomes the owner of the item as soon as the sale process ends. About 80 per cent of pawn loans are repaid and repeat customers account for much of the loan volume. Moreover, it is common for a customer to use the same pledge as collateral to obtain sequential loans (Avery, 2011).

[13] Data on state level laws from 1997 to 2010 are unavailable.

local law enforcement authorities to track stolen items. Pawnshops must also regularly send to police a list of all newly pawned items and, if possible, any associated serial number. Nevertheless, to be found guilty of criminal possession, the pawnbroker must know that the item he is accepting is actually stolen, a fact that is often difficult to prove. Hence, the pawnbroker only looses the collateral and the amount loaned, if the police seize the item.

Different dynamics can turn a pawnshop into a market for stolen goods (Sutton, 2010). First, thieves, exploiting the increase in personal properties' trade in the community, can circumvent the security measures of an honest pawnbroker, "disguising" stolen property in the regular flow of allowed items. Moreover, competition for profits may undermine pawnbrokers' security policy, leading them to accept some items of uncertain origin. From the words of a pawnbroker: "*If he's coming in my store with a VCR, I'm not asking him where he got it. It's the police's job to find out if it's stolen, not mine. You don't ask where things come from. If you don't take those, the guy down the street will."* (Glover and Larubbia, 1996) Finally, in a worst scenario, the pawnbroker could explicitly facilitate the sale of stolen goods in his shop (fencing),[14] exploiting the lack of strict law enforcement from local authorities or, for example, the fact that most of stolen goods lack of a unique identifier and are hardly recognizable by police or by victims.[15]

[14] Police efforts have indicated that some pawnbrokers are involved in fencing. For example, in the US, the Sarasota Police Department, Venice Police Department and North Port Police Department assisted with the undercover operation to sell gold jewelry to each business. Many were found to be in compliance. However, a number of businesses operated under a 'no questions asked' policy, making no attempt to properly document the seller information, record the items being purchased or obtain the seller's fingerprint (Bill, 2011).

[15] Wright and Decker (1994) interviewing burglars in the St. Louis area, describe different mechanisms through which pawnshops may be used to quickly convert stolen goods into cash. First, even if a burglar must provide his name, address, and a form of identification, jurisdictions rarely make full use of this information. Moreover, these requirements can be easily deceived. The burglar may provide false information (Glover and Larrubia, 1996) or use false identification when needed. Alternatively, some burglars reported persuading friends to pawn the items for them, reducing the likelihood that a pawnbroker would not accept the item from a suspicious client (Wright and Decker, 1994). Finally, jewelry such as rings, bracelets and necklaces can easily be melted down, transforming forever stolen items into unrecognizable bars of precious metal (Sutton, 2010).

III. Data and Empirical Analysis

Data

This paper focuses on a balanced panel of 2,176 US Counties, (70% of all the counties in the United States), in 50 States from 1997 to 2010. The final dataset is obtained merging information from several sources. Data on crime is accessed through the National Archive of Criminal Justice Data.[16] Eight different types of crimes are reported: larceny, burglary, robbery, motor-vehicle theft, murder, aggravated assault, rape and arson.[17] Infogroup Academic, a US private company, provided data on the total number of pawnshops by county per year.[18]

Table 1 reports crime-related summary statistics, expressed by county and normalized per 100,000 people. The average number of pawnshops is 5.88, with a standard deviation of 6.32. Larceny is the most common theft crime, followed by burglary and motor vehicles theft.[19] Violent crimes and arson are less frequent, with the lowest reported crime being murder, with an average of 3.89 and a standard deviation of 5.43.

[16] Data are downloadable at: http://www.icpsr.umich.edu/icpsrweb/content/NACJD/guides/ucr.html#desc_cl.

[17] County-level files are created by NACJD based on agency records in a file obtained from the FBI that also provides aggregated county totals. NACJD imputes missing data and then aggregates the data to the county-level. The FBI definition of the eight types of crime, as well as the explanation of the hierarchy rule, can be found in the data appendix.

[18] More information is available at http://lp.infogroup.com/academic. Infogroup provided the overall number of pawnshops by county, per year. The data gathering process follows a six-steps procedure. In the compilation phase, data is taken directly from sources such as: Government, public company filings, Utility Information, NCOA, Tourism Directories, web compilation and RSS Feeds. The second step in the process is the address standardization process followed by a phone verification phase with 40 millions call made per year. The last three phases include a standardization of elements and a duplicate removal, an enhanced content and a final quality check. Figure 1 in the appendix shows the geographic distribution of the number of pawnshops in 1997, the first year in our analysis. The sample has an average of 9800 pawnshops per year. These numbers are confirmed by other studies. See - for example - Fellowees and Mabanta (2008), Shackman and Tenney (2006).

[19] In the FBI's Uniform Crime Reporting (UCR) Program, property crime includes the offenses of burglary, larceny-theft, motor vehicle theft, and arson. The property crime category includes arson because the offense involves the destruction of property; however, arson victims may be subjected to force. Because of limited participation and varying collection procedures by local law enforcement agencies, only limited data are available for arson. In the FBI's Uniform Crime Reporting (UCR) Program, violent crime is composed of four offenses: murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault. Violent crimes are defined in the UCR Program as those offenses that involve force or threat of force.

[Table 1]

I add a wide set of county time-varying socio-economic controls, obtained from the US Census Bureau.[20] Data on labour market is obtained from the Bureau of Labour Statistics-Current Population Survey while Data on the number of sworn police officers and civilian employees comes from the Department of Justice-Federal Bureau of Investigation.[21]

Empirical Analysis

I begin by estimating the following OLS equation:

$$y_{i,s,t} = \alpha_i + \gamma_t + \mu_{s,t} + X'_{i,s,t}\beta_0 + \#pawnshops_{i,s,t}\beta_1 + \epsilon_{i,s,t}$$

where *i* indicates the county, *s* the state and *t* the year. The outcome of interest is the number of reported crimes. The analysis focuses on β_1, the effect of pawnshops on crime. Both measures are expressed in per capita terms. Standard errors are clustered at the county level.

The inclusion of county fixed effects α_i control for time-invariant unobserved characteristics both related to the changes in pawnshops and crime. Year fixed effects γ_t and state linear trends $\mu_{s,t}$ are also included.

I finally add a vector of county time-varying socioeconomic controls $X'_{i,s,t}$. I include income per capita, percentage of people below the poverty line, percentage of unemployment, the number of social security recipients and the average monthly payment per subsidy. Given the type of credit service provided by pawnshops, I add the number of commercial banks and saving institutions in

[20] I use http://censtats.census.gov/usa/usa.shtml.

[21] Sworn police officers are law enforcement employees with arrest powers. Civilian employees include personnel employed by each local agency who do not have arrest powers and include job classifications such as clerks, radio dispatchers, meter maids, stenographers and accountants. Descriptive statistics of all the controls included in the analysis are shown in Table 1 of the Appendix.

the county. These controls, together with the number of banking and saving deposits, aim to capture time varying confounding unobservables, both related to the financial penetration in the county and the relative presence of crime. I also add the number of sworn police officers and civilian employees,[22] the population density and the racial/ethnic composition in the county, which implicitly controls for the presence of possible confounding migration patterns.[23] Finally, to control for variation in drug penetration and risky behaviour, I add data on arrests for sale and possession of drugs (opium/cocaine, marijuana, synthetic drugs and other dangerous non narcotics) and gambling (bookmaking horse and sports, numbers and lotteries and all other illegal gambling).

Results

Table 2 shows the evolution of β_1 both for the pooled measure of theft-related crimes (obtained by summing up larceny, burglary, robbery and motor-vehicle theft) and for the other crimes (murder, aggravated assault, rape, arson). The general decreasing pattern of the coefficient of interest indicates the importance of adding fixed effects and the described socio-economic controls. Results from the two most complete specifications are presented in column 5 and 10, where I include all fixed effects and all county-varying observables.[24] For theft-related crimes, I observe a positive coefficient of 6.07, significant at the 1% level, while no significant effects of pawnshops on other crimes is detected. To put results into perspective, the coefficient indicates that an increase of one unit of the

[22] I include sworn police officers and civilian employees at the state level in the year (t-1), due to concerns related to the possibility of controlling for potential outcomes.

[23] The racial origin is defined according to four categories: White, Black, Asian and Indian American. Moreover each race is divided into Hispanic or Not Hispanic ethnic origin.

[24] Results are totally unchanged if I include state FE * year FE instead of state linear trends.

number of pawnshops in a county leads to an increase by an average of 6 theft-related crimes, (both variables are expressed per 100,000 people).

[Table 2]

Table 3 presents the analogous analysis for each type of crime. I detect a positive and significant effect only on larcenies and burglaries. The coefficient of pawnshops on larcenies is 4.57, which is significant at the 1% level. The coefficient on burglaries is 1.52 and it is significant at the 5% level. No effect is detected on robberies, motor-vehicle thefts or on all other crimes.[25]

[Table 3]

These findings strengthen the hypothesis that pawnshops influence crime through their potential demand for stolen goods. Larceny is the most generic (and most frequent) type of theft. It includes shoplifting, pocket picking, purse snatching, theft of objects from motor vehicles, theft of bicycles and theft of items from buildings in which the offender has legal access. Burglaries instead, are larcenies aggravated by the unlawful entry in a private property.

In this setup, the most meaningful falsification test is on motors-vehicles thefts given that pawnshops do not typically accept these items. Reassuringly, I do not detect any effect on this crime and on all the other violent crimes.

Selection on Unobservables

Given the lack of random assignment, I cannot exclude the possibility that the omission of some time-variant unobservables might be driving the results on

[25] Results do not depend on the functional form used. In fact, a one per cent increase in the number of pawnshops per capita is related to a 1.5 and 0.8 percentage increase in the number for larcenies and burglaries, respectively. Results are shown in table 2 of the Appendix.

larcenies and burglaries. For this reason I use the Altonji et al. (2005) method of assessing selection on unobservables using selection on observables. The intuition behind the test is to measure how strong the selection on unobservables must be relative to the selection on observables in order to explain away the effects. This strategy relies on a comparison between a regression run with potentially confounding factors controlled for, and one without.[26] A rule of thumb is that any ratio above 1 is acceptable, as it indicates that selection on unobservables must be larger than selection on observables in order to invalidate the results (Nunn and Wantchekon, 2012). In my specification, the Altonjii ratio exceeds 16 for the measure of pooled theft-related crimes.

Reverse Causality

The pawnbroker's choice of locating or opening the business in a particular county might depend on the previous level of burglaries and larcenies in the areas. Despite the interesting implications of this phenomenon, I exclude this channel in the last section of the paper, interacting gold prices with the initial allocation of pawnshops fixed at the first year of the sample.[27]

Robustness Checks

Table 4 presents robustness checks for larceny (Panel A) and burglary (Panel B).

[26] Let *c* denote the estimate with controls, and *nc* denote the estimate without controls. The Altonjii ratio is $\left|\frac{\beta_c}{\beta_c-\beta_{nc}}\right|$

[27] In one extreme case, pawnbrokers might decide to avoid locating their shops in counties with low levels of theft crimes. If that were the case, our $\beta_1$coefficient would suffer, if anything, from a downward bias. In the opposite case, pawnshops could positively select in counties with high levels of larcenies and burglaries. This phenomenon, while potentially inflating the effects of pawnshops on crime and hence undermining the precision of our estimate, would not make the analysis less interesting. Table 3 and 4 of the Appendix further investigate this aspects focusing on the lagged effect of pawnshops' concentration on larcenies and on burglaries and analysing the concentration of pawnshops as a function of contemporaneous and past levels of theft crimes.

[Table 4]

Column 1 reports the coefficient when I cluster standard errors at the state level; column 2 shows the results with double clustering at county-year level, taking into account both autocorrelation of the error structure within county over time and the spatial correlation in each year across counties. In column 3 I weight the regression by the coverage indicator reported by the agency, a measure of the reliability of the information on crime available to the researcher.[28] Finally, I perform two tests to check the sensitivity to outliers. Column 4 reveals estimates for the sample that drops counties in the top 1% of the pawnshops per capita distribution. Column 5 presents estimates for the sample that does not include the counties in the top 1% of the population distribution.[29] The stability of the coefficient is shown across all different specifications.

Heterogeneity in the Results

Population Density

The anonymity of a big city might amplify the likelihood of the pawnshop being a convenient destination for stolen goods. In rural and less densely populated areas, pawnshops might be far from the crime scene. Moreover, in these areas criminal activity is generally less frequent, and residents are more willing to defend the interests of the members of their communities. Such considerations could undermine burglars' incentives to try to use a local pawnshop to sell stolen goods (and hence to commit a burglary in its proximity). For this reason, I investigate for the possible presence of heterogeneous effects,

[28] The Coverage Indicator variable represents the proportion of county data that is not imputed for a given year. The indicator ranges from 100, indicating that all ORIs in the county reported for 12 months in the year, to 0, indicating that all data in the county are based on estimates, not reported data. I exclude observations for which the coverage indicator equals 0.

[29] I also eliminate from the sample the top 10%, 20% and 30% of the most populous counties to check whether the result is driven by big cities. Results are stable across specifications and are available upon request.

splitting the sample into "low" and "high" population density counties. The two categories are computed with respect to the median density in the sample.

[Table 5]

Table 5 shows results in line with the hypothesis that population density can amplify the effects of pawnshops. For the case of larceny, the coefficient is 10.4 and is significant at the 1% level in high densely populated counties, while it is 3.36 significant at the 10% in low-density counties. The same pattern is found for burglaries.

Geographical Spillovers

My initial empirical analysis focused on understanding the effects of within-county changes in the number of pawnshops on the changes of theft crimes *in the same county*. I now extend the analysis by focusing on the presence of geographical spillover effects on crime.

I construct a measure of the number of pawnshops in bordering counties and in the state. To avoid collinearity issues and difficulty of interpretation, these two variables do not include the number of pawnshops in county *i* (the county where crime is measured). Table 6 shows the results of this specification.

[Table 6]

The inclusion of these two new variables does not change the effect or the significance of the number of pawnshops in county *i* on larcenies and burglaries (first row of table 6). Interestingly, no effect of pawnshops in the neighboring counties is detected. However, I find a large and significant coefficient of the number of pawnshops at the state level for larceny (21.61 significant at the 10 % level) for burglaries (15.2 significant at the 1% level) and for robberies (0.94 significant at 10%).

These results partly corroborate burglars' interviews describing how the presence of stolen goods markets affects their choice of whether and where committing a theft. Knowing that the probability of being caught increases while stolen property is still in possession, burglars prefer to commit a theft at a maximum distance of half an hour by car from the resale point, (Sutton, 2010). Nevertheless, results seems also capture strong geographical spillover effects, suggesting that burglars might take the risk of traveling far from the crime scene, plausibly to avoid suspicions about the origin of the item or to outdistance the good from the place where it was stolen.

IV. Responses to Gold Prices

In this section I further address the endogeneity of pawnshops to crime, exploiting the exogenous rise in gold prices as a quasi-natural experiment. Before explaining the research design, I describe the various mechanisms behind the importance of gold. Then, I define the identification strategy and present the results.

Demand side

Gold has always been the primary determinant of pawnbrokers' profits.[30] Bos et al. (2012) describe that in the US 34% of men and 63% of women used jewelry as pledge in pawn transactions, with gold representing roughly 80 percent of the value of all pledges.[31] Table 7, borrowed from Carter and Skiba (2012), reports

[30] The importance of gold in pawnbrokers' activities is reflected in its symbol: three spheres suspended from a bar. The three-sphere symbol is attributed to the Medici family of Florence, Italy, owing to its symbolic meaning of Lombard. This refers to the Italian province of Lombardy, where pawnshop banking originated under the name of Lombard banking. The three golden spheres were originally a symbol medieval Lombard merchants hung in front of their houses, and not the arms of the Medici family. It has been conjectured that the golden spheres were originally three flat yellow effigies of byzants, or gold coins, laid heraldically upon a sable field, but that they were converted into spheres to better attract attention.

[31] Similar evidence is found in Comeau et al. (2011).

the number of loans for each collateral category, the percentage of observations, and the average amount and standard deviation of the items pawned for each category. The sample of observations originates from a pawnshop lender in Texas between 1997 and 2002.

[Table 7]

Forty-nine percent of pawnshops loans in the dataset are collateralized with jewelry, with over half of jewelry consisting of rings, including both men's and women's class and wedding rings. The next most popular category of pledges is televisions and electronics, including satellite dishes, stereos, and CD players. Individuals also commonly pawn tools, household items such as small appliances, sporting equipment, guns, musical instruments, and camera equipment. The average loan amount for loans collateralized by jewels is $96, a value only lower than guns and musical instruments.

What makes jewelry and, in particular, gold so important for pawnbrokers? Besides the fact that gold is a precious metal, the bulk of pawnbrokers' profits originate from melting down the gold received by their clients through the "refinement" process. In fact, pawnbrokers sell 90% of their jewelry to refiners. A refiner takes the rings, necklaces, bracelets and other items and melts them. Truly professional outfits remove impurities from the metals until they get something close to pure gold.[32] Hence, stolen items, easily transformed into an unrecognizable bar of precious metal, can disappear forever from the second-hand market (Sutton, 2010), ending in the Bullion Market or in similar places.[33] This

[32] Refiners typically have minimum quantities of metals that they accept and work with. They normally work with several pounds of material, so direct link between clients and refiners can rarely happen. Information can be found online, see: http://www.pawnnerd.com/where-do-pawn-shops-sell-their-gold-and-silver/or http://www.economist.com/news/finance-and-economics/21591230-falling-price-gold-hurting-pawnbroking-business-hock-and-sinker.

[33] The Bullion Market is a forum through which buyers and sellers trade pure gold and silver. The bullion market is open 24 hours a day and is primarily an over-the-counter market, with most trading based in London. The bullion market

dynamic can facilitate the burglars', (or pawnbrokers'), attempt of safely getting rid of the stolen goods.

Supply Side

Even if most thieves have an ever-changing hierarchy of items that they prefer to steal (Sutton, 2010), crime statistics and victim surveys describe how the most commonly stolen items during burglaries are cash, jewelry and consumer electrical equipment.[34] Table 8 shows the percentage of stolen items during burglaries. Police recorded crime data are from the Sanwdwell Metropolitan Borough Council area of the West Midlands (Burrel and Wellsmith, 2010).[35]

[Table 8]

Research Design and Identification Strategy

I ask the following question: does an increase in the expected benefits of crime, related to the exogenous rise in gold prices, cause relatively more theft crimes in counties with an higher predetermined concentration of pawnshops?

The underlying hypothesis is that shifts in the resale value of gold, exogenously determined by changes in the macroeconomic conditions, while potentially increasing burglars' expected value of committing a theft uniformly in all counties, might cause relatively more theft crimes in counties with an higher

has a high turnover rate and most transactions are conducted electronically or by phone. Gold and silver derive their value from their industrial and commercial uses; they can also act as a hedge against inflation.

[34] Similar evidence is found in Fitzgerald and Poynton (2010), Sorensen (2011) and Walters et al. (2013).

[35] Table 5 in the Appendix reports the percentage of stolen items during burglaries, by type of item in 1994, 2001 and 2011 in the United States. The relevant category "personal portable objects" includes clothing, furs, luggage, briefcases, jewelry, watches, keys and other. Source: Bureau of Justice Statistics, National Crime Victimization Survey, (1993 – 2011).

predetermined concentration of markets potentially interested in buying gold products.

These premises lead to estimate the following OLS equation:

$$y_{i,s,t} = \alpha_i + \gamma_t + X'_{i,s,t}\beta_0 + \left[\#pawn_{i,t=1997} * gold\_prices_t\right]\beta_2 + \epsilon_{i,s,t}$$

where *i* indicates the county, *s* the state and *t* the year. The coefficient of interest is β_2, the effect on crime of the interaction between the initial concentration of the number of pawnshops per capita in a county, fixed to the first year of our sample (1997) and the gold price at time *t*. Standard errors are clustered at the county level.[36]

A key role is played by the inclusion of year fixed effects, that partial out from the estimate the direct and uniform effect that the rise in gold price might have on the growth of theft crimes in all counties. I include all controls previously employed and also the contemporaneous number of pawnshops. To control for the presence of other possible time-varying confounding factors, I also add the interaction between each control fixed in year 1997 and gold prices.

This specification, not only provides a different angle from which to assess the role of pawnshops on crime, but it also unambiguously addresses the reverse causality concerns discussed earlier.

Gold Prices

My study focuses on the 14 years period from 1997 to 2010. During this period gold prices fluctuated significantly, rising in value by about 37% from 1997 to 2005. From 2006 to 2010, gold prices displayed an impressive increase of almost 200%.[37]

[36] In this specification I omit state trends due to the presence of collinearity with gold prices.

[37] I use as unit of measurement the price of gold in US dollars (averaged over the entire year) per troy ounce. Data are freely downloadable from the following website: http://www.gold.org.

[Figure 1]

This huge final spike poses some empirical issues, both related to the functional form of gold prices and to the possibility that this final spike might have pushed other types of businesses, such as jewelries and online refineries, to increase (or to start) their demand for gold products. I hence start to address these issues by dividing the following analysis into two periods: 1997-2005 and 2006-2010.

Results

Tables 9 and 10 report the results for both theft-related crimes and other crimes.

[Table 9-10]

The first row shows the effect of the contemporaneous number of pawnshops, while the second row reports the results of the interaction term of interest.

The main effect of pawnshops on crime is strong and highly significant for larceny and burglary in the first 9 years of the sample, while it loses its power in the last five years. In the second part of the panel these coefficients are not precisely estimated. Furthermore, I detect a positive effect of the interaction term only for burglaries for both periods of the sample, of 1.14 and 0.30 both significant at the 10% level. A one standard deviation increase in the initial concentration of pawnshops generates a 0.05 to 0.10 standard deviation increase in the effect of gold price on burglaries. The effect of the interaction term on

larceny is not precisely estimated, especially in the second part of the sample. As in the earlier analysis, I do not detect any effect on all other crimes.[38]

Copper Thefts and the "Red Gold" Rush

The demand for copper from developing nations has generated an intense international copper trade. According to the FBI, copper thieves exploit this demand and the related spike in international prices by stealing and selling the metal to recyclers across the United States. Copper thieves target electrical sub-stations, cellular towers, telephone landlines, railroads, water wells, construction sites, and vacant homes for lucrative profits.

The concluding analysis performs a further falsification test, exploiting the fact that typically pawnshops do not accept objects made by copper, even if criminals heavily target these. Table 11 shows the results when I include in the specification the interaction between the price of copper and the initial concentration of pawnshops in the county.[39]

[Table 11]

Adding this further control plausibly generates collinearity between the two interaction terms. [40] This is likely to reduce the significance of the interaction between gold prices and pawnshops. As expected, I do not detect any positive effect of the initial concentration of pawnshops on the effect of copper prices on burglaries. Interestingly, I instead detect a negative coefficient of 1.8 significant at

[38] Table 6 in the Appendix displays the results for burglaries and larcenies of a log-log specification. Results are qualitatively similar to table 14. This time, the interaction term is 2.8 significant at the 10% level for larcenies between 2006-2010. For burglaries the coefficient of interest is 1.90, (with a p-value of 10.7), and 2.13, significant at the 10% level. Robustness checks for this specification are shown in table 7 of the Appendix.

[39] Data on historical copper price is obtained from the U.S. geological survey at: http://www.usgs.gov/

[40] The correlation between the price of gold and copper is 0.84.

the 1% level in the second part of the sample. While I do not want to overemphasize this result, I consider the substitutability across markets for stolen goods, due to oscillation in world prices, as an interesting venue for future research.

V. Concluding Remarks

This paper offers one of the first systematic empirical investigations of the effect of stolen goods markets on criminal behavior. Motivated by the richness of anecdotal evidence, I look at this issue through the lens of pawnshops, a business that has long being suspected of being involved in illicit trade. I address the endogeneity of pawnshops to crime in multiple ways.

I first exploit the panel properties of the unique dataset constructed for the analysis. Results confirm that the number of pawnshops in a county is a strong and significant predictor of larcenies and burglaries. The findings are robust to extensive robustness and falsification checks. I also detect the presence of geographical spillover effects on crime and heterogeneity of the effects related to the population density.

I then exploit an exogenous shift in crimes' expected benefits using the rise in gold prices as a quasi-natural experiment, where the intensity of the treatment is given by the initial concentration of pawnshops in the county. Results still confirm the hypothesis presented in the paper.

This paper suggests new directions for future research. A direct spin off of this work would be the analysis of other markets for stolen goods, such as flea markets, junkyards or online web sites such as EBay or Craigslist. Moreover, entering the "black box" of the mechanism that links demand and supply of crime is critical for the understanding of criminal behavior. Two mechanisms might in fact play an important role in this context. On the one hand, the increase in the

size of stolen goods' markets might increase crime by reducing the criminal expected probability of being arrested (negative deterrence effect). On the other hand, the increase in the level of competition in the resale market might push up prices, raising the expected resale value of the stolen item (price effect). Disentangling these two channels might help to shape specific policy interventions that seek to reduce the impact that the proliferation of stolen goods markets can have on criminal behavior. This and other interesting aspects are left for future research.

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FIGURE 1 – GOLD PRICES

Notes: Figure 1 shows the evolution of gold prices, from 1997 to 2010, both in levels (right hand side) and in percentage deviations from *t-1*. I use as unit of measurement the normalized price of gold in US dollars (averaged over the entire year) per troy ounce.

TABLE1 - DESCRIPTIVE STATISTICS (PAWNSHOPS AND CRIMES)

	(1) *Observations*	*(2)* *Mean*	*(3)* *Standard Deviation*
Pawnshops	*28,430*	*5.88*	*6.32*
Larcenies	*28,430*	*1,840*	*1,046*
Burglaries	*28,430*	*654.2*	*394.7*
Robberies	*28,430*	*52.74*	*73.96*
Motor/Vehicle Thefts	*28,430*	*190.4*	*180.0*
Murders	*28,430*	*3.86*	*5.43*
Rapes	*28,430*	*27.28*	*22.44*
Assaults	*28,430*	*237.2*	*203.2*
Arsons	*28,430*	*18.13*	*20.81*

Notes: Variables standardized per 100.000 people.

TABLE 2 – THEFT-RELATED CRIMES (POOLED) VS OTHER CRIMES (POOLED)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
	Theft-Related Crimes (Pooled)					*Other Crimes (Pooled)*				
Pawnshops	*18.28****	*16.74****	*26.85****	*6.475****	***6.070****	*3.119****	*3.002****	*2.440****	*0.00386*	***0.0562***
	(5.540)	*(5.472)*	*(6.776)*	*(2.134)*	***(2.167)***	*(0.668)*	*(0.663)*	*(0.626)*	*(0.493)*	***(0.493)***
Observations	*28,430*	*28,430*	*28,430*	*28,430*	*27,466*	*28,430*	*28,430*	*28,430*	*28,430*	*27,466*
YEAR FE	*NO*	*YES*	*YES*	*YES*	*YES*	*NO*	*YES*	*YES*	*YES*	*YES*
State TRENDS	*NO*	*NO*	*YES*	*YES*	*YES*	*NO*	*NO*	*YES*	*YES*	*YES*
COUNTY FE	*NO*	*NO*	*NO*	*YES*	*YES*	*NO*	*NO*	*NO*	*YES*	*YES*
County Observables	*NONE*	*NONE*	*NONE*	*NONE*	*ALL*	*NONE*	*NONE*	*NONE*	*NONE*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the county level. The number of pawnshops and reported crimes are expressed in per capita terms. The unit of analysis is the county. Theft Crimes include: larcenies, robberies, burglaries and motor–vehicle thefts. Other crimes include: murders, rapes, aggravated assaults and arsons. The table shows the evolution of the coefficients when fixed effects and controls are included. The most complete specification (with county FE, year FE, State linear trends and all county observables is shown in column 5 for all theft-related crimes and in column 10 for all the other crimes. County observables include percentages of: Whites Hispanics, Whites not Hispanics, Blacks Hispanics, Blacks not Hispanics, Asians Hispanics, Asians not Hispanics, American Indians Hispanics, American Indians not Hispanics. I also include income per capita, percentage of people below the poverty line, percentage of unemployment, the number of social security recipients, the average monthly payment per subsidy, the number of commercial banks and saving institutions, the number of banking and saving deposits, the number of sworn police officers and civilian employees, the population density. Finally, I add data on arrests for sale and possession of drugs (opium/cocaine, marijuana, synthetic drugs and other dangerous non narcotics) and gambling (bookmaking horse and sports, numbers and lotteries and all other illegal gambling).

TABLE 3 - BREAKDOWN BY TYPE OF CRIME

	Larcenies	*Burglaries*	*Robberies*	*M-V Thefts*	*Murders*	*Rapes*	*Assaults*	*Arsons*
Pawnshops per capita	***4.572****	***1.518****	*-0.0249*	*0.00530*	*0.0160*	*0.0251*	*-0.0409*	*0.0560*
	(1.675)	***(0.652)***	*(0.0580)*	*(0.172)*	*(0.0196)*	*(0.0523)*	*(0.469)*	*(0.0413)*
Observations	*27,466*	*27,466*	*27,466*	*27,466*	*27,466*	*27,466*	*27,466*	*27,466*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
State Trends	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
County FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
County Observables	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the county level. The table shows the results from 8 different regressions, one for each type of reported crime. All the specifications include county FE, year FE, state trends and all county observables. County observables include percentages of: Whites Hispanics, Whites not Hispanics, Blacks Hispanics, Blacks not Hispanics, Asians Hispanics, Asians not Hispanics, American Indians Hispanics, American Indians not Hispanics. I also include income per capita, percentage of people below the poverty line, percentage of unemployment, the number of social security recipients, the average monthly payment per subsidy, the number of commercial banks and saving institutions, the number of banking and saving deposits, the number of sworn police officers and civilian employees, the population density. Finally, I add data on arrests for sale and possession of drugs (opium/cocaine, marijuana, synthetic drugs and other dangerous non narcotics) and gambling (bookmaking horse and sports, numbers and lotteries and all other illegal gambling).

TABLE 4 - ROBUSTNESS CHECKS

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
	Panel A - Larcenies				
Pawnshops per capita	*4.57** *(2.1)*	*4.57*** *(1.59)*	*4.37*** *(1.569)*	*4.94*** *(1.761)*	*4.53*** *(1.68)*
	Panel B - Burglaries				
Pawnshops per capita	*1.51** *(0.65)*	*1.51** *(0.73)*	*1.48** *(0.62)*	*1.6** *(0.68)*	*1.51** *(0.65)*

Year FE	*YES*	*YES*	*YES*	*YES*	*YES*
State Trends	*YES*	*YES*	*YES*	*YES*	*YES*
County FE	*YES*	*YES*	*YES*	*YES*	*YES*
County Observables	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Panel A shows the robustness checks when the outcome variable is larceny, while panel B is related to burglary. Column 1 shows the results when I cluster at the state level, while in column 2 I cluster at the county/year level. In column 3 I perform a weighted regression using as weight the FBI coverage indicator. In column 4 I eliminate from the sample the counties in the top 1% of the pawnshops' per capita distribution. In column 5 I eliminate from the sample the counties in the top 1% of the population distribution.

TABLE 5 - HETEROGENEITY IN THE RESULTS: DENSITY

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
	Larcenies		*Burglaries*		*Robberies*		*M/V Thefts*	
	Low	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*
Pawnshops per capita	*3.36**	*10.4****	*1.32**	*2.77***	*-0.05*	*0.11*	*0.09*	*-0.0657*
	(1.97)	*(3.7)*	*(0.74)*	*(1.34)*	*(0.0597)*	*(0.163)*	*(0.198)*	*(0.467)*
Observations	*13,788*	*13,678*	*13,788*	*13,678*	*13,788*	*13,678*	*13,788*	*13,678*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
State Trends	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
County FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Controls	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered at the county level. Each column shows the results from a different regression where the outcome variable is the number of reported crimes (per capita) in the county (Larcenies, Burglaries, Robberies, Motor-Vehicle Thefts). The sample is divided in counties below the median density and above the median density. The density percentiles are computed with respect to the density of the county, averaged for each county in the 14 years of the sample (1997 - 2010). All the specifications include all the fixed effects used in the analysis and all the county observables.

Table 6 - GEOGRAPHICAL SPILLOVERS

	(1) Larcenies	(2) Burglaries	(3) Robberies	(4) M/V Thefts
Pawnshops (Same County)	***4.53****	***1.49****	*-0.026*	*0.000*
	(1.66)	***(0.65)***	*(0.0588)*	*(0.17)*
Pawnshops (Bordering Counties)	*0.25*	*0.76*	*0.16*	*0.36*
	(2.3)	*(0.99)*	*(0.11)*	*(0.33)*
Pawnshops (State Level)	***21.61****	***15.2****	***0.94****	*2.39*
	(12.01)	***(4.3)***	***(0.54)***	*(1.90)*
Observations	*27,450*	*27,450*	*27,450*	*27,450*
Year FE	*YES*	*YES*	*YES*	*YES*
State Trends	*YES*	*YES*	*YES*	*YES*
County FE	*YES*	*YES*	*YES*	*YES*
Controls	*ALL*	*ALL*	*ALL*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the county level. Each column shows the results from a different regression where the outcome variable is the number of reported crimes (per capita) in the county. In each regression we include: the number of pawnshops in the county (first row), the number of pawnshops in the bordering counties (second row) and the number of pawnshops in the state (third row). The number of pawnshops in bordering counties and at the state level does not contain the number of pawnshops in the county where crime is measured.

TABLE 7 - COLLATERAL BY CATEGORY (CARTER AND SKIBA, 2012)

Category	*Number of Observations*	*Percentage of Observations*	*Average Loan Amount*	*Standard Deviation*
Jewelry	*199,288*	***49.98%***	*$96.28*	*105.02*
TVs/Electronics	*126,297*	*31.68%*	*$58.80*	*62.34*
Tools/Equipment	*31,600*	*7.93%*	*$50.18*	*60.67*
Household Items	*10552*	*2.65%*	*$42.92*	*44.7*
Missing	*7,833*	*1.96%*	*$63.75*	*72.54*
Guns	*7,734*	*1.94%*	*$146.97*	*98.75*
Instruments	*7,700*	*1.93%*	*$116.92*	*104.66*
Camera/Equipment	*4,052*	*1.02%*	*$75.85*	*77.87*
Miscellaneous	*3,666*	*0.92%*	*$51.50*	*62.46*

Table 11 reports the number of loans for each collateral category, the percentage of observations, and the average amount and standard deviation of the items pawned for each category. All amounts are in 2002 dollars. The sample of observations is from a pawnshop lender in Texas between 1997 and 2002, (Carter and Skiba, 2012).

TABLE 8 - ITEMS STOLEN DURING BURGLARIES - (BURREL AND WELLSMITH, 2010)

Cash	*40%*	*Documents*	*5%*
Jewelry	***31%***	*Ornaments*	*5%*
Audio	*25%*	*Food*	*5%*
VCR	*17%*	*Tools*	*5%*
TV	*17%*	*Furniture*	*3%*
Personal	*12%*	*Cigarettes*	*3%*
Telecom	*12%*	*Vehicles*	*2%*
Computer	*11%*	*Cycle*	*2%*
Photographic	*11%*	*DVD*	*2%*
Games	*10%*	*Building*	*1%*
Purse	*10%*	*Garden*	*1%*
Cards	*10%*	*Digital*	*0%*
Luggage	*9%*	*Sports*	*0%*
Clothing	*9%*	*Antiques*	*0%*
Domestic	*7%*		
Keys	*6%*		

This table shows the percentage of the stolen items during burglaries. Police recorded crime data are from the Sanwdwell Metropolitan Borough Council area of the West Midlands. The period covered is from 1997 to 2003. Percentage do not sum to 100 due to the stealing of multiple categories.

TABLE 9 - RESPONSE TO GOLD PRICES (THEFT-RELATED CRIMES)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Larcenies		Burglaries		Robberies		M/V Theft	
	1997-2005	2006-2010	1997-2005	2006-2010	1997-2005	2006-2010	1997-2005	2006-2010
Pawnshops per capita	***6.17******	***1.64***	***2.13******	***0.92***	*0.9*	*-0.01*	*0.30*	*0.30*
	(1.77)	***(1.73)***	***(0.80)***	***(0.88)***	*(0.7)*	*(0.08)*	*(0.24)*	*(0.26)*
*Pawnshops (t0)*Gold Price (t)*	*-0.40*	*0.50*	***1.10****	***0.30****	*0.7*	*-0.02*	*-0.03*	*-0.02*
	(1.5)	*(0.38)*	***(0.58)***	***(0.16)***	*(0.5)*	*(0.02)*	*(0.2)*	*(0.05)*
Observations	*17,195*	*10,271*	*17,195*	*10,271*	*17,195*	*10,271*	*17,195*	*10,271*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
County FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Controls	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*
*Controls*Gold Price*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the county level. I split the sample in two periods: 1997-2005 and 2006-2010. This table shows the results related to the contemporaneous number of pawnshops in a county (first row) and the interaction between pawnshops in a county in the year 1997 and gold prices. I also include the interactions between all controls fixed in the year 1997 and the gold price at time t, all controls, county and year fe.

TABLE 10 - RESPONSE TO GOLD PRICE (OTHER CRIMES)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Murders		Rape		Arson		Assaults	
	1997-2005	2006-2010	1997-2005	2006-2010	1997-2005	2006-2010	1997-2005	2006-2010
Pawnshops per capita	0.1	-0.00	0.05	-0.00	0.04	0.04	0.06	0.12
	(0.2)	(0.2)	(0.06)	(0.9)	(0.05)	(0.08)	(0.53)	(0.55)
*Pawnshops (t0)*Gold Price (t)*	-0.01	0.50	0.02	0.01	0.7	0.01	0.10	0.05
	(0.01)	(0.38)	(0.04)	(0.01)	(0.5)	(0.01)	(0.38)	(0.09)
Observations	17,195	10,271	17,195	10,271	17,195	10,271	17,195	10,271
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
County FE	YES	YES	YES	YES	YES	YES	YES	YES
Controls	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL
*Controls*Gold Price*	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the county level. I split the sample in two periods: 1997-2005 and 2006-2010. This table shows the results related to the contemporaneous number of pawnshops in a county (first row) and the interaction between pawnshops in a county in the year 1997 and gold prices. I also include the interactions between all controls fixed in the year 1997 and the gold price at time t, all controls, county and year fe.

TABLE 11 - FALSIFICATION TEST ON COPPER PRICES

	(1)		(2)
		Burglaries	
	1997-2005		2006-2010
*Pawnshops (t0)*Gold Prices (t)*	*1.26*		*0.20*
	(0.95)		*(0.16)*
Pawnshops (t0) Copper Prices (t)*	*-0.19*		*-1.8****
	(0.90)		*(0.42)*
Observations	*17,195*		*10,271*
Year FE	*YES*		*YES*
County FE	*YES*		*YES*
Controls	*ALL*		*ALL*
*Controls*Gold Price*	*ALL*		*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the county level. In this specification I include the interaction between gold prices and the number of pawnshops in 1997 (first row) and the interaction between copper prices and the number of pawnshops in 1997 (second row). I split the sample in two periods: 1997-2005 and 2006-2010. I also include the interactions between all controls fixed in the year 1997 and the gold price at time t, all controls, county and year fe.

Data Appendix – For Online Publication Only

Crimes Definition

1. Murder (criminal homicide): The willful (non negligent) killing of one human being by another.
2. Forcible rape: The carnal knowledge of a female forcibly and against her will.
3. Robbery: The taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or threat of force or violence and/or by putting the victim in fear.
4. Aggravated assault: An unlawful attack by one person upon another for the purpose of in inflicting severe or aggravated bodily injury. This type of assault usually is accompanied by the use of a weapon or by means likely to produce death or great bodily harm.
5. Burglary: The unlawful entry of a structure to commit a felony or a theft.
6. Larceny: The unlawful taking, carrying, leading, or riding away of property from the possession or constructive possession of another. Common types of larcenies include shoplifting, pocket picking, purse snatching, theft of objects from motor vehicles, theft of bicycles and theft of items from buildings in which the offender has legal access.
7. Motor vehicle theft: The theft or attempted theft of a motor vehicle.
8. Arson: any willful or malicious burning or attempting to burn, with or without intent to defraud, a dwelling house, public building, motor vehicle or aircraft, personal property of another, etc.

Hierarchy Rule

In some cases, a single incident may have consisted of two distinct offenses. For example, during the course of a robbery, a victim may have been fatally shot. In cases in which multiple offenses are committed by the same offender against the same victim during a given felonious act, the hierarchy rule is employed to determine how the crime is classified. A crime is classified according to the most serious offense committed. Importantly, the hierarchy rule does not apply to the offense of arson. In fact, when arson is involved in a multiple offense situation, the reporting agency must report two part I offenses, the arson as well as the additional part I offense. The preceding list is ranked according to the hierarchy rule.

Data Appendix – For Online Publication Only

Tables

TABLE 1- DESCRIPTIVE STATISTICS COUNTY OBSERVABLES

	(1) *Mean*	*(2)* *Standard Deviation*
% White – Not Hispanic	*0.79*	*0.18*
% White – Hispanic	*0.06*	*0.12*
% Black – Hispanic	*0.00*	*0.00*
% Black – Not Hispanic	*0.10*	*0.14*
% Asian – Hispanic	*0.01*	*0.02*
% Asian – Not Hispanic	*0.0*	*0.00*
% American Indian – Hispanic	*0.00*	*0.0*
% American Indian – Not Hispanic	*0.01*	*0.06*
% Unemployment	*6.0*	*2.7*
Income per capita	*27,365*	*7,852*
People below the poverty line	*16,278*	*53,982*
Arrests:		
Sale of Cocaine	*29.93*	*53.48*
Sale of Marijuana	*31.56*	*40.35*
Sale of Synthetics	*11.30*	*29.65*
Sale of Others	*17.31*	*41.73*
Possession of Cocaine	*60.31*	*82.60*
Possession of Marijuana	*227.7*	*206.0*
Possession of Synthetics	*24.90*	*47.00*
Possession of Others	*48.31*	*80.48*
Bookmaking	*0.169*	*3.6*
Numbers	*0.103*	*1.30*
Other types of gambling	*1.703*	*13.26*
Number of banks and savings institutions	*39.82*	*17.73*
Poverty standardized	*0.146*	*0.06*
Social Security recipients	*20,488*	*47,166*
Total enforcement	*94.98*	*52.53*
Density	*318.5*	*2,019*

Social security average monthly payment	*411.2*	*75.6*

TABLE 2 - Crimes Breakdown – Log/Log Specification

	(1) Larcenies	(2) Burglaries	(3) Robberies	(4) M-V Thefts	(5) Murders	(6) Rapes	(7) Assaults	(8) Arsons
Pawnshops per capita	***1.487****	***0.828****	*-0.0267*	*0.00484*	*0.0152*	*-0.0163*	*0.0288*	*0.0528*
	(0.714)	***(0.400)***	*(0.0539)*	*(0.138)*	*(0.0193)*	*(0.330)*	*(0.0490)*	*(0.0399)*
Observations	*27,466*	*27,466*	*27,466*	*27,466*	*27,466*	*27,466*	*27,466*	*27,466*
Adjusted R-squared	*0.829*	*0.792*	*0.916*	*0.849*	*0.287*	*0.747*	*0.548*	*0.522*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
State Trends	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
County FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Controls	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the county level. The table shows the results from 8 different regressions, one for each type of reported crime. All the specifications include county FE, year FE, state trends and all controls. Variables of interest are computed as ln(0.01 + x), where x is the percapita value of the variable.

TABLE 3 - Pawnshops' lagged structure

	(1)	(2)	(3)	(1)	(2)	(3)
		Larcenies			*Burglaries*	
Pawnshops per capita	*4.57****	*2.96***	*2.58**	*1.51***	*0.31*	*0.13*
	(1.67)	*(1.38)*	*(1.330)*	*(0.65)*	*(0.55)*	*(0.520)*
Pawnshops per capita (T-1)		*1.38*	*0.044*		*1.24**	*0.46*
		(1.62)	*(1.318)*		*(0.67)*	*(0.565)*

Pawnshops per capita (T-2)			*2.07*			*0.87*
			(1.39)			*(0.63)*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
State Trends	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
County FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Controls	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. All the standard errors are clustered at the county level. In both columns 1, both for larcenies and burglaries, we show the baseline specification with the contemporaneous number of pawnshops. In columns 2 we add the number of pawnshops per capita, at t-1. Finally, in columns 3 we include the number of pawnshops per capita at t-1.

TABLES 4 - Crimes' lagged structure (Pawnshops as A dependent variable)

	(1)	(2)	(3)	(4)	(5)	(6)
		Larcenies			*Burglaries*	
Contemporaneous Crime	*0.25****	*0.12*	*0.11*	*0.46***	*0.18*	*0.09*
	(0.9)	*(0.08)*	*(1.330)*	*(0.20)*	*(0.17)*	*(0.18)*
Crime (T-1)		*0.17***	*0.10**		*0.29**	*0.21*
		(0.08)	*(1.318)*		*(0.17)*	*(0.15)*
Crime (T-2)			*0.11*			*0.11*
			(1.39)			*(0.17)*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
State Trends	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
County FE	*YES*	*YES*	*YES*	*YES*	*YES*	*YES*
Controls	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the county level. The outcome variable is the number of pawnshops per capita in the county at time t. In the first three columns the main regressor is the number of larcenies. In the last three columns the coefficient of interest is the number of burglaries.

Table 5 - Items taken during completed household burglaries, by type of item

	1994		*2001*		*2011*	
	Number	*Per cent*	*Number*	*Per cent*	*Number*	*Per cent*
Total completed burglaries	*5,261,200*		*3,067,800*		*2,845,500*	
Cash/checks, credit/bank cards, purses/wallets	*786,600*	*15*	*553,200*	*18*	*482,200*	*16.9*
Motor vehicles	*33,400*	*0.6*	*33,400*	*1.1*	*38,600*	*1.4*
Motor vehicle parts/accessories, gasoline/oil	*217,300*	*4.1*	*130,800*	*4.3*	*128,500*	*4.5*
Bicycles or parts, toys, recreation/sport equipment	*698,600*	*13.3*	*382,700*	*12.5*	*246,500*	*8.7*
Household appliances/portable electronics	*1,433,900*	*27.3*	*844,400*	*27.5*	*978,700*	*34.4*
Household furnishings/collections	*359,000*	*6.8*	*225,300*	*7.3*	*179,100*	*6.3*
Personal portable objects	***1,482,600***	***28.2***	***905,400***	***29.5***	***885,200***	***31.1***
Firearms	*161,000*	*3.1*	*116,500*	*3.8*	*81,900*	*2.9*
Tools/miscellaneous equipment	*776,500*	*14.8*	*448,200*	*14.6*	*462,100*	*16.2*
Farm/garden produce, food/liquor	*272,900*	*5.2*	*169,700*	*5.5*	*129,200*	*4.5*
Animals	*21,700*	*0.4*	*2,800*	*0.1*	*3,500*	*0.1*
Other	*322,300*	*6.1*	*173,500*	*5.7*	*86,000*	*3*
Unknown	*11,000*	*0.2*	*7,400*	*0.2*	*7,300*	*0.3*

Notes: This table shows the percentage of the stolen items during burglaries, by type of item in 1994, 2001 and 2011. Personal portable objects include clothing, furs, luggage, briefcases, jewelry, watches, keys and other. Source: Bureau of Justice Statistics, National Crime Victimization Survey, 1993 – 2011.

Table 6 – Responses to Gold Prices – Logarithmic specification

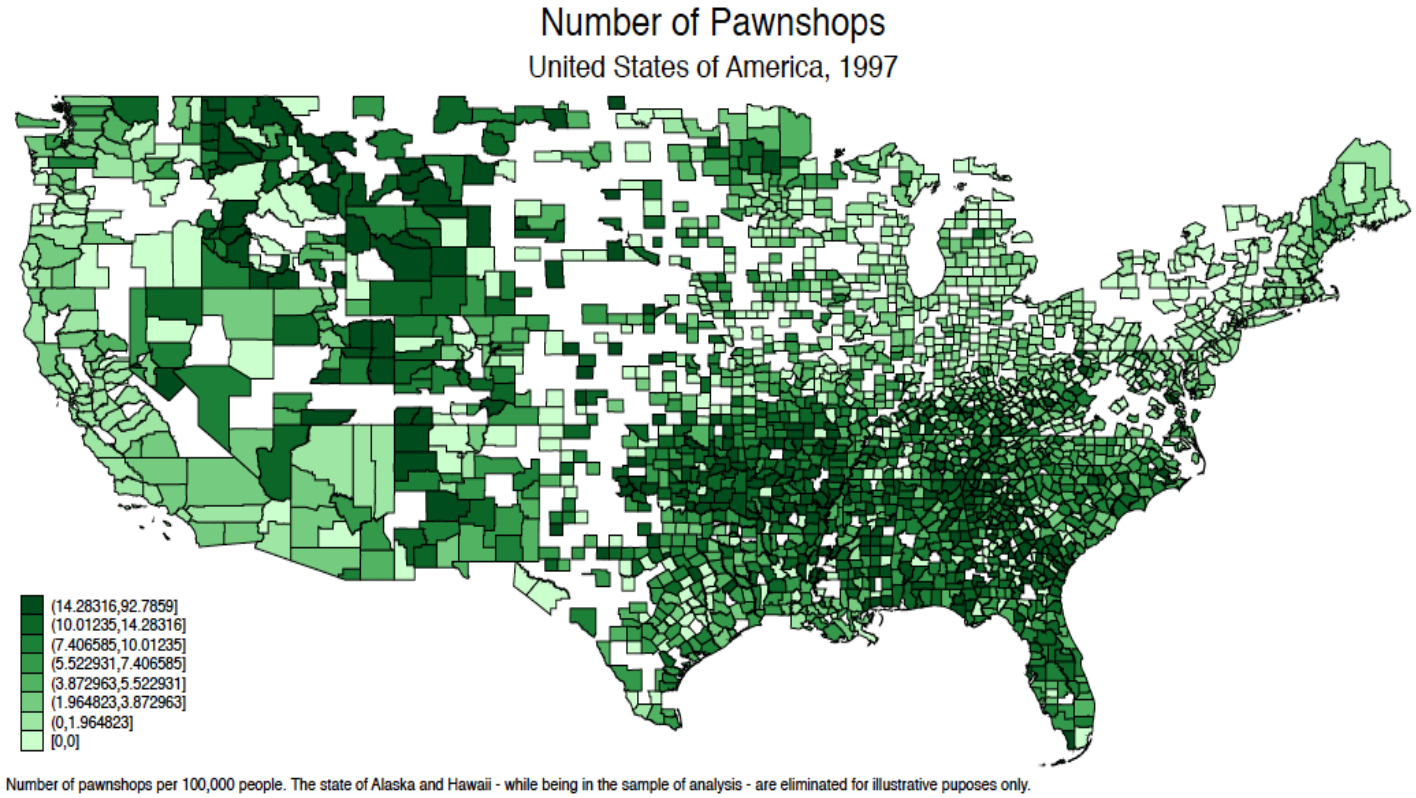
	(1)	(2)	(3)	(4)
	Larcenies		Burglaries	
Pawnshops per capita	***2.14******	***0.55***	***1.11****	***0.57***
	(0.73)	***(0.79)***	***(0.48)***	***(0.54)***
*Pawnshops (t0)*Gold Price (t)*	*-1.3*	***2.8****	***1.8***	***2.13****
	(2.02)	***(1.55)***	***(1.17)***	***(0.91)***
Observations	*17,195*	*10,271*	*17,195*	*10,271*
Year FE	*YES*	*YES*	*YES*	*YES*
County FE	*YES*	*YES*	*YES*	*YES*
Controls	*ALL*	*ALL*	*ALL*	*ALL*
*Controls*Gold Price*	*ALL*	*ALL*	*ALL*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the county level. This table shows the results of the log log specification. Larceny, burglary and pawnshops per capita are computed as ln(0.01 + x), where x is the percapita value of the variable. The interaction term is computed as ln(0.01+pawnshops(t0))*ln(gold Price). Results are qualitatively identical if we take the log of the interaction term

Table 7 - Robustness Checks

	(1)	(2)	(3)	(4)	(5)
	Panel A – Burglaries (1997-2005)				
*Pawnshops(t0)*Gold*	*1.10*	*1.10*	*1.18***	*1.29***	*1.09**
	(0.65)	*(0.70)*	*(0.58)*	*(0.65)*	*(0.58)*
	Panel B – Burglaries (2006-2010)				
*Pawnshops(t0)*Gold*	*0.30*	*0.30*	*0.28**	*0.27*	*0.29**
	(0.18)	*(0.19)*	*(0.15)*	*(0.18)*	*(0.16)*
Year FE	*YES*	*YES*	*YES*	*YES*	*YES*
State Trends	*YES*	*YES*	*YES*	*YES*	*YES*
County FE	*YES*	*YES*	*YES*	*YES*	*YES*
County Observables	*ALL*	*ALL*	*ALL*	*ALL*	*ALL*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Panel A shows the results for burglaries, from 1997 – 2005. Panel B shows the results for burglaries from 2006-2010. Column 1 shows the results when we cluster at the state level, while in column 2 we cluster at the county/year level. In column 3 we perform a weighted regression using as weight the FBI coverage indicator. In column 4 we eliminate from the sample the counties in the top 1% of the pawnshops' per capita distribution. In column 5 we eliminate from the sample the counties in the top 1% of the population distribution



Number of pawnshops per 100,000 people. The state of Alaska and Hawaii - while being in the sample of analysis - are eliminated for illustrative puposes only.