SAFE SEX, SAFE COMMUNITIES: ANALYZING THE LINK BETWEEN CONTRACEPTIVE USAGE AND CRIME RATES

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ABSTRACT

This research investigates the link between contraceptive use in the 1970s and the decline of crime rates observed during the 1990s. A theoretical framework is adopted in which individual contraceptive use reflects a decision to delay parenthood until a family network can be established to increases the costs associated with criminal behavior. In this context, contraceptive use affects the crime rate by reducing the number of individuals with low opportunity costs and high potential for engaging in criminal activity. The theoretical predictors of the model are tested with data on contraceptive use from the Centers for Disease Control Family Growth Survey, using the crime rate in the 1990s and contraceptive use in the 1970s. Empirical evidence shows that the use of contraceptive methods does have statistically significant effects on the crime rates. This extends the existing literature on crime and abortion by considering the effects of a wide array of reproductive choice technologies on the crime rate.
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INTRODUCTION

The role that abortion plays in criminal activity has been debated. Donohue and Levitt (2001) linked the decrease in crime rates observed in the 1990's to the number of abortions after Roe v. Wade legalized active abortion in 1973. The validity of the link between abortion and crime rates has been challenged, most notably by Joyce 2001, 2004a, 2004b; Foote and Goetz 2005; Cook and Laub 2003; Miron and Dills 2006. They argue that the findings by Donohue and Levitt (2001) were not compelling once the key statistical measurement errors were corrected. However, Donohue and Levitt (2005) addressed their concerns and still find evidence of a significant link between abortion rates in the 1970 and crime rates in the 1990s. .

If there is a significant link between abortion and crime rates, then there may be also a link between contraceptive usage and the crime rates. This article investigates the link between crime and contraceptive use. Just as abortion reduce the number of unwanted children who, according to Donohue and Levitt, were more likely to engage in crime as teens and young adults, contraceptive use would generate the same effect through the reduction in the number of unwanted children. The cumulative effect of social/economic, cultural, and socio-psychological factors heavily influences the likelihood of a child becoming a juvenile delinquent (Shulman, 1949). In general, children are more likely to become juvenile delinquents and participate in criminal activities when they are born into single-parent or other non-intact families. (Painter and Levine, 2000).

This article investigates whether contraceptive use lowers the future crime rate by reducing the size of the birth cohort most likely to enter a future criminal cohort. Donohue and Levitt (2001) report that the drop in the U.S crime rate in the early 1990s can be explained by the increase in abortion rates in the 1970s shortly after the Supreme Court ruling in Roe v. Wade. This research extends the work of Donohue and Levitt (2001) by considering the full menu of reproductive technology choices beyond abortion, and their effect on the crime rate in the early 1990s.

UNDERSTANDING CRIME, UNWANTED CHILDREN AND CONTRACEPTION USAGE

The economic modeling of crime begins with the works of Becker (1968), Stigler (1970), and Ehrlich (1973). It was first suggested by Becker (1968) that improvements in legitimate labor market opportunities or a strong economy makes crime less attractive. However, Freeman (1995), Machin and Meghir (2000), Gould, Weinberg and Mustard (1997), Donohue and Levitt (2001) and Raphael and Winter-Ebmer (2001) suggest that there is a statistically significant but weak relationship between unemployment rates and property crime. This may be due to the phenomenon of hysteresis in criminal behavior, as first suggested by Mocan et. al., (2005). In this seminal work, they explain that criminal participation may be express in a dynamic model where individuals utilize both legal and criminal human capital to increase potential earnings. This suggests that higher criminal participation in not necessarily linked to higher unemployment.

Becker (1968) attempts to find the optimal level of public and private policies to decrease the crime rate. Becker (1968) looks at the social value of a crime, but Stigler (1970) investigates various ways to decrease or limit the supply of criminals. Additionally, he examines the best policies to deter criminals from committing various offenses. Stigler analyzes factors that affect the supply of criminals. He conjectures that the laws designed to prevent crimes are highly influenced by public policy and that public opinion is not adequate for the prevention of crime.

In addition to establishing the economic rationale for the crime rate, it is necessary to understand what costs will deter people from committing crimes. Ehrlich (1973) tries to explain the crime level by measuring the value of the time allocated between illegitimate activities versus legitimate activities. Within this

analysis, the focus is directed on the environmental factors contributing to criminal activities. He advocates more spending on law enforcement where expenditures depend on the effectiveness of the expected punishment the cost of deterring crime compared with

alternative methods of combating crime. And investigates how increasing the cost certain factors such as law enforcement can deter an individual from participation in illegal activity.

The environment and social interactions are also factors contributing to crime. Glaeser, Sacerdote, and Scheinkman (1996) argue that there are strong peer-effects that contribute to an individual being a participant or a catalyst in criminal activity. Some of the deterrents that influence negative social interaction according to this study are: strong parents, formal schooling, and information that counters peer influences. This give us the opportunity for our research to adopt a theoretical framework in which family planning decisions condition the number of unwanted children who may later join a criminal cohort, as an approach to exploring the possible causal nexus between crime rate and contraceptive use.

While the previous literature indicates the role that public policy and environmental factors has in criminal participation, the central aim of this research is to investigate the possible causal link between the reductions in the crime rate observed during the 1990s and the wide array of reproductive choices used during the 1970s. While there are many arguments why crime rate fell during the 1990s, Donohue and Levitt's (2001) findings have attracted attention to the role of reproductive choice technologies and their effects on future cohorts of criminals. In addition, reproductive choice technologies permit individuals some control over the timing of conception and provide an opportunity to bear children under more favorable conditions.

Donohue and Levitt (2001) attribute the decrease in crime due to the decrease of unwanted children from the legalization of abortion. Unwanted children are likely to receive smaller human capital investments by their parents and are more likely to get into trouble when they get older (Lott and Whitley, 2007; Bouza, 1990 and Morgentaler, 1998). These finding are supported by the works of Hay and Evens (2006) who find that children of an unwanted or unplanned pregnancy had significantly higher delinquency rates when they were ages 11 to 17. They find the correlation between unwanted pregnancy and general delinquency, status offenses, drug offenses, and serious offenses (Hay and Evens, 2006). An opportunity to reduce the number of unwanted pregnancy through contraception could lead to lower delinquency rates especially if women younger women use contraception. Any study that links increase in abortion in the 1970s with decrease in crime in 1990s must come to grips with the racial gaps in both abortion and crime. (Trent et. al, 1991 and Jones et.al., 2002) It is well known that young black men are over represented in US prisons. (Bureau of Justice Statistics). We also know that black women are more likely to terminate pregnancies versus white women. (Jones et al. 2002). This would lead to a decrease in crime rate observed.

THEORY AND METHODOLOGY

The economic theory of choice can be extended to making the decision to use contraceptives during sexual activity (Donohue and Levitt, 1999: Akerlof et. al., 1996). Assume that contraceptive cost associated with sexual activity is classified as either low or high. Low cost activity carries the highest probability or risk of unintended pregnancy because no birth control is used. Call this the high risk strategy (H). Conversely, high cost activities carry with it the lowest probability of unintended pregnancy and has a positive birth control cost. Call this the low risk strategy (L). Choosing the low risk strategy has a cost of "*C"*, due to lost purchasing power by expenditures on contraception. The probability of conception (CN) is equal to P_H (the probability associated with using high risk strategy) and P_L (the probability associated with low risk strategy). Let the probability of CN given H and CN given L respectively be: $P_H = P(CN \mid H)$ and $P_L = P(CN \mid L)$ and $P(CN \mid H) > P(CN \mid L)$.

Let the utility of a newborn child be "*B"*, if the net utility of *B* is positive (B>0) then an individual's utility increases with a newborn child. *B*<0 corresponds to a case where an individual is better off without the baby at that given time. A child born to parents when *B* < 0 is deemed unwanted. This child that satisfies (B<0) is unlikely to be the beneficiary of parental human capital investments that increases the opportunity cost of participating in crime.

The expected utility from engaging in sexual activity can be modeled as follow:

$$EU_L = P(CN \mid L)B - C = P_L B - C \quad (1)$$

$$EU_H = P(CN \mid H)B = P_H B \quad (2)$$

The expected utility specified in (1) and (2) are based on the risk level taken at the time of the sexual act. It is assumed that the utility of sexual activity is the same regardless of the associated risk; therefore our interest is in what determines the equilibrium sexual activity strategy on unwanted newborns.

Setting equation (1) and (2) equal and solving for B yields the equilibrium condition:

$$P_H B = P_L B - C \Rightarrow B = \frac{C}{(P_L - P_H)} \quad (3)$$

It is plausible that the low risk strategy is adopted if and only if (Donohue and Levitt, 1999):

$$B \leq \frac{C}{(P_L - P_H)} \quad (4)$$

Since $P_H > P_L$, then $P_L - P_H < 0$, and the low risk strategy may be exercised if $B<0$. This establishes that for all individuals engaging in sexual activity for which children are unwanted, the low-risk strategy is the equilibrium choice. In other words, an individual will prefer to use contraception when a baby is not wanted *As such, in a population where unwanted newborns are more likely to engage in criminal activity, there will be a causal and inverse relationship between contraceptive use today and crime rates tomorrow.* Some women adopt a high risk strategy, even though $B < 0$. In this case, the pregnancy may be unwanted and they may opt to have an abortion.[1]

Why might "unwanted" children select to engage in criminal activity later on in life? Prior research supports the theory that unwanted children are more likely to engage in criminal behavior due to that lack of human capital investment. (Lott and Whitley, 2007; Bouza, 1990 and Morgentaler, 1998) Moreover, if the choice of activities is governed by self-selection processes conditioned on differential costs and productivity (Roy, 1951), then relative to wanted children, unwanted children may have lower costs associated with engaging in criminal activity. For example, the

absence of a nuclear and extended family networks at the time of birth could result in low stocks of human and social capital. Human and social capital are important for success later in life. Therefore, unwanted children may face unfavorable schooling/labor market opportunities that reduce the amount of earnings available for them in the legitimate labor market. To illustrate this point, a selection model can be used to explain the rational of why an individual will choose to participate in crime due to the earning potential.

A Roy-type selection model (Roy, 1951) is well-suited when considering how unwanted children decide to engage into criminal activity. Selection model allows us to determine the probability of participating in either a legal or an illegal occupation. Let the log of earnings from legal and illegal activities respectively be indexed by 0 and 1. The log earnings from each profession are denoted by the following:

$$w_0 = \mu_0 + \varepsilon_0 \quad \& \quad w_1 = \mu_1 + \varepsilon_1 \tag{5}$$

In equation (5) μ_0 and μ_1 are interpreted as one's mean earnings in a particular activity with $\varepsilon_0 \sim N(0, \sigma_0^2)$ and $\varepsilon_1 \sim N(0, \sigma_1^2)$. ε_0 and ε_1 are the mean value of an individual's skills in a particular profession.[2] There is an associated cost (C) with the choice of each activity that includes the related cost of time. The choice to participate in illegal activity depends on the sign of the index function below:

$$I = \ln(w_1 / (w_0 + C)) \approx (\mu_1 - \mu_0 - \pi) + (\varepsilon_1 - \varepsilon_0) \tag{6}$$

Borjas (1987) accounts for time by the term $\pi = C/w_0$. The variable π is a constant; which establishes that, C is directly proportional to w_0 .

Assume that a person knows their own C, μ_0 , and μ_1 and their own ε_0 and ε_1. The researcher can only observe an individual's choice to participate in legal or illegal activity. Assume further that the cost of a particular choice is highly sensitive to the nuclear and/or extended family network that is present, this network serves to condition the behavior by creating a system of rewards and punishments, and provides a source of social capital that expand the set of legitimate opportunities for a child. The use of contraception allows one to time pregnancy affording an opportunity to put into place the nuclear and/or extended family networks that make possible for the future success of a child.

Established nuclear and/or extended family networks can also increase the costs associated with illegal activities by imposing upon a child higher moral costs. Similar to the costs associated with the "shaming" to members of one's family network. These costs can be viewed as a "stigma-cost". This stigma-cost associated with a family network is increased when resources, such as maturity, time, income, etc., are available. The use of contraception gives a women control over the timing of her pregnancy. This control over timing can potentially allow a woman an opportunity to give birth where a more supportive family network is present. Arguably, this stigma cost would impact crime through increasing the opportunity cost.

If we assume that stigma-cost are higher when a family network is available, then a child whose birth was planned would have a higher stigma-cost associated with participating in criminal activity. Conversely, a child born at an inopportune time may not have the necessary family network in place, thereby creating a lower stigma-cost associated with participating in criminal activity.

Building on equation (6), the correlation between illegal and legal earning can be defined as follows:

$$\rho = \frac{\sigma_{01}}{\sigma_0 \sigma_1} \text{,where } \sigma_{01} \text{ is the cov } (\sigma_0, \sigma_1) \tag{7}$$

According to Bojars (1987) implementing this model requires knowledge about ρ, however we do not need to know ε_0 and ε_1. It is plausible that an individual will participate in criminal activity when the index function, I > 0 or:

$$(\mu_1 - \mu_0 - \pi) + (\varepsilon_1 - \varepsilon_0) > 0 \tag{8}$$

To clarify, a person will engage in criminal activity if the earning is greater than the earning they would receive from legitimate employment and the cost associated with participating in this illegal activity. Also, in the second set of parentheses, the difference between the values of the skills to participate in legal

and illegal activity has to be positive in order for this condition to be true. Meaning, the skills used for each activity are assumed to be equal.

If follows from equation (8) that the probability of choosing an individual at random who will participate in illegal activities instead of legal activities can be derived. Let $\nu = \varepsilon_1 - \varepsilon_0$, then the probability of a child choosing to participate in criminal activity can be stated as follows:

$$P = \Pr[\nu > (\mu_0 - \mu_1 + \pi)] = \Pr\left[\frac{\nu}{\sigma_\nu} > \frac{(\mu_0 - \mu_1 + \pi)}{\sigma_\nu}\right]$$

(9)

$$= 1 - \Phi\left(\frac{(\mu_0 - \mu_1 + \pi)}{\sigma_\nu}\right) = 1 - \Phi(z) \text{ where } z = \left(\frac{(\mu_0 - \mu_1 + \pi)}{\sigma_\nu}\right).$$

In equation (9) Φ is equal to the standard normal distribution (Borjas, 1987). It is shown that as z increases, the probability of participating in criminal activity decreases. If we analyze z, the greater the cost of π, the greater z becomes. It is maintained in this research that the stigma-cost associated with criminal behavior is greater when a family network is present. This suggests that the probability of an individual participating in a criminal activity would be lower when pregnancies are timed through the use of birth control. Conversely, an untimely pregnancy attributed to high risk sexual behavior increases the probability of a child involvement in criminal activity.

This approach sets forth a theoretical framework which explains why children born in a particular cohort are more likely to participate in crime. Furthermore, this affords an opportunity to incorporate contraceptive use as a variable that empowers individuals to better influence the environment (i.e. family network) around which children are reared. The theory of optimal contraceptive use and selection into criminal activity suggests that empirically, the crime rate will be a function of contraceptive usage sufficiently lagged to account for the timing of the entry of a birth cohort into the criminal cohort.

To formalize this idea, a utilization rate is constructed from the sample to understand the total amount of contraceptives used in a state. Because the use of contraceptives does not immediately affect the crime rate, utilization rate is gathered from a period sufficiently lagged from the crime rate. In this research, a 15 - 17 year difference is selected between the use of contraceptives and the crime rate. This 15 - 17 year difference is supported by Hay and Evens (2006) and Donohue and Levitt (2001). For clarification, if a person uses birth control in 1973, its effect on crime will not be felt until 17 years later in 1990. Juvenile delinquency can occur earlier than age 17 however; this age group represents the high crime participation group. A specification of the process generating crime is as follows:

$$Crime_{st} = \beta_1(Contraceptive_{s(t-17)}) + \beta_i X_{st} + \gamma_s + \lambda_t + \varepsilon_{st}$$
$$for\ i = (2, \cdots, n)$$

(10)

where "*s"* indexes states in the region, and "*t"* reflects time. γ_s and λ_t are used to represent state and time fixed effects. The crime variable will analyze crime rates for not only the states but also arrest for individuals under 25 and individuals that are 15 - 17 years old. The contraceptive variable is the utilization rate calculated from a sample from the National Family Growth Survey. The utilization rate is calculated as follows:

$$Utilization\ Rate = \frac{Total\ number\ of\ female\ population\ using\ contraceptive}{Total\ number\ of\ female\ population}$$

(11)

This utilization rate shows what proportion of the female population reported using contraception, during the selected period. The variable denoted as "X", is a vector that includes the incarceration rate, police per capita, the unemployment rate, per capita income, the poverty rate, presence of concealed handgun laws, and per capital beer consumption. These variables are the same ones supported by prior research (Donohue and Levitt 2001).[3] This resulting model is adjusted for population differences.

Data

Data on individual contraceptive usage are from the National Survey of Family Growth (NSFG).[4] The NSFG, sponsored by the Center for Disease Control (CDC), which provides an opportunity to verify if variation in the use of contraceptives technologies by individuals in the 1970s across states, had an effect on crime rates in the 1990s. However, the data only covers states until 1976 after which regional data is only accessible. This resulted in a panel of 204 observations covering the 50 states and the District of Columbia. The state level control variable will be lagged to ensure the effects of the selected variables on criminal activities are observable. From the NSFG, the following contraceptive methods were reported: 1.) birth control pill, 2.) douche, 3.) foam, 4.) jelly cream suppository, 5.) IUD coil loop, 6.) condom rubber, 7.) diaphragm, 8.) rhythm calendar, 9.) rhythm temperature, 10.) abstinence, 11.) withdrawal coitus interruptus, 12.) sterilization wife, 13.) no method, 14.) sterilization husband and 15.) other method. For the purpose of this research, each contraceptive technology will not be examined individually. All technology is grouped regardless of which method was used. Even though specified, combination of technologies will not be examined in this study, only single used technologies.[5]

Second, crime statistics are tabled from the FBI Uniform Crime Report. This report has data on various violent and property crimes from 1960 to 2004 for every state in the US. Since this study is looking at the crime rate after the 1990s, the only years that will be examined will be the 1990 to 1993. Third, information on the police and incarceration rate is collected from the Correctional Population in the United States published by the Bureau of Justice

Statistics (BJS). Lastly, population characteristics such as the poverty rate, unemployment rate, and the per capita state personal income will be gathered from the Census Bureau United States Statistical Abstract.[6]

RESULTS

Table 1 reports the mean and standard deviation of the relevant variables for the entire sample of 50 states and Washington, DC. The following variables were constructed: the number of violent crimes per 100,000 (VIOLENT), the number of property crimes per 100,000 (PROPERTY), number of violent arrests per population for individuals under the age of 25 (VIOLENT under 25), number of property crime arrests per population for individuals under the age of 25 (PROPERTY under 25), number of violent arrests per population for individuals 17 years of age (VIOLENT arrest 17), number of property crime arrests per population for individuals 17 years of age (PROPERTY arrest 17) percentage of unemployed per population (UNEMPLOY), percentage of people below the poverty line per population (POVERTY), a binary variable indicating whether or not the state has the presence of a concealed gun law (GUNLAW), the per capita income (INCOME), the amount of beer consumption per population (BEER), the number of police per capita (POLICE), the number of people incarcerated per capita (INCARCERATE) and the number of females using any specified form of contraceptive technology per female population (CONTRACEPTIVE).

Table 1 reveals that approximately 80% of the sample female population during the periods of 1973-1976 in a state used some form of contraception. This sample also reveals that the average income in the United States is around 22,000 for the period of 1990 -1993 and the percentage of unemployment in the United States is 6%. The variable of interest for this study, examines the utilization rate of contraception by the population. Utilization can also be specified by each individual contraceptive technology.

Table 2 reports on the mean and standard deviation of the various contraceptive selected for the sample of females in the population that using each of the major contraception methods including, PILL, FOAM CONDOMS, etc.

Table 2 reveals that the majority female population preferred the pill and foam as the contraception of choice as opposed to other technologies. According to this sample, approximately 32 % of the female population used both Pill and Foam as a contraceptive choice. Furthermore, the least preferred method of contraceptive practice over the period was rhythm temperature and abstinence, with the maximum utilization rate by a state at 7 percent and 15 percent of the population.

Table 1
Sample Mean, Standard Deviations, Minimums, and Maximums

Variable	Mean	Std. Dev.	Min	Max
UNEMPLOY	0.0622	0.01527	0.02142	0.113

POVERTY	13.8363	4.16704	6	26.4
GUNLAW	0.34804	0.47752	0	1
BEER	23.6578	3.80833	12.7	40.2
INCARCERATE	266.74	166.332	62	1287
VIOLENT	596.552	412.098	65.5608	2921.8
PROPERTY	4648.19	1166.84	2324.18	8839.28
POLICE	277.957	93.5396	178.942	907.947
INCOME	22058.7	3514.34	15438.3	33165.7
CONTRACEPTION	0.79242	0.10382	0.28239	1
VIOLENT under 25	6369.71	10729.9	77	63016
PROPERTY under 25	22763.9	27904.7	685	168882
VIOLENT arrest 17	628.926	1045.38	9	5862
PROPERTY arrest 17	2396.3	2875.16	75	16741
VIOLENT arrest 16	512.874	923.005	4	5245
PROPERTY arrest 16	2477.37	3077.99	91	18170
VIOLENT arrest 15	354.4	673.625	0	3997
PROPERTY arrest 15	2207.23	2816.86	24	17305

Table 2
Contraceptive Methods' Means, Standard Deviation, Minimum, and Maximum

Variable	Mean	Std. Dev.	Min	Max
PILL	0.3211919	0.0997025	0	0.5962672
FOAM	0.3211919	0.0997025	0	0.5962672
DIAPHRAM	0.0068822	0.0151805	0	0.1725997
JELLY	0.0069722	0.0201816	0	0.1524305
D and J	0.0301333	0.0729917	0	0.758118
DOUCHE	0.0061021	0.0098909	0	0.0821751
IUD	0.0954336	0.0844195	0	0.5396144
F_STERILIZATION	0.0836949	0.0633907	0	0.3649648
M_STERILIZATION	0.0936815	0.0793295	0	0.4436441
CONDOMS	0.0606053	0.0746707	0	0.7200888
RHYTHM_TEMP	0.0025843	0.00813	0	0.0782185
RHYTHM_CAL	0.0244761	0.0354112	0	0.2551622
WITHDRAWL	0.0160093	0.0348805	0	0.3438732
ABSTINENCE	0.0052525	0.0158019	0	0.1541676
ALL_OTHER	0.0066102	0.0316395	0	0.382412
N	204	---	---	---

The following model estimates the Fixed Effect parameter for the following model[7]:

$$\ln(CRIME) = B_0 + B_1(UNEMPLOY) + B_2(POVERTY) + B_3 GUNLAW + B_4 \ln(INCOME) + B_5(BEER) + B_6 \ln(POLICE) + B_7 \ln(INCARCERATE) + B_8(CONTRACEPTIVE) + x_s + \varepsilon_t \quad (12)$$

Table 3 reports the estimates for the empirical specification for violent and property crimes. To fully understand the effect contraceptive use may have on criminal activity, this research investigates violent and property crime rates, violent and property arrest for individuals under the age of 25 and violent and property crime arrest for individuals 17 years of age. Each column in Table 3 represents different areas of criminal participation. The first column expresses the impact on violent crime rates. From the variables estimated UNEMPLOY, INCOME and CONTRACEPTIVE are statistically significant. Specifically looking at the variable of interest, CONTRACEPTIVE, has a coefficient (-.1744) which suggest an inverse relationship to violent crime. Column 2 estimates the relationship to violent arrest for individuals under the age of 25. It is argued that contraceptive use only influences juvenile behavior or criminal participation below the age of 25. In this model the variables GUNLAW,

INCOME and CONTRACEPTIVE are statistically significant. Furthermore, the coefficient for the variable CONTRACETIVE, (-.3305), is negative

and has a value with a larger magnitude of influence than the estimate for states violent crime rates. Lastly, the effect of contraception on violent crime for a specific group is estimated. Column 3 estimates the impact on violent arrest for individuals 17 years or age. The variables INCOME, BEER, and CONTRACEPTIVE are statistically significant. The main variable of interest, CONTRACEPTIVE, has a coefficient of (-.4684) that has a larger magnitude value than the previous coefficients estimates in Column 1 and 2. Although columns 2 and 3 have less statistical significance than the first column, it does suggest that contraception uses has impacted violent crime rates and increases in magnitude when examining only 17 years of age criminal activity.

Table 3
Fixed Effects Models for Violent and Property Crimes using Equation (10)

Specification	**Fixed Effects Model**			**Fixed Effects Model**		
	Violent Crime	**Violent under 25**	**Violent arrest 17**	**Property Crime**	**Property under 25**	**Property arrest 17**
UNEMPLOY	1.540571[b]	0.7381	3.0861	-0.104	0.03368	-0.74838
	(.688)	(1.75)	(2.54)	(.568)	(1.34)	(1.55)
POVERTY	-0.00163	0.0013	0.0036	-0.00464	-0.00862	-0.00131
	(.004)	(.010)	(.014)	(.003)	(.008)	(.008)
GUNLAW	-0.655	0.4268[b]	0.23881	-0.01107	0.07456	0.0389
	(.730)	(.193)	(.279)	(.060)	(.148)	(.170)
INCOME	1.7768[c]	2.4739[a]	2.8378[b]	-0.6247[b]	-0.55924	0.35518
	(.310)	(.847)	(1.22)	(.256)	(.651)	(.748)
BEER	-0.00243	-0.01539	-0.0349[c]	0.00754	0.0052	-0.01194
	(.005)	(.014)	(.021)	(.005)	(.011)	(.012)
POLICE (t-1)	-0.0668	-0.1776	-0.1145	0.06087	-0.02348	0.02102
	(.085)	(.217)	(.314)	(.071)	(.167)	(.192)
INCARCERATE (t-1)	0.0002	-0.02932	-0.03425	0.00322	0.01564	0.01418
	(.010)	(.026)	(.037)	(.008)	(.020)	(.022)
CONTRACEPTIVE (t-17)	-0.174430[b]	-0.33057[c]	-0.4684[c]	-0.11742[b]	-0.23046[c]	-0.3232[b]
	(.068)	(.176)	(.255)	(.056)	(.135)	(.155)
CONSTANT	-15.96435[a]	-30.06[a]	-32.486[a]	9.959[a]	1.2649	0.51396
	(3.06)	(8.38)	(12.1)	(2.53)	(6.43)	(7.40)
N	204	204	204	204	204	204

R_squared	0.1261	0.028	0.181	0.038	0.02	0.045

[a]Significant at the .01 level, [b] Significant at the .05 level, [c] Significant at the .10 level,
Standard errors in parentheses, N = Number of observation

Using the same logic as applied for violent criminal activity above, Property crime is estimated for total, under 25 and individuals 17 years of age. These estimates are represented in column 4, 5, and 6, respectively. In Column 4, the estimate for property crime show INCOME and CONTRACEPTIVE being statistically significant. The coefficient for CONTRACEPTIVE also suggests an inverse relationship with property crime (-.1174). When estimating property crime arrest for individuals under the age of 25, CONTRACEPTIVE is significant at the 10% level with a coefficient of (-.2304). Once again, the value of the coefficient becomes larger in magnitude than the previous estimate for all property crime. When estimating the relationship to Property crime arrest for individuals 17 years of age, CONTRACEPTIVE is statistically significant at the 10% level. It is also shown that that the value of this coefficient (-.3232) is larger in magnitude than all previous estimate for property crime. This further suggests and supports the argument that contraception use has some impact on criminal participation.

Table 4
Fixed Effects Models for Violent and Property Crimes using Equation (10) with t-16 and t-15 (Coefficients for Contraception only)

	Contraceptive	**S.E.**
T-16		
Violent Crime	-0.1532253[c]	(0.085079)
Violent crime under 25	-0.3331908[b]	(0.166469)
Violent arrest 16	-0.7031635[a]	(0.247162)
Property crime	-0.0844337	(0.053502)
Property crime under 25	-0.2129082[c]	(0.117154)
Property arrest 16	-0.1694893	(0.144273)
T-15		
Violent Crime	-0.0156282	(0.08856)
Violent crime under 25	-0.0969999	(0.140845)
Violent arrest 15	-0.4860699[c]	(0.248004)
Property crime	-0.0819031[c]	(0.047814)
Property crime under 25	-0.2454359[a]	(0.085936)
Property arrest 15	-0.1195171	(0.117033)

[a]Significant at the .01 level, [b] Significant at the .05 level, [c] Significant at the .10

level Standard errors in parentheses, N = Number of observation

Table 4 reports the Coefficients for contraceptive use for individuals in the 15 and 16 year cohorts. Here we estimate the effect of contraceptive on the years 15 and 16 years after the use for contraceptives. The coefficient for considerations CONTRACEPTIVE is the only one shown on this chart. The signs of each test reveal an inverse relationship as suggested with the theory. However, it is largely significant when looking at the 16 year cohorts, especially for violent crime and only significant slightly for property crime at the 15 year cohorts.

CONCLUSION

To the extent that the availability of contraceptives affects birth cohorts, policy makers find strength when arguing for an increased in spending on family planning incentives. While on the forefront of this debate is the constitutional right to abortion, Roe v. Wade, various amounts of choices may provide an avenue to increase the general public use of noninvasive contraceptives, thereby decreasing long run societal cost. Certain state level controls are very expensive and requires a large portion of the state budget to finance. Utilizing a cost effective funding of contraceptive usage, could lead to decrease state expenditures later. The cost associated with the process of incarcerating an individual is expensive, for example court cost, processing fees, housing, and etc. Expenditures on readily available low cost contraceptive technology, could be instituted which would decrease the cost that envelops incarceration.

Human and social capital investment plays an important role in determining the outcomes of individuals. More importantly, this capital investment helps develop children to become more functional in society. Society has often stated that it "takes a village to raise a child." This is very evident from this research. The stigma cost associated with behavior is increased when individual have enough time to establish a family network. This network helps to mold an individual into a more productive citizen. In many instances, the family network will deter a child from participating in criminal activities. For society, being involved in community and neighborhood programs could increase the cost associated with children participating in crime. Children, as shown in the literature, which possess low social capital investment, have a higher probability of participating in criminal activity. Adopting specific technology, may allow an individual more time to set up a family network that will deter their child from participating in criminal activity.

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ENDNOTES

[1] According to Donohue and Levitt (1999), if a woman chooses to abort a pregnancy, it may cost her the amount of "*A*" which includes both emotional and monetary cost as well as the possibility of complication with future child bearing. A woman will choose to abort if and only if B<-A, or the utility of having the baby is more negative than the cost of an abortion. The negative value of "A" is expressed because it could be misleading with respect to cost being a positive number and the utility of a baby being less than zero. Because abortion as an option is costly, "no wanted baby will ever be aborted, and some unwanted babies will be born." (Donohue and Levitt, 1999). $-A < \frac{C}{(P_L - P_H)}$ Then choosing the low level of pregnancy risk is more efficient means of preventing birth than abortion. In the above mentioned equation, the usage of contraception will be preferred as a precautionary choice. For all women the level of risk is identical to the level chosen when the abortion is illegal. If $-A \geq \frac{C}{(P_L - P_H)}$ then the abortion becomes a more efficient method of birth control than precaution.

[2] This model will continue the assumption of Roy's Model that assumes jointly lognormal distribution with means of μ_0 and μ_1. These mean values are considered socioeconomic variables that are observable. Also, the value of ε_0 and ε_1 socioeconomic variables that are unobservable which are the same as discussed in Borjas (1987)

[3] Further description/definition of variables is located in the appendix under definition of terms.

[4] The data was provided by the Centers for Disease Control. The NSFG conducts the national samples of women 15-44 years of age, interviewed in person in their own households. Sample sizes were 9,797 in 1973, and 8,611 in 1976. In Cycles 1, 2, and 3, only the conterminous United States was included. In Cycles 4 and 5, Alaska and Hawaii were included. Analysis can be done for the four major census regions (Northeast, Midwest, South, and West) and for metropolitan and non-metropolitan areas. Estimates cannot be made for individual States or for smaller areas

after 1976 .Therefore the selected dates of 1973-1976 provide state observations that determine the sample size. The data following 1976 were not estimated for this research.

[5] For example, in this data set, condom/foam and diaphragm/sponge, was specified both as used together and separate. This study will not examine combinations such as this for individual birth control technology usage. However, as specified earlier, total use of all birth control technologies will be analyzed.

[6] Any information that the census does not have, such as beer consumption and the presence of a concealed handgun law, will be gathered from Donohue and Levitt's data set that they have made readily available.

[7] Given the possibility of unobserved heterogeneity, which introduces a bias in the OLS parameter estimates, a Random and Fixed Effects parameter estimates maybe more effective. Random Effect parameter estimates assume individual specific constant terms as randomly distributed across cross–sectional units (Green, 2005) Fixed Effects parameter estimates assume that differences across units can be captured in the differences in the constant term. It is also possible to allow the slopes to vary across *i*, but this method introduces some new methodological issues, as well as considerable complexity in the calculations. A study on the topic is Cornwell and Schmidt (1984). Also the assumption of a Fixed *T* is only for convenience. The more general case in which T_i varies across units (Green, 1995a). It is suggested to use a Fixed Effects Model as an appropriate estimation model (Green, 2001 and Gujarati 1998) A Hausman test to discriminate between the Random and Fixed Effects parameter specification indicates that the Fixed Effects specification is consistent with the data. This conclusion can be gleamed from the significant value of the chi^2 statistic for both violent ($Chi^2 = 71.85$) and property crimes ($Chi^2 = 21.04$).