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Gavrilova, Evelina

NHH Norwegian School of Economics, Norwegian Center for
Taxation

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Evelina Gavrilova

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1. Introduction

Female offending has largely been overlooked in the economics literature on crime (Freeman 1999; Campaniello and Gavrilova 2018). Yet, it is relevant to current crime trends. There is a well-known decline in crime over the last decades. But what is less well-known is that the decrease in crime has been driven by decreases in male crime, while female crime has been increasing in the last decades (Lauritsen, Heimer, and Lynch 2009; Estrada, Bäckman, and Nilsson 2016; Beaton, Kidd, and Machin 2018, Section 2 this paper). This gradual shift is noteworthy as it shows that the population of male criminals is deterred by traditional policies, while the understudied population of female criminals begins to grow.

In the economics of crime literature we study the impact of policies on crime through the lense of the Becker (1968) model. The effect of a given law-enforcement policy can be represented either as a shift in the probability of arrest or as a shift in the punishment variable. From then on, comparative statics issue predictions that can be tested empirically with the data. However, the model provides a gender-neutral description of the criminal participation decision. The criminal in the model could equally likely be a man or a woman. Therefore, there is an implicit assumption that predictions should hold in equal measure for all sub-populations of criminals. Yet, the differences in crime trends by gender hints at a heterogeneity that needs more attention in the theoretical and empirical literature.

In criminology and sociology, research is already guided by a gendered theory of offending (Steffensmeier and Allan 1996; Kruttschnitt 2013). This theory has its basis in the equality hypothesis, which states that as women and men become more equal in their social roles, they should become more equal in their criminal offending (e.g. Simon 1976).¹ Given initial low female crime participation, this hypothesis captured the attention with the stark prediction of an almost doubling of the crime rates as women start joining the ranks of criminals. Yet, it seems like the two genders meet in the middle - women have started to offend more and men have decreased their crime (Estrada, Bäckman, and Nilsson 2016). The on-going research shows that there are different pathways for men and women into crime, influenced by different policies and incentives.

Economists are well-equipped to catch up. Economists are excellent at capturing incentives and they are no strangers to examining gender effects. There is a multitude of theories explaining and predicting the differences between male and female participation in the legal labor market. Given the broader trends in the crime market, it becomes necessary for future research to develop a gender-specific economic model of crime that can capture the incentives that influence differently males and females. The purpose would be to generate testable predictions and to guide policy into the goal of effectively deterring crime.

In this paper I review the literature on gender in the economics of crime. The emerging picture is that women are increasingly involved in crime at all ages. Women are favored in the Justice process with lower probabilities of arrest, shorter sentences and lighter sentencing regimes. The possible existence of a bias means that female crime can not be curbed by the policy maker through sweeping deterrence policies that affect all criminals. Rather, the key to decreasing crime lies in the multitude of life-cycle events that impact the opportunity cost to crime.

¹This hypothesis became popular in the social sciences in the 70s, concurrent with broad societal shifts in gender equality . Given the times of conception, this hypothesis is additionally referred to as the *liberation hypothesis*.

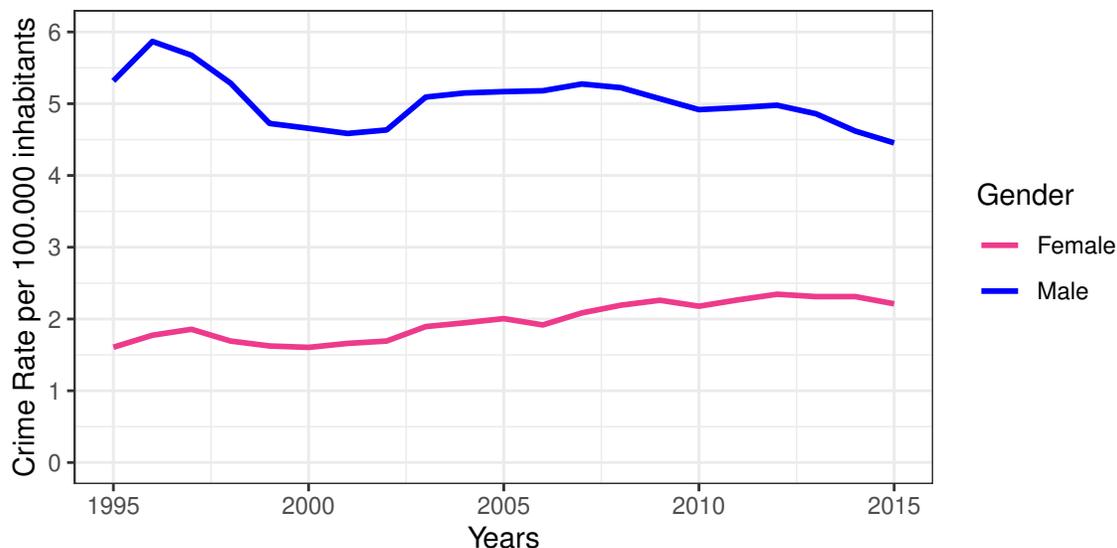


Figure 1: Crime Participation by Gender.

Notes: Each line shows the crime rate per 100,000 in total property crimes, including: larceny/theft, burglary, motor vehicle theft and stolen property offenses. Source: NIBRS

Females are successfully deterred by welfare policies, with effects driven by the subgroup of single mothers. However, given trends of decreasing fertility, the group of potential criminals responding to welfare policies is dwindling. Therefore, there is a need for more research into the incentives that deter female criminals. The purpose would be to expand the set of tools that the policy maker can use to limit rising female crime.

In section 2, I show descriptive evidence that about female crime participation in terms of yearly and age trends. In section 3, I examine the criminal incentives of illegal earnings, arrest and punishment. In Section 4, I present causal evidence from research on the spillover of welfare policies and labor market policies onto crime. In Section 5, I present evidence of education policies and peer effects that shift potential criminals to/from the crime path in the long term.

2. Participation Trends

In this section, I will quantify the trends in female crime participation, using the National Incident Based Reporting System (NIBRS) data.² I focus on property crimes, as previous research shows that women are most often involved in property crimes (using data for the US, UK and Italy in Campaniello 2019). In each subsection I present descriptive evidence for the US and compare the figures with the results in the previous literature.

In Figure 1 I plot property crime rates for offenders of different genders in the US. In the figure, one can see an increasing trend in female crime and a decreasing trend in male crime. In relative terms, 23 percent of the crimes in 1995 were committed by women. In the next 20 years, until 2015, this rate increased by almost half to 33 percent of the offenses.

Under these numbers there seems to be significant heterogeneity driven by age-groups and cohorts. In Figure 2 I plot the age gradient for males and females in the first and last year of the sample. We can see that the age gradient underwent evolution in these 20 years. The decrease in male participation seems to be driven by a relative decrease in males aged 15-20 years, while female participation has increased throughout all ages

²The NIBRS is a US-based database with records of criminal incidents. The main advantage of this database is that provides demographic characteristics like age and gender on the criminals in reported crimes. The main drawback is that it is representative for small and medium-sized law enforcement agencies. For this exercise, I selected a balanced panel of agencies which have submitted data for the whole period 1995-2015.

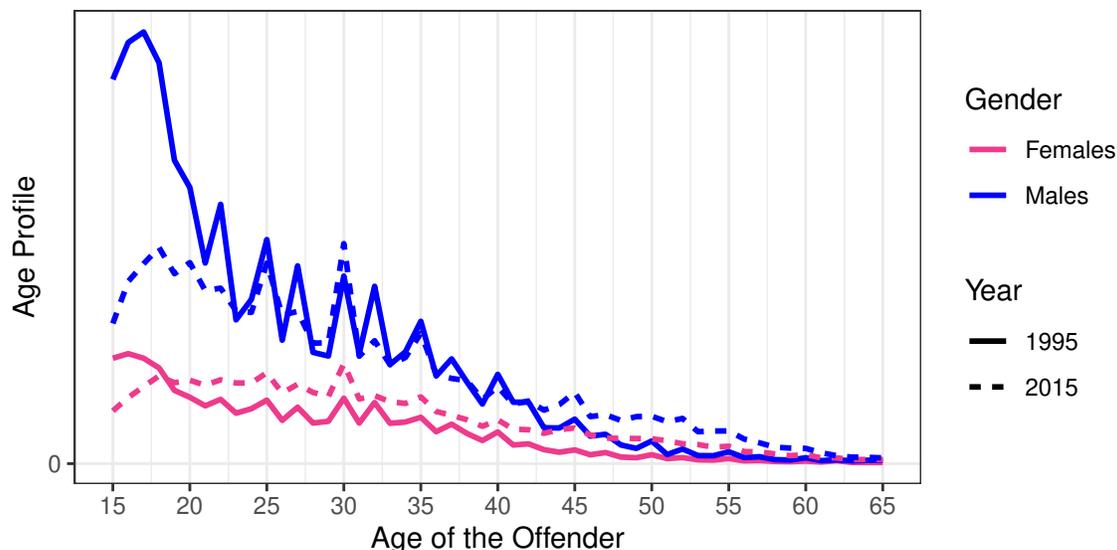


Figure 2: Age Profiles by Gender

Notes: The dashed line represents reported crime counts for men, the solid line represents crime counts for women. The spikes at 20,25,30,etc in are consistent with witness errors. The corresponding arrest lines are smooth, not shown for brevity. Source: NIBRS

above 18. Looking at both women and men, it seems like the cohort of criminal young men in 1995 is aging out, and in its place there is over the board more participation of women in all ages.

The question of the criminal career is understudied in economics, yet it might have additional bearing over the overall figures that we observe. It is unclear how much of the crimes in Figures 1 and 2 are due to single-time offenders vs career criminals. In publicly available crime data, researchers often can not link different crimes to the same person. Therefore, it is unknown whether there are differences in the careers of criminals of different genders. For example, one could predict that female participation in crime would decrease around child-bearing age, while male participation can remain constant. This could lead to a pattern where males are likely to commit more crimes during their career than females. Therefore, counting criminals, rather than crimes as in Figure 1, could result in more even criminal participation. This would be in line with the findings in Williams (2015). He uses self-reported data on property crimes from NLSY1997 in the time period 1997-2011. Respondents were aged 12-16 years old in 1997, with retention rates for the sample over 80 percent. Williams (2015) finds roughly similar rates in thefts between the two genders. He observes that 54.4% percent of the male vs 42.5% of the female respondents have committed a theft. These findings speak towards an equalization in the existence of a criminal career for the offender. Taken together with Figure 2, it confirms the notion that men commit more crimes during their career.

However, it is notable that for both genders age and crime participation seem to be negatively correlated. This decrease coincides with life-cycle events such as employment in the ages 25-60 years old, primary child care in the ages 20-45 years and crime incapacitation events like incarceration. It is interesting to consider the summary statistics of the study on reoffending by Agan and Makowsky (2020). Their sample comes from 43 states, with time span 2000-2014. The average age for all released inmates is 35 years, which is well beyond the most active years for criminals from Figure 2. Considering the average age at release, 17.7 percent males recidivate within 1 year and 35.5 percent within 3 years. For women, the figures are lower at 14.2 percent recidivate within a year, 28.4 percent within 3 years. Overall, the recidivism numbers are lower for women consistent with lower participation in crime in the age categories above 35 as observed in Figure 2.

The increase of female participation in crime is not only in property crime. Lauritsen, Heimer, and Lynch (2009) look at violent crime in the US with police report and with victimization data. They find that in the period 1973 until 2005 female involvement in violent crime has increased by roughly 20 percent from a range

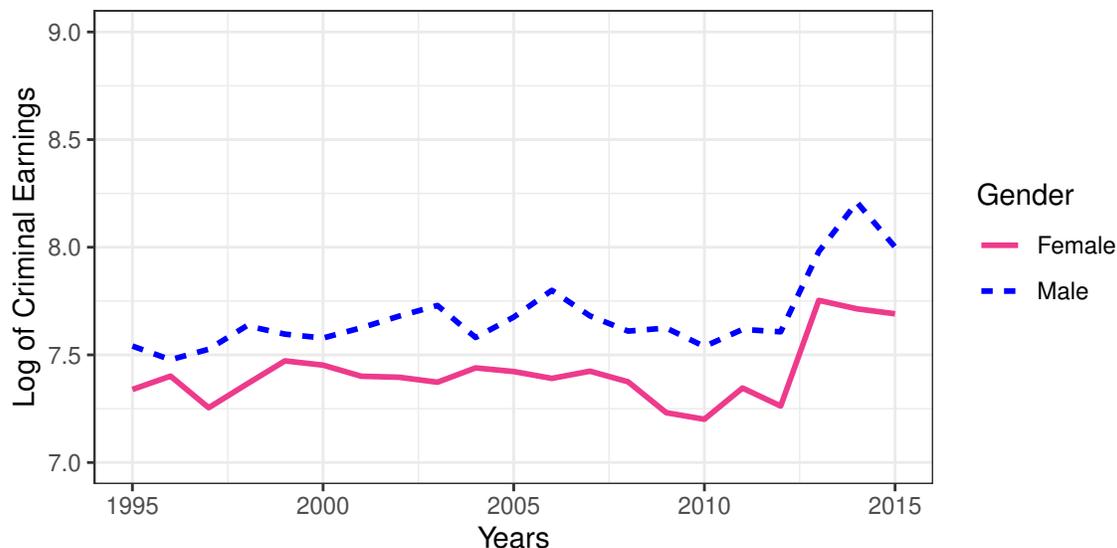


Figure 3: Criminal Earnings by Gender

Notes: Source: NIBRS

of 5%-15% to a range of 15-25% for robbery, simple and aggravated assault.

This pattern of increasing female participation is found also in other countries. Beaton, Kidd, and Machin (2018) look at criminals aged 15-24, in Queensland, Australia for a period of 20 years and find a narrowing of the gender crime participation gap. The narrowing is driven by falling male offending rates, while female rates remain stable, for both violent and property crime. Estrada, Bäckman, and Nilsson (2016) look at the gender gap in Sweden since mid-19th century. In addition, they follow three birth cohorts 1965, 1975 and 1985 and their convictions, in theft offenses and violent crime. They find that the narrowing of the gender gap is due to a powerful decline in the number of men convicted of theft crime and an increase of women's convictions for violence.

3. Criminal Incentives

In this section I will examine the main incentives to commit crime from Becker (1968)- illegal earnings, probability of arrest and punishment.

Illegal Earnings

One of the main parameters of the crime participation decision are the criminal profits. In property crimes, these profits can be quantified in monetary terms by the value of property stolen. There are few papers that have used this type of information to describe the criminal decision. Campaniello and Gavrilova (2018) look at the criminal earnings gap between men and women. When including all property crimes, they find an average earnings gap of 7%. This gap is notably lower than the 12.4 percent gap at the 10th percentile of the hourly wage distribution in the US (Blau and Kahn 2017).

There are many margins of dynamics that underlie this average gap. First of all, Campaniello and Gavrilova (2018) find that shoplifting is an important crime for women. Anecdotal evidence suggests that females sort into shoplifting crimes because they are a complementary to regular household activities. Other explanations could be more in tone with the modern times - e.g. there is no uncertainty about the intrinsic value of the stolen property. Other stolen items will have to be pawned, which leads to a significant decrease and uncertainty in the value obtained from the theft. Shoplifted items can directly substitute other budgeted items, so that the budget constraint of the criminal is relaxed. Campaniello and Gavrilova (2018) find that

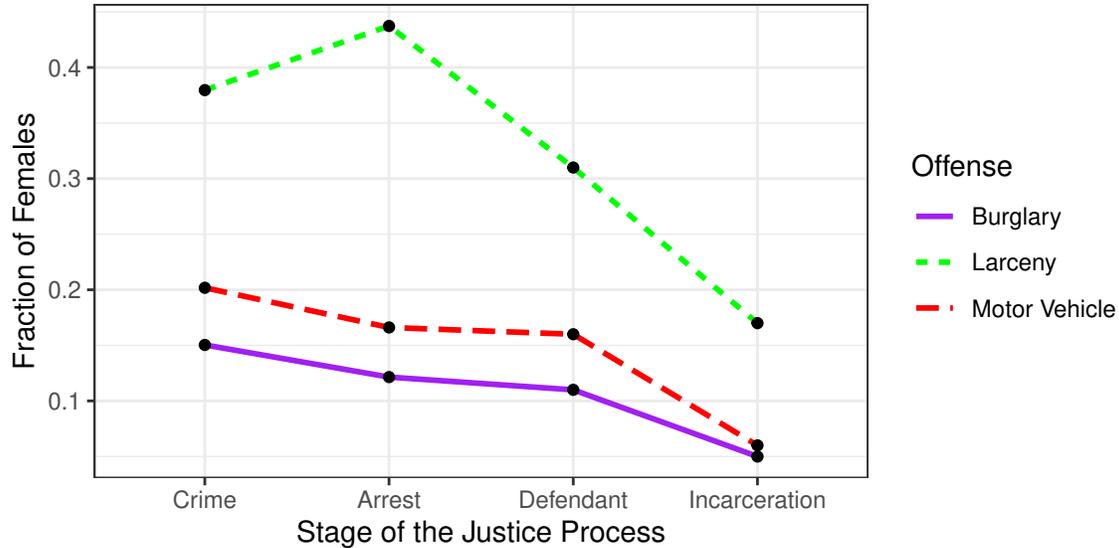


Figure 4: Fraction of Women at Each Stage of the Justice Process.

Notes: Each dot shows the percentage of women within each crime type at each stage of the Justice process. Note that larceny includes shoplifting. All statistics pertain to the year 2010, except for defendants - 2009. Source: NIBRS, 2010, Department of Justice, 2012

women prefer to commit shoplifting. They find an average earnings gap of 13% in the absence of shoplifting, which decreases to 7% once shoplifting is included in the sample. They interpret this as evidence that females sort into shoplifting to obtain higher criminal earnings. Similarly, Carr and Packham (2019) look at the impact of welfare program on crime and find strong responses of women committing shoplifting. However, it is important to note that this crime is in no way unique to women - about 60% of the shoplifting crimes are committed by men, it is only when comparing shoplifting to other possible ventures that it becomes apparent that it is a preferred crime for women.

Second, there is an issue of selection. Women could be less likely to select into high-profit crimes. Williams (2015) uses data on the value of the theft, volunteered by the respondents. He separates between thefts of value less than 50\$ and with value of more than 50\$. For the latter sample, he finds participation figures of 21% male vs 11.2% of the female respondents. Notably, this participation gap is larger than the average gap discussed above from the same paper, hinting at a distinctly different pattern of searching and sorting into criminal opportunities for men and women. In addition, this pattern could be explained by higher risk-aversion in women, where they would focus on lower-gain crimes to offset the risk of participating in criminal activities.

With respect to policy incentives, it is interesting to consider whether women respond differently to earnings incentives than men. When they focus on the decision to commit a crime, Campaniello and Gavrilova (2018) find that males are more responsive to earnings opportunities with an elasticity of crime with respect to earnings of 0.36 vs. 0.23 for females. In the legal market, the earnings elasticities are flipped in size with females having higher own-wage elasticities (Blau and Kahn 2017). This, taken together with the similarity in earnings gap, is interesting to explore for future research.

Arrests

Women are generally favored in the justice process. The fraction of females in each stage of the Justice process are showed in Figure 4. Arrests are the point of entry into the Justice system. In the figure we observe that for motor vehicle theft and burglary women are less likely to be arrested than men. For larceny we observe a higher arrest rate for women. Likely this figure is driven by shoplifting, which is included in the definition of larceny, and it is crime with a high likelihood of arrest due to monitoring devices in stores.

Overall, Campaniello and Gavrilova (2018) find that females face a 9% lower likelihood of arrest, conditional on crime characteristics. They find similar arrest elasticities with respect to the decision to commit a crime of -0.14 for both genders. This would imply, that in the Becker framework of the criminal dilemma, both genders respond similarly to increases in the probability of arrest. A smaller baseline probability of arrest for females could contribute to explaining the gradual upward shift in female crime from Figure 1.

Incarceration and Sentencing

There are reasons to believe that women are favored by a bias in the justice process. In descriptive terms, in Figure 4 it is easily observed that for burglary, larceny and motor vehicle theft the fraction of women incarcerated is much lower than the fraction of reported and arrested women. For these crimes, on average, 1 of every ten incarcerated criminals is female, whereas looking only at reports, around a third of crimes are committed by females. This type of “leaky pipeline” phenomenon is well known in the literature. Most papers have an unexplained portion of the gender gap and argue in favor of discrimination. This unexplained bias can take several forms: shorter sentences (e.g. Mustard 2001; Starr 2015; Philippe 2020), lighter sentence regimes (e.g. Freiburger and Hilinski 2013; Bindler and Hjalmarsson 2020), stronger downward departures from sentencing guidelines (Mustard 2001), different processes of fact finding (e.g. Starr 2015; Bindler and Hjalmarsson 2020) and lower monetary fines (e.g. Philippe 2020).

However, the existence of a bias is a contentious issue. Turning to cross-country data, Wang and Stamatel (2019) documents gender gaps across 75 countries on ten years of data of contact with the Justice system, for all crimes. The percentages of female across each stage of the Justice process (contact, prosecution, conviction) are roughly the same on average, within country.³ Therefore, the pattern in the US from Figure 4 does not seem to have external validity. There are two main caveats to this claim. First, a bias could still operate at the point of first contact - the arrest. Second, the cross-country analysis can't capture the shorter spans and lighter sentence regimes that are highlighted as one of the main pathways in which the bias can be expressed.

Most studies in this strand of the literature are motivated by a large gender disparity in sentencing length. Mustard (2001) focuses on sentencing and departures from sentencing guidelines. He finds that women get 33 months shorter sentences than men, on average. Starr (2015) looks at the whole post-arrest justice process. In the raw data, she observes that females receive sentences that are 31 months smaller than the sentences of men. These two numbers, 33 months and 31 months, are very similar. It is notable that they are indicative of a sentence gap in two different time periods in the US. In that line of thought, Mustard (2001) finds a raw average sentence length for men of 51 months, vs 18 months for women. Starr (2015) finds, respectively, 56 months and 25 months, hinting at a pattern of increasing sentence length over the years for both genders.

In more detail, Mustard (2001) shows that the gap decreases to 5 months, but still significant, once accounting for offense level and criminal history.⁴ Females are likely to receive 21 months less for bank robberies, 11 months less for drug trafficking, about a month less for larceny, fraud and immigration crimes, while the difference is not significant for firearm possession and trafficking. He finds that these differences results from departures from guidelines and account for 70% of the male-female differences. Conditional on receiving downward departures, females get 7 months less than males on average. In addition, males are less likely to get no prison term, when the option is available and less likely to receive downward departure, more likely to receive upwards adjustment. Mustard (2001) paints a harsh picture of how sentencing patterns favor women over men. By focusing on guideline departures, he hints that judges are partially responsible for the gap. The main caveat in this and other studies, is that the judges might be privy to information that is not available to the researcher.

Starr (2015) attempts to account for how much each procedure (charging, bargaining, fact-finding, sentencing) contributes to the observed gender gap. A decomposition of the average sentencing gap shows that a new

³The countries are separated into High development and Middle-low development. For the first(second) group the average fraction of females at the first point of contact is 16.09 (9.64), the fraction of women in the process of prosecution is 14.93(10.35) and for conviction 14.08(8.09). It also bears importance to note that data for the US are available only at the point of contact, namely 23 percent females, which is roughly consistent with the numbers in Figure 4.

⁴Accounting for the number of dependents, age and income does not change significantly the estimate of 5 months (Mustard 2001, Table 6).

disparity favoring women seems to be introduced at every stage of the sentencing process. Accounting for pre-charge control variables explains 70% of the gender gap and it reduces the gap to 8 months. Charging and conviction have little influence, while fact-finding seems to explain 17% of the overall gender gap, reducing it to 2 months unexplained gap. Most of the disparity in the Justice process comes in at fact-finding - around 60 percent of the unequal treatment for the same two criminals of different genders comes at this stage

This type of disparity at fact-finding is also observed in the historical English context by Bindler and Hjalmarsson (2020). Examining 200 years of data from the courts of London, they find a persistent gender gap in judge sentencing and jury convictions. Looking at case characteristics, they find that two witnesses are necessary to convict a woman at the same rate as males against whom one witness is testifying.

Bindler and Hjalmarsson (2020) suggest a mechanism where all-male judiciary protected female criminals from the harshest punishments. One protection offered in the period 1715-1850 has been that females were less likely to be convicted to capital punishment and more likely to get transportation. This type of lighter sentencing regime can be also observed in current times. Focusing on different types of sentencing, Freiburger and Hilinski (2013) look at data from Michigan and find that females are 11 percent more likely to get probation than jail with respect to males. The effect is strongest for white females. Considering the type of incarceration, the two genders are equally likely to be sentenced to prison or jail.

All of the studies until now suggest that there is an unexplained difference in sentencing that is correlated to gender. Starr (2015) exploits the available data on court cases and tests the implications of several competing theories for the source of the unexplained differences. First, she considers the role of unobservable differences in the crimes committed by women and men. Using data on drug quantity and quality which determine eligibility for mandatory minimums, she finds suggestive evidence that women benefit from disparate treatment. Second, she explores the “girlfriend theory”, which states that women are accessories to the criminal undertaking of their male partners. In this case, leniency would be appropriate. She tests the implications of this theory in multi-defendant cases, and finds supporting evidence with larger gender gap. However, this explanation is not valid for single-defendant cases, where there are still large disparities. Third, she tests the role of parental responsibilities on conviction. Female defendants are more likely to have primary custody of children. This leads to a prediction of large disparities among single parents, and small disparities among childless defendants. The prediction is confirmed by the data, but still a large disparity remains among the latter defendants. Fourth, females might receive more leniency, because they cooperate with the government more often. This seems to be more difficult to measure through the different case parameters, as it is endogenous to a deal being offered. Suggestive evidence explains up to 9% of the unexplained gap in drug cases and it has no explanatory power in non-drug cases. Fifth, Starr considers the role of other sympathetic life circumstances such as mental health, addiction, etc. The idea is that females could have a more troubled life, and thus be perceived as less culpable. Such departures from guidelines are part of the case only if cited by the judge, so it is not easy to determine their role in sentencing. Tentative evidence suggests that they might explain 1%-2% of the gender gap, but are too rare to explain more. Finally, Starr shows that the gender gap is substantially larger among black than non-black defendants (74% vs 51%). Racial disparities among men favor whites, but among women the race gap is insignificant and reversed in sign.

The sentencing gap is not only a fact of the US and the UK. Philippe (2020) uses observational data from France, for the period from 2000 to 2003.⁵ He finds that women receive 15 days shorter sentences on average. One logical step in this strand of research is to account for the gender of the judge, as female judges could counter the favors extended by male judges. He find that one standard deviation increase in the number of women in the court (in judging and prosecutor roles) decreases the gender gap by 10%.

In addition, Philippe (2020) finds that this gender gap persists for co-offenders in multi-defendant cases. Within a mixed gender pair, women are less likely to get prison, and if they do their sentence is 50% shorter, which is consistent with the findings of Starr (2015). Similar to the findings of Mustard (2001) and Freiburger and Hilinski (2013), women are more likely to get suspended prison sentences. As a dependent variable that has not been considered previously in the literature, Philippe (2020) also shows that females are likely to get lower monetary fines for their crimes.

⁵In Wang and Stamatel (2019) the average statistics for France are 14.95% of females at first contact, 9.43 percent in prosecution and 8.97 percent in conviction.

Overall, the literature on sentencing finds that women benefit relative to men in the prosecution process. There are many pathways along which a bias could be expressed and more causal evidence is needed. A straightforward road for this literature would be to explore new instruments and quasi-random judge assignment, in order to prove a null hypothesis of no difference in the treatment of gender. An interesting question to investigate further would be to determine the role of the gender of the judge on the sentencing gap.

4. Opportunity Cost

The opportunity cost to crime is represented by the labor market outcomes in the absence of crime. This is easiest measured through the legal wage. Yet, implicit in this measurement are the two legal labor market decision margins: extensive, for having a job, and intensive, for how high the earnings from the job are. The predictions are that if a criminal is unemployed and has no job, then she is likely to commit a crime. If a criminal earns a low wage, then high criminal profits can sway her to commit a crime. Implicitly, if a criminal has a tight budget constraint, she is more likely to commit a crime.

Most of the literature focuses on quasi-experimental variation in labor market outcomes, or in the budget constraint of the criminal. These type of reforms come in many forms: mass layoffs (Bennett and Ouazad 2020), housing vouchers (Carr and Koppa 2020), welfare benefits (Carr and Packham 2019; Corman et al. 2013) and tax credits (Agan and Makowsky 2020). While these reforms impact the whole population of criminals, they tend to have different impacts by gender. Sometimes this impact is underpinned by requirements that are best fulfilled by female household heads. Thus, the impact of these policies hinges on working together with life-cycle events in the life of a woman.

Focusing on the extensive margin, Bennett and Ouazad (2020) estimate the impact of exogenous mass-layoffs on own criminal activity in Denmark for a sample with strong attachment to the labor force. They find positive and significant results for men, up to 3 years post job loss. In the displacement year, men have a 0.57 percentage points higher probability of committing any crime. The result for women is exactly half at 0.26 percentage points higher probability of committing crime and the effect is only for the displacement year. Both effects are driven by property crimes. A woman that has lost her job is less likely than a man to commit a crime. One potential explanation could be that women are less likely to be the primary earners in the household, therefore their job loss is not changing the household budget constraint. An alternative explanation could be along the lines of women being more forward-looking than men about the potential impact of a conviction on their job prospects. This job concern is consistent with the underlying sample which has been selected with an eye towards strong labor force attachment. Finally, the nature of the mass layoffs speaks towards a mechanism with network effects, which are stronger for men than for women as described in the next section (Billings and Schnepel 2020).

Another factor that influences the extensive margin is the stigma faced by ex-convicts. Sciulli (2013) and Sheely (2020) consider the labor market opportunities for women beyond convictions using, respectively, British and US data. Sciulli (2013) uses propensity score matching and finds evidence that the employment probability of middle-aged females are about 3 times lower than the employment probability for males as a result of conviction (21.2% vs 7.1%). Conviction increases the inactivity by males by 4.1% vs 14.5% for females. Sciulli (2013) interprets the evidence as a strong discouragement effect and stigmatization of conviction among females. In a similar vein, Sheely (2020) uses fixed effects models to look for the separate effects of arrests, conviction and incarceration on labor market outcomes. She finds suggestive evidence that the differences between the three margins are not significant. She finds effects of 5pp (for arrest) - 7.4pp (for conviction) - 8.3pp (for incarceration) decrease in the probability of employment for women and 9.4pp - 11.9 pp - 17.3pp increase in the probability of not being in the labor force. Sciulli (2013) finds larger employment effects for women, while effects on detachment from the labor force seem to be consistent between the two studies. Both studies can't disentangle the effect of stigmatization for ex-convicts which find it difficult to enter the labor force from the effect of voluntary abstaining from participation in the labor market due to child-care responsibilities. A logical extension of this literature would be to consider the impact of "ban-the-box"-type of policies on women.

Looking at the intensive margin, Agan and Makowsky (2020) look at the impact of the minimum wage and the Earned Income Tax Credit (EITC) in the US on crime. They theorize that a change in the minimum wage impacts the labor prospects of released criminals through two channels - on the extensive margin, the likelihood of finding employment and on the intensive margin, the wage effect is underpinned by the wage they expect to earn. EITC benefits increase available income on the intensive margin and, thus, incentives to work in the labor market. They use a sample from 2000-2014, across 43 states. Agan and Makowsky (2020) find evidence that increases in both type of policies reduce female recidivism. On one hand, the effect of the minimum wage is the same for both genders. On the other hand, the EITC has an impact only on females, mainly in violent crimes. The availability of a state top-up to the federal EITC decreases the probability that a woman will return to prison in 3 years by 3 percentage points. The effect seems to be underpinned by the fact that females are more likely to have custodial responsibility for children, which is defined in the eligibility criteria for EITC.

From the perspective of policies impacting the budget constraint, Carr and Koppa (2020) identify the effects of housing vouchers on arrests of adult household heads. Housing vouchers relax budget constraints that might lead to crime, yet the prediction is ambiguous as the effect depends on the indifference curves and preferences of the household. Most importantly, voucher recipients can lose their eligibility if they are convicted of crime. The relative value of the voucher is high enough to make this rule salient to households. Therefore, one would expect to observe a decrease in crime as potential offenders are deterred. Carr and Koppa (2020) find no effects for more than a year after voucher service has been received. Most of the underlying sample of application is composed of women, 85 percent, and most of the recipients are single mothers.

Another policy that impacts the budget constraint is the Supplemental Nutritional Assistance Program (SNAP, similar to “food stamps”). Carr and Packham (2019) look at the impact of SNAP benefits on criminal activity. They find that increasing the number of disbursement days for SNAP benefits within a month leads to a decrease in shoplifting at grocery stores by 20.9 percent. They also find results consistent with increases in theft in the week before benefit receipt by women, likely in the age group above 40 years old.

Taking together the two studies by Carr and Koppa (2020) and Carr and Packham (2019), it seems likely that when women commit crime to relax the budget constraint they do so for small amounts. Through shoplifting women can directly acquire the items they need, while there is no way to shoplift a home. In the next section I show evidence that women do not have access to organized crime networks, so potentially they do not have access to large criminal income opportunities the size of a housing voucher. Therefore, there is an open question as to what criminal profits influence women to commit crimes.

In a series of papers Corman et al. (2013), Corman et al. (2017), Dave et al. (2020) and Corman, Dave, and Reichman (2018) explore the effects of a 1996 welfare reform in the US. The reform offered limited cash assistance and eligibility was contingent on labor market involvement. Corman et al. (2013) find that the reform lead to a decrease of 10%-21% of illicit drug use among women at risk of relying on welfare. Corman, Dave, and Reichman (2018) shows that the reform influences the offending of adult women. These two papers serve as a first stage in the subsequent intergenerational effects analyses. Corman et al. (2017) moves on to the next generation and examines how maternal employment influences crime in the next generation. By filtering variation from states with more stringent work incentive policies, the authors find a decrease in arrests for minor crimes for youth aged 15-17 years by 9-11%. The impact is similar for boys and girls. In addition, Dave et al. (2020) find that the welfare reform lead to significant increases in delinquent behavior of boys, but not for girls. The authors also find increases in drug use for both genders, more for boys than for girls. The main mechanism that seems to be at play is that boys are more responsive to disruptive events associated with the demand for welfare.

The papers reviewed in this section show that women respond to labor market incentives. The papers that explore welfare policies find the strongest responses by the subgroups of single mothers and older women. From Figure 2 we observe that these age groups are less likely to participate in crime. Together, this means that it is possible that the participation becomes lower over the life-cycle because of welfare policies that influence the marginal criminal. Yet, at the same time, Figure 2 also shows a worrying trend of increased female participation at all ages. This trend could coincide with the fall in fertility of US women⁶, which would

⁶The broad trend is U-shaped. The fertility rate was 1.978 in 1995. From 1999 to 2009 it was above 2. In 2015 the

imply that potential criminal women are less likely to have children and to be part of the sub-group that responds the strongest to welfare policies. This conjecture presents an interesting avenue to future research.

5. Paths to Crime

There is an important strand in the literature that focuses on examining the impact of policies that put potential criminals on a path where they are not the marginal criminal in a Becker decision model. Such policies are related to education (e.g. Cano-Urbina and Lochner 2019) and neighborhood environment (e.g. Kling, Ludwig, and Katz 2005). By discussing education and neighborhoods, one cannot skip the topic of criminal networks and how peers influence one another. In this section, I will discuss the impact of policies and decisions that put people into the path of crime or away from the path of crime.

Education

There is a large economic literature on the impact of education on labor outcomes. One of the most used instruments in this literature are compulsory schooling laws, which put a lower limit to the mandatory years of schooling before a pupil can drop out. Students who drop out early end up with less years of schooling, and so with lower earnings relative to their peers who continue their education. These lower earnings put drop outs on a path where they could be the marginal criminal who makes a criminal participation decision. Using this instrument, Cano-Urbina and Lochner (2019) look at the effect of education attainment on crime by females. Using data from 1960-1990, they find that educational attainment reduces arrest rates for violent and property crime, but not for white collar crime. They find that one additional year of schooling decreases incarceration rates for women by 0.04-0.08 percentage points, comparable to effects of 0.1-0.4 for men in the literature. In line with these results, Beaton, Kidd, and Machin (2018) find suggestive evidence that male crime decreased more than female crime following an educational reform. Taken together, these two papers imply that men benefit more relatively to women from educational reforms. Therefore, these education policies seem to be more effective in deterring men than in deterring women.

Yet, Cano-Urbina and Lochner (2019) find that the effect for women corresponds to 50%-80% decrease of the female incarceration rate for the affected crime types. It is probable that the effect is so big because female incarceration rates are small in comparison to males, as described in previous sections. One other paper in the literature also finds strong effects. McNichols, Sabia, and Kumpas (2020) look at a specific intensive margin of educational investment - sports activities in high-school. They leverage exogenous variation from reform from 1972, which required education institutions to achieve greater participation parity in sports activities. They find that 10% increase in female sports participation, reduced female arrests by 17.5 % among affected cohorts.

The effects found until now in the literature are big and based on different policies, therefore it is necessary to find what are the policy parameters with external validity and what are context-specific effects. What is ostensibly missing from this literature, are more studies on other education parameters such as, for example, the impact of class size on crime. Finally, it is important to note that education might not change the crime participation preferences, but rather allow criminals to sort into white-collar crime, on which there is very little research in economics.

Peers and Networks

One of the main pathways into crime is through social networks. There are separate strands in the literature on the economics of crime investigating peer effects and criminal networks. However, only a small fraction of the papers include gender as a covariate. An even smaller fraction looks explicitly at gender effects.

One of the general findings is that criminal networks are described by gender *homophily*, where men tend to commit crimes with men and women tend to commit crimes with women. Preference for the same gender is observed in delinquent adolescent networks (Lee et al. 2020) and in small criminal groups (Gavrilova 2019).

fertility rate was 1.844. The two relevant years for Figure 2 are 1995 and 2015. Data from the World Bank, accessed from <https://data.worldbank.org/indicator/SP.DYN.TFRT.IN?locations=US>

The presence of gender homophily is indicative of a gender bias barrier in organized crime that is difficult to cross. As an example, consider traditional organized crime structures like the mafia. Whenever there is a form of reference-based initiation into crime, fathers are likely to select their sons rather than their daughters, big brothers will refer to the gang their male siblings rather than their sisters, etc. This implies through path-dependence that larger structures with more connections will be male dominated. This is consistent with the notion of “institutional sexism” in the underworld (Steffensmeier and Terry 1986). Steffensmeier and Terry (1986) conduct interviews with 29 male criminals specializing in property crimes. The criminals reveal that they consider women as lacking important qualities to be good offenders such as trustworthiness and “heart” for the crime. The authors conclude that women are lacking access and mentorship to big illegal opportunities. More recently, Pizzini-Gambetta (2014) discusses the role of women in organized crime, in light of the equality hypothesis. She finds that across organized crime structures women are few and they occupy roles at the lower rings of the organization. As a wider consequence of the homophily, females would be less likely to be initiated into crime by other offenders, which is consistent with lower delinquency levels (Lee et al. 2020) and lower influence of criminal networks on their decision to participate in crime (Billings and Schnepel 2020).

The NIBRS data offers a view into the organization of small groups of criminals who offend together, *co-offenders*. Until the age of 19, more than 50 percent of the observed criminals from both genders are part of a group when committing a crime. From the age of 20 to 50 females are significantly more likely to be involved in group crimes, albeit the difference is of small magnitude - for example, at age 22 40 percent of the female criminals are involved in a group compared to 37 percent for males. In Gavrilova (2019) I analyze this data and find that criminals first sort on race, and then on gender. Around 75 percent of the pairs in which males are involved are homophilic. Notably, the numbers for females are lower, at 63 percent for black females and 51 percent for white females. Taken together, these numbers imply that females are social criminals who would thrive within organized crime.

In Gavrilova (2019) I theorize that criminals are incentivized by the Prisoner’s Dilemma and prefer to match with partners with lower probabilities of arrest. In equilibrium, this implies a pattern of positive assortative matching among criminals on the probability of arrest. Conditional on being part of mixed group, I find that women are less likely to be arrested. I reject several competing theories and I propose the existence of a bias where men would accept matches with women only if the women are better criminals. This would be consistent with the sexism that prevents women to enter organized crime in the first place. If a female is considered to be “bad” at offending because of her gender, then a male partner in crime would discount the features of a “better” criminal and consider himself her equal.

However, it is necessary to point out that there is a competing explanation for the observed gender bias in organized crime. Namely, concurrent preferences of women. For example, Pizzini-Gambetta (2014) argues that females prefer to remain in the lower ranks of organized crime because they *dislike* committing violent acts to advance in the hierarchy. Yet, recent crime trends suggest that these preferences might be changing, as women become more involved in violent crime (cf. Section 2).

One of the consequences of a barrier to entry into organized crime for women is that young girls would be less likely to be initiated into crime and, therefore, they would seem less delinquent. Lee et al. (2020) use data on US teenagers from the Add Health survey to determine the key players in youth delinquency networks. They use a structural network model with dependent variable a delinquency index measuring the rate of rule-breaking behavior. Throughout different estimation approaches, being a female is associated with a lower delinquency level. They also find evidence of gender homophily in network formation, meaning that being of the same gender increases the likelihood of belonging to the same network.

Another consequence of the barrier to entry into organized crime is that men are more likely to rely on their criminal networks in their participation decision. This line of thought is consistent with Billings and Schnepel (2020). The article examines how the criminal decision of an ex-inmate depends on the amount of criminally involved peers in the neighborhood, in an US setting. They use information on pre-arrest criminal networks and treat the incarceration status of peers as exogenous at the time of release of a prisoner. They find that the incarceration of peers leads to a lower probability of re-offense for males, but no effect for females. Therefore, it seems like females are less influenced in their crime participation decision by their criminal network than

males.

Networks could be also at the root for the findings in Kling, Ludwig, and Katz (2005). The article looks into the effects of the Moving To Opportunity (MTO) experiment on criminal behavior of adolescents. Moving to lower-poverty, lower-crime neighborhood lead to less violent crime arrests for both boys and girls. For girls the effect extended to other crimes as well. However, several years after the move, males had an increasing rate of property crime, while females did not commit more property crime. The authors propose that there are gender differences in adaptation (consistent with Dave et al. 2020). More precisely, boys take more time to realize their advantage in scoping potential targets for property crimes. An alternative interpretation is that it takes time for boys to establish a street reputation and enter or create networks of criminal peers. Girls are less likely to be initiated into a criminal network, and if they are not influenced by a network, they are less likely to commit crimes relative to boys.

Overall, the emerging picture of women in criminal network is hopeful for the agenda of decreasing crime. If women continue to face a barrier to entry in organized crime, then they are less likely to benefit from access to mentors, suppliers and economies of scale.

6. Conclusion

There is little empirical research on gender in the literature on the economics of crime. Research into this gap is gaining importance given that female participation in crime has been increasing over the last decades in several developed countries. On one hand, this trend is supported by the certainty that women face lower probabilities of arrest and favorable treatment in the justice system. On the other hand, this trend is weakened by a barrier to entry into organized crime that limits the illegal opportunities of women.

In this paper I review the economic literature on gender heterogeneity in crime and find that there is a need for more theoretical and empirical contributions. From the perspective of theory, there are no economics of crime contributions that consider the fact that males and females could respond to different incentives. Surveyed research in this paper tends to find different effects for women and men, confirming that there are different incentives at play for each gender that influence the criminal participation decision. Therefore, future research can be involved in the development of a gender-specific economic model of crime, which can reflect the incentives that lead to gender heterogeneity in crime. Concurrently, from the empirical side, the surveyed causal studies are few and there is a need to learn more about gender crime effects of deterrence and labor policies.

Most of the evidence of policies on crime comes from the US. Therefore, there is a need to establish the external validity of observed effects and to expand the set of instruments available to the policy maker. There is a wide avenue open to future research dedicated to finding policies that limit female participation.

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