Race and Gender Differences Under Federal Sentencing Guidelines[1]

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Abstract

Using data from the United States Sentencing Commission, we examine how judicial biases may have influenced sentences during the era of the Federal criminal sentencing guidelines. Our utility maximization model of judicial sentencing preferences leads to a partially censored ordered probit model that accounts for mass points in the sentencing distribution that occur at the upper and lower guideline limits and at sentences involving no prison time. Our results indicate that racial and gender based discrepancies exist, even after controlling for circumstances such as the severity of the offense and past criminal history.

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Our goal in this paper is to estimate race and gender disparities in federal criminal sentencing during a period in which the Federal Sentencing Guidelines were in effect. The guidelines were formulated by the U.S. Sentencing Commission under the authority of the Sentencing Reform Act of 1984. After the case of United States v. Booker in 2005, the guidelines became advisory rather than mandatory. However, subsequent case law developments suggest that judges who continue to adhere to the now advisory guidelines are more likely to be immune from appellate scrutiny than those who do not.

The Federal Sentencing Guidelines prescribed that sentences were to be set by the judge within a range determined in accordance with a computed criminal history level score and a computed offense level score.[5] Judges were allowed to depart from the mandatory guideline range only for reasons that were not adequately considered by the sentencing commission in formulating the guidelines and were explicitly forbidden from considering factors such as race, gender, socio-economic status, family circumstances, and with few exceptions, age.

In sociology, criminology, legal studies, and to a lesser extent in economics, there exists an empirical literature on racial and gender disparities in criminal sentencing. While some of these studies examine the role of judges, to our knowledge we are the first to construct a utility-based model of judicial preferences that directly yields an empirical model.[6] Most early papers outside of the economics literature estimated judicial gender or racial bias from models with few

[5] The core of the guidelines therefore, is a matrix called the sentencing table. See http://www.ussc.gov/2009guid/TABCON09.htm.

[6] Gelbach and Bushway (2011) develop a structural model to measure discrimination in the case of bail setting

control variables. Consequently, these studies suffered from various empirical issues including omitted variables bias and sample selection bias.

The federal criminal sentencing data that we employ provide information on the computed criminal history and offense level scores, allowing us to control for factors that may be correlated with both race/gender and sentence level.[7] By estimating the conditional effect of race or gender on sentencing, we are able to infer whether or not the average judge is biased. The demographic variables contained in our data also allow us to test for judges considering factors that were explicitly prohibited under the guidelines.

Schanzenbach and Tiller (2007) argue that federal judges can influence the calculation of offense levels by using facts of the case that are not explicitly admitted to in the plea bargain or found by the jury at trial. In our case, conditioning upon an endogenously determined offense level should simply lead to an underestimate of the level of bias (assuming that judges who assign higher sentences to a particular group also tend to assign higher offense levels to this group).

Our methodology offers an improvement over previous studies using simple OLS estimation because sentence lengths are not continuously distributed. To take account of the large mass points found in the data at sentence lengths of zero or sentences at the lower or upper bounds of the guideline ranges, we estimate what might be termed ``The Partially Censored Ordered Probit Model".

This estimation strategy applied to each race and gender group separately is an improvement over previous studies (Anderson, Kling and Stith (1999), Mustard (2001) and

[7] The data is publicly available from the Bureau of Justice Statistics and contains case level data on cases that reached the sentencing phase. To isolate the effect of judges from juries, we focus on only cases that reached the sentencing phase through a guilty plea. These were approximately 95\% of the cases.

Kempf-Leonard and Sample (2001)) which infer a race effect from the coefficient on a race dummy, or from the coefficients on a small set of (e.g. race and education, race and age) interaction terms. Such inference is inappropriate when the average case characteristics differ substantially across race since the coefficient on the dummy variable measures the differences in sentence lengths of individuals with the same average characteristics but of different race. Our decomposition separates the effect of racial differences in average case characteristics and the effect of differences in weights assigned to the characteristics by judges. The latter provides a lower bound of the effect of judicial preferences.

I. Behavioral and Econometric Model

Our model of judicial sentencing preferences holds that judges seek to maximize their utility over the ideal sentence for a convicted defendant subject to costs from departures from the sentencing guidelines. We specify

a quadratic utility function

(1)

$$U_i = -\frac{1}{2}(S_i - S^*{}_i)^2 - \theta_h(S_i - G_i^h)D_i^+ - \theta_l(G_i^l - S_i)D_i^-$$

where for the i^{th} convicted defendant, U_i is the sentencing judge's utility, S_i is the sentence awarded, S_i^* is the ideal sentence in the absence of sentencing departure costs, G_i^h and G_i^l are the maximum and minimum sentences specified by the guidelines such that $0 \le G_i^l \le G_i^h$, D_i^+ and D_i^- are indicator variables for upward and downward departures from the guidelines and are defined by $D_i^+ = 1[S_i > G_i^h]$ and $D_i^- = 1[S_i < G_i^l]$. The parameter restrictions are $\theta_h, \theta_l > 0$.

Solving the FOC utility maximizing condition implies

(2)
$$\dot{S} = S_i^* - \theta_h D_i^+ + \theta_l D_i^- \\ = (X'_i\beta + \varepsilon_i) - \theta_h D_i^+ + \theta_l D_i^-$$

The constrained utility maximizing sentence is $\dot{S}_i$. The ideal sentence is represented by the stochastic function where X'_i is a vector of the defendant's characteristics and facts of the case that determine the judge's preferences for the ideal sentence, β is a vector of parameters, and ε_i represents random utility and is distributed $i.i.d.\ N(0,\sigma^2_\varepsilon)$.

In the case of a judge for whom $D_i^+ = 1$, $\dot{S}_i - S^*_i = -\theta_h < 0$ implies that the utility maximizing sentence is below the ideal sentence. The intuition is that the judge would depart upwards from the guidelines but not as much as would have been preferred in the absence of the guidelines. Similarly in the case of a judge for whom $D_i^- = 1$ for a defendant $\dot{S}_i - S^*_i = \theta_l > 0$ implies that the utility maximizing sentence is above the ideal sentence. The intuition is that the judge would depart downwards from the guidelines but not as much as would have been preferred in the absence of the guidelines. Actual sentences deviate from ideal sentences whenever the guidelines are binding.

Given the threshold nature of the guidelines, the actual sentence awarded spans 6 regions:

$R_1 = i \in \{S_i \mid S_i = 0\}$, $R_2 = i \in \{S_i \mid 0 < S_i < G^l_i\}$, $R_3 = i \in \{S_i \mid S_i = G^l_i\}$,

$R_4 = i \in \{S_i \mid G^l_i < S_i < G^h_i\}$, $R_5 = i \in \{S_i \mid S_i = G^h_i\}$ and $R_6 = i \in \{S_i \mid G^h_i < S_i\}$.

In order to accommodate mass points at G^l_i and G^h_i, we first need to determine the probabilities that the utility maximizing values $\dot{S}_i$ yield sentences that fall in the six regions already considered. From the assumption of a normal distribution on random utilities, it is easily shown that

(3) $$P_{R1} = prob(S_i = 0) = 1 - \Phi((X'_i\beta + \theta_l)/\sigma_\varepsilon)$$

$$P_{R2} = prob(S_i = G^l{}_i) = \Phi((G^l{}_i - X^{'}{}_i\beta)/\sigma_\varepsilon) - \Phi((G^l{}_i - X^{'}{}_i\beta - \theta_l)/\sigma_\varepsilon)$$

$$P_{R3} = prob(0 < S_i < G^l{}_i) = \Phi((G^l{}_i - X^{'}{}_i\beta - \theta_l)/\sigma_\varepsilon) - [1 - \Phi((X^{'}{}_i\beta + \theta_l)/\sigma_\varepsilon)]$$

$$P_{R4} = prob(G^l{}_i < S_i < G^h{}_i) = \Phi((G^h{}_i - X^{'}{}_i\beta)/\sigma_\varepsilon) - \Phi((G^l{}_i - X^{'}{}_i\beta)/\sigma_\varepsilon)$$

$$P_{R5} = prob(S_i = G^h{}_i) = \Phi((G^h{}_i - X^{'}{}_i\beta + \theta_h)/\sigma_\varepsilon) - \Phi((G^h{}_i - X^{'}{}_i\beta)/\sigma_\varepsilon)$$

$$P_{R6} = prob(S_i > G^h{}_i) = 1 - \Phi((G_i^{\,h} - X^{'}{}_i\beta + \theta_h)/\sigma_\varepsilon)$$

The corresponding log likelihood function and expected sentence for the model are specified by:[8]

(4)
$$\ln(L_i) = \sum_{j=1}^{6} 1(R_i = j) \times \ln(P_{Rj})$$

$$\ln(L_i) = \sum_{j=1}^{6} E[S_i \mid R_j] \times P_{Rj}$$

Judicial sentencing preferences tied to gender and race can be identified from decomposition analysis. The basic idea is to determine how much of a sentencing gap between any two demographic groups can be explained by differences in the circumstances of their cases. Judicial sentencing preferences are identified as a residual from the remainder of the sentencing gap. Using the standard formulation by Oaxaca (1973), we decompose the gaps as follows:

(5)
$$\hat{Gap}_g = \hat{S}_{wm} - \hat{S}_{wf} = (\hat{S}_{wm} - \hat{S}^0{}_{wf}) + (\hat{S}^0{}_{wf} - \hat{S}_{wf}) = C_g + P_g$$
$$\hat{Gap}_r = \hat{S}_{wm} - \hat{S}_{bm} = (\hat{S}_{wm} - \hat{S}^0{}_{bm}) + (\hat{S}^0{}_{bm} - \hat{S}_{bm}) = C_r + P_r$$

where *g* and *r* represent gender and race, respectively, and $\hat{S}_j$ represents the average of the expected sentence for all individuals in group *j* (white males-*wm*, white females-*wf* and black males-*bm*). $\hat{S}^0{}_j$ shows the average expected sentence for all individuals in groups *wf* and *bm* had

[8] The conditional expected sentences are specified as follows: $E(S_i \mid R_1) = 0$, $E(S_i \mid R_3) = G_i^{\,l}$, $E(S_i \mid R_5) = G_i^{\,h}$. For *j=2,4,6*, $E(S_i \mid R_j)$ follows the expectation of a truncated distribution, derivations of the expected values in these regimes are available upon request from the authors.

they been assigned the estimated parameters of *wm*. Thus the terms C_g and C_r describe the portion of the gender and racial gap that can be be accounted for by differencing circumstances, while P_g and P_r describe the portion of these gaps that we ascribe to judicial preferences in sentencing.

II. Results and Evidence

Table 1 reports the effects of selected personal characteristics on judges' ideal sentences S^*. With a few exceptions for age of the defendant, the guidelines expressly prohibit judges from taking such characteristics into account when determining sentences. For all three demographic groups, both citizen and age affected a judge's preferred sentence. In addition, being married, having dependents, and having a private defense counsel all had effects on sentences for men. Educational indicator variables were significant in only two of twelve cases. These results indicate that judicial preferences, and thus actual sentences under our model, depended on factors by and large prohibited from consideration under the guidelines.

Table1. Effects of Personal Characteristics on Judges' Ideal Sentence(S^*)

	White Women	White Men	Black Men
Age	0.54**	0.55***	-0.73**
Age Squared	-0.01**	-0.01***	0.01
Married	0.27	-4.23***	-4.90***
Dependents	-0.32	-1.00***	-0.75***
Citizen	-8.13***	-6.90***	-8.43***
GED	2.42	2.35	4.58**
High School	0.96	-1.38	2.14
Some College	1.39	-3.57**	-0.63
College Grad	0.72	-2.37	-2.10
Private Defense	-0.25	-9.10***	-3.91***
N	7690	35020	25064

[a] Not reported are year and circuit fixed effects. Effects of criminal severity and criminal history reported in Table2.

Table 2 presents further evidence on judicial preferences. The first two rows of Table 2 present the marginal sentence effects of the criminal severity score and criminal history score, respectively. Consistent with judicial bias, these scores are the lowest for white women and the highest for black men.[9]

[9] The impacts of current offense severity and criminal history are calculated using the white male values of the scores weighted by the coefficients estimated for white women and black men. This weighting permits us to directly calculate gender and racial differences in the marginal effects of guideline scores independently of gender and racial differences in the scores themselves.

Table2. Estimated Judicial Bias

	White Women	White Men	Black Men
Severity Score	2.353	4.096	4.401
History	16.487	24.668	29.314
Down Depart Cost	32.455	42.995	52.490
Up Depart Cost	17.246	25.163	27.969
Mean Predicted	19.481	39.693	69.373
Gap With White	-20.212	.	29.680
Explained	-13.771	.	26.573
Unexplained	-6.441	.	3.107

Our estimates of the utility costs of departures from the guidelines are shown in the third and fourth rows of the table. These are reckoned in terms of months of prison time. For example the marginal cost of downward departures for white women is estimated at 32.5 months. This means the downward departure cost is equivalent to awarding a sentence that is 32.5 months in excess of the desired level. Equivalently, any judge for whom the ideal sentence was between the lower guideline and 32.5 months, will award a sentence at exactly the lower bound guideline. The fact that white women have the lowest downward departure cost, and black men the highest, is consistent with favoritism towards the first group and bias against the second and can help explain lower sentences for the first group and higher sentences for the second. The estimates of upward departure costs reverse the interpretation of the direction of the bias, as the effect of these parameters is interpreted in the opposite direction. However, our data show that downward departures are roughly 10 times more likely than upward departures.

Finally, we report our decomposition of predicted mean sentences. The unconditional mean predicted sentence is the lowest for white women and the highest for black men.[10] White women's and black men's expected sentences were also predicted using the estimated parameters for white men. The sentencing gaps were then decomposed as shown in the previous section. Of the predicted negative gender gap of 20 months, nearly 14 months can be explained by women having the advantage in circumstances. This leaves an unexplained gap of 6 months that is a lower bound estimate on judicial favoritism toward women. Of the predicted positive racial gap of 30 months favoring white men, about 27 months can be explained by black men being disadvantaged in terms of circumstances. Much of this can be attributed to the higher sanctions for the types of drug crimes black men were convicted of. This leaves an unexplained gap of 3 months that serves as a lower bound estimate of judicial preferences favoring white men vis-a-vis black men.

The U.S. Federal Sentencing Guidelines set upper and lower bounds on prison sentences for convicted defendants but permitted judges to depart from these bounds under certain circumstances. Sentences were to be awarded on the basis of calculated scores representing past criminal history and severity of the current offense. For the most part the Guidelines expressly prohibited judges from taking into account personal circumstances when determining sentences. The intent of this more mechanical approach was to curb sentencing disparities, especially along racial lines. Our findings show that personal circumstances did in fact figure into the determination of sentences and that racial and gender sentencing disparities remain even after conditioning on personal circumstances and the criminal history score and the severity of current

[10] Our predicted sentences are around 4 months higher than observed sentences for each group, however, the differences between the groups are roughly the same when comparing predicted sentences and actual sentences.

offense score. Even in the case of guilty pleas, there is the likelihood that the calculation of the severity of current offense score is influenced by a judge's preferences. One would expect that the calculation would tilt in the direction of placing a sentencing case within the guidelines in order to "harmonize" judicial preferences with the guidelines. Despite this motive, we find a large proportion of departures, mainly downward departures. This potential endogeneity biases our results against finding unexplained racial and gender gaps. Despite this bias toward zero, we find racial and gender disparities that we interpret as lower bound estimates of judicial bias.

References

Anderson, James M., Jeffrey R. Kling, and Kate Stith, "Measuring Interjudge Sentencing Disparity: Before and after the Federal Sentencing Guidelines," *Journal of Law and Economics*, 1999, *42*, 271–298.

Gelbach, Jonah and Shawn Bushway, "Testing for Racial Discrimination in Bail Setting Using Nonparametric Estimation of a Parametric Model," *Mimeo*, 2001.

Kempf-Leonard, Kimberly and Lisa L. Sample, "Have Federal Sentencing Guidelines Reduced Severity? An Examination of One Circuit," *Journal of Quantitative Criminology*, 2001, *17*, 111–144.

Mustard, D. B., "Racial, Ethnic, and Gender Disparities in Sentencing: Evidence from the U.S. Federal Courts," *Journal of Law and Economics*, 2001, *44*, 285–314.

Schanzenbach, Max M. and Emerson H. Tiller, "Strategic Judging Under the U.S. Sentencing Guidelines: Positive Political Theory and Evidence," *Journal of Law, Economics, and Organization*, 2007, *23* (1), 24–56.