

Demographic Differences in Federal Sentencing Practices: An Update of the *Booker Report's* Multivariate Regression Analysis



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Demographic Differences in Federal Sentencing Practices: An Update of the *Booker Report's* Multivariate Regression Analysis



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**DEMOGRAPHIC DIFFERENCES IN FEDERAL SENTENCING PRACTICES:
AN UPDATE OF THE *BOOKER REPORT*'S
MULTIVARIATE REGRESSION ANALYSIS**

I. INTRODUCTION

In 2006, the United States Sentencing Commission¹ undertook a review of the impact on federal sentencing of the Supreme Court's decision in *United States v. Booker*.² In March 2006, the Commission published the results of that review in the *Final Report on the Impact of United States v. Booker on Federal Sentencing*.³ As part of that report, the Commission performed an analysis of data from the federal courts to examine whether differences in the length of sentences imposed on offenders were correlated with demographic characteristics of those offenders. Based on continued interest in this issue, and in response to specific requests to update its prior analysis, the Commission has now repeated the analysis used for the *Booker Report* with additional data and has also developed a second methodology to examine that data. This report presents the results of that work.

This report focused on three separate time periods which together spanned the time between May 1, 2003, and September 30, 2009. The Commission found a correlation between the length of sentences imposed on some groups of offenders and the demographic characteristics of those offenders. These differences were not present in all time periods under study and differed in magnitude in the time periods in which they were observed.

In conducting this analysis, as it did in the *Booker Report*, the Commission used a research tool common in the social and behavioral sciences called multivariate regression analysis. This tool is used to examine data where multiple factors may contribute to an observed outcome, such as the sentencing of federal offenders. The principal benefit of this tool is that it accounts, or controls, for the effect of each factor in the analysis. Each factor can then be separately assessed and the extent to which each factor influences the outcome can be measured.

¹ The United States Sentencing Commission [hereinafter Commission] is an independent agency in the judicial branch of government. Established by the Sentencing Reform Act of 1984, its principal purposes are (1) to establish sentencing policies and practices for the federal courts, including guidelines regarding the appropriate form and severity of punishment for offenders convicted of federal crimes; (2) to advise and assist Congress, the federal judiciary, and the executive branch in the development of effective and efficient crime policy; and (3) to collect, analyze, research, and distribute a broad array of information on federal crime and sentencing issues.

² *United States v. Booker*, 543 U.S. 220 (2005).

³ United States Sentencing Commission, *Final Report on the Impact of United States v. Booker on Federal Sentencing* (March 2006) [hereinafter *Booker Report*]. The *Booker Report* and this report were issued pursuant to the Commission's general statutory authority under 28 U.S.C. §§ 994-995.

The Commission used two methodologies to examine the updated data. The first methodology was the one the Commission used in the *Booker Report*. The second methodology was developed after the *Booker Report* was released to the public. Both methodologies were reviewed by two groups of outside researchers and academicians. The preliminary results of the analysis were then peer reviewed prior to release to ensure that the methodologies used were appropriate and the results correctly stated.

Based on this analysis, and after controlling for a variety of factors relevant to sentencing, the following observations can be made:

- Black male offenders received longer sentences than white male offenders. The differences in sentence length have increased steadily since *Booker*.
- Female offenders of all races received shorter sentences than male offenders. The differences in sentence length fluctuated at different rates in the time periods studied for white females, black females, Hispanic females, and “other” female offenders (such as those of Native American, Alaskan Native, and Asian or Pacific Islander origin).
- Non-citizen offenders received longer sentences than offenders who were U.S. citizens. The differences in sentence length have increased steadily since *Booker*.
- Offenders with some college education received shorter sentences than offenders with no college education. The differences in sentence length have remained relatively stable across the time periods studied.
- The data were inconsistent as to the association between an offender’s age and the length of sentence imposed.

A. Trends Observed in the Data

The *Booker Report* contained an analysis of longer-term trends in sentencing differences associated with the race and gender of the offender, dating from 1999 through the end of 2005. Using the same methodology as in the *Booker Report*, this examination of sentencing trends has been extended in this report through fiscal year 2009. As noted above, the Commission also used a second methodology to review the data discussed in this report. The Commission was unable to examine sentencing differences from fiscal years 1999 to 2003 using the second methodology due to the unavailability in the Commission’s datasets of certain data necessary to perform this analysis for fiscal years prior to 2003.⁴ However, some consistent trends with regard to differences in sentence

⁴ The second methodology incorporates a factor that is not readily available in the Commission’s datasets before fiscal year 2003, which is the pre-sentencing custody status of the offender. The differences between the two methodologies are discussed *infra* at notes 59-70 and accompanying text.

length are observed when analyzing the data beginning in May 2003 with the second methodology.

1. Using the *Booker Report* Methodology

With respect to the sentences imposed on black and white offenders, a comparison shows that the difference in sentence length was greatest in fiscal year 1999 using this methodology. In that year, black offenders received sentences that were 14.2 percent longer than those imposed on white offenders, after controlling for the other factors in the analysis. This difference in sentence length declined steadily in fiscal years 2000 and 2001. By fiscal year 2002, no statistically significant difference was observed in the sentences imposed on black offenders compared to white offenders. No statistically significant difference between the sentences imposed on these two groups was observed again until after the *Booker* decision in January 2005. Using the most recent data available, these differences appear to have been increasing steadily since that decision. In the most recent period studied (December 2007 through September 2009), black offenders received sentences that were 10.0 percent longer than those imposed on white offenders, after controlling for the other factors in the analysis.

The Commission further observed that differences in the sentences imposed on male and female offenders have been relatively consistent since fiscal year 1999. In that year, male offenders received sentences that were 18.6 percent longer than those imposed on female offenders. Similar differences in sentence length were observed in each subsequent time period, including the most recent period studied (December 2007 through September 2009), during which male offenders received sentences that were 17.7 percent longer than female offenders, after controlling for the other factors in the analysis.

2. Using the Second Methodology

Using the second methodology, the difference in sentence length for black male offenders compared to white male offenders has increased over time and was greatest in the most recent period studied (December 2007 through September 2009). During this period, black male offenders received sentences that were 23.3 percent longer than those imposed on white male offenders. This is an increase from the 5.5 percent difference observed in the first period studied using the second methodology (May 2003 through June 2004). Sentences for Hispanic male offenders also have increased relative to those of white male offenders. During the first period studied using the second methodology, Hispanic male offenders received sentences that were 4.4 percent shorter than those imposed on white male offenders. In the most recent period studied (December 2007 through September 2009), however, Hispanic male offenders received sentences that were 6.8 percent longer than those imposed on white male offenders.

Sentences for female offenders of all races were consistently shorter than those for white male offenders. In two of the time periods studied “other” race female offenders received the shortest sentences (when compared to white male offenders) *vis-a-*

vis women of any other race. In all three time periods studied black female offenders received shorter sentences when compared to white male offenders than did white female or Hispanic female offenders. These differences were present during each of the periods studied; however, no trends in the size of these differences over time were observed.

It is important to note that the results of the two methodologies presented above cannot be compared directly for the years in which they overlap because the two methodologies differ in several important respects, which are described later in this report.

B. Cautions When Reviewing the Results of This Report

Although the multivariate regression analysis used to perform this analysis is common in social science research, and steps were taken to ensure its appropriateness for this analysis, it has limitations. For example, one or more key factors which could affect the analysis may have been omitted from the methodologies used because a particular factor is unknown or was erroneously excluded from the analysis, or because data concerning such a factor is unavailable in the Commission's datasets. Examples of factors for which no data is readily available in the Commission's datasets include a measure of the violence in an offender's criminal past, information about crimes not reflected in an offender's criminal history score as calculated under the sentencing guidelines, and information about an offender's employment record. For these reasons, the results presented in this report should be interpreted with caution.

Although the Commission's analysis demonstrates that some differences in the sentences imposed on certain groups of offenders are associated with specific demographic characteristics, it is also important to note that these differences may be attributable to one (or more) of a number of factors that, while correlated with the demographic characteristics of offenders, are not caused by them. For example, judges make decisions when sentencing offenders based on many legal and other legitimate considerations that are not or cannot be measured. Some of these factors could be correlated with one or more of the demographic characteristics of offenders but not be influenced by any consideration of those characteristics. The analysis presented in this report cannot explain why the observed differences in sentence length exist but only that they do exist, the relative size of those differences, and the time periods in which the differences were observed.

II. AN OVERVIEW OF MULTIVARIATE REGRESSION ANALYSIS

The Commission employed multivariate regression analysis to conduct the research presented in this report. Regression analysis is a statistical tool used to examine the effect of one or more factors on a particular outcome. This analytical tool is commonly used in the social and behavioral sciences.⁵ The results of such an analysis

⁵ Michael O. Finkelstein and Bruce Levin, *Statistics for Lawyers* 350 (2d ed. 2001) [hereinafter Finkelstein]. Multivariate regression analysis is sometimes called "multiple regression analysis."

also have been used in a variety of legal contexts.⁶ The Commission has used this tool in its prior research and, in particular, in its previous work on the issue of demographic differences in sentencing as contained in the *Booker Report*.

A. Examining Outcomes Influenced By Multiple Factors

Multivariate regression analysis is used to examine a collection of data in which there are a variety of outcomes and when there are “several possible explanations for the relationship among a number of explanatory variables” evident in the data.⁷ For example, height varies from person to person. Each person’s height is determined by his or her genetic background (*i.e.*, as reflected in the father’s height and the mother’s height) but many other factors might also play a part in determining a person’s height, such as age (children are usually shorter than adults), gender (men are taller than women on average), nutrition, exercise, disease or illness, and environmental conditions.⁸ Multivariate regression analysis can help to parse out the contribution, or lack of contribution, of each of these factors even when the outcomes (the heights of the people in the study) vary. The tool can also be used to study social outcomes. For example, policymakers wishing to promote programs to improve literacy might wish to know what factors affect a child’s ability to read in order to target government resources at the factors that matter most and can be affected by social policies. Of course, many factors might bear on literacy rates, such as the child’s age, parents’ age, parents’ educational level, presence of books in the home, shared reading activities, and other literacy activities. Multivariate regression analysis can be, and has been,⁹ used to help determine which of these factors actually affect literacy levels and which do not.

B. Dependent and Independent Variables

Regression analysis usually begins with a decision to examine an observed phenomenon or outcome (*e.g.*, height or literacy levels). The researcher will first develop a hypothesis as to the many possible factors that might produce that outcome.¹⁰ That hypothesis is then tested through the use of regression analysis as data about the outcome and many possible factors affecting that outcome are brought together. In some cases

⁶ *Id.* See also Federal Judicial Center, *Reference Manual on Scientific Evidence* 143, 181-83 (2d ed. 2000) [hereinafter *FJC Reference Manual*] (chapters entitled “Reference Guide on Statistics,” by David H. Kaye, M.A., J.D., and David A. Freedman, Ph.D., and “Reference Guide on Multiple Regression,” by Daniel L. Rubinfeld, Ph.D.).

⁷ *FJC Reference Manual, supra*, at 181.

⁸ Some of the foundational principles of regression analysis came from studies of the height of children. See Finkelstein, *supra* note 5, at 352-54.

⁹ See Neil J. Salkind, *Statistics for People Who (Think They) Hate Statistics* 324 (2d ed. 2007) (citing a European study using regression analysis to find that the mother’s age and shared reading activities had no bearing on a child’s literacy).

¹⁰ “Ideally, the selection of explanatory factors is determined solely by strong, well-validated, substantive theory, without regard to [any prior examination of the] actual data.” Finkelstein, *supra* note 5, at 378

available data are used, in other cases researchers will collect additional data for the analysis.¹¹ The goal of the analysis is to determine if associations between the factors being examined exist to such an extent that a causal relationship can be inferred between one or more of those factors and the observed outcome. Researchers refer to the outcome as the “dependent variable” and the factors that might affect (and therefore might explain) that outcome as the “independent variables” or the “explanatory variables.” In more technical terms, regression analysis “typically uses a single dependent variable and several explanatory . . . variables to assess the statistical data” and seeks to determine whether correlations exist between one or more of the independent variables and the dependent variable – allowing for a possible inference of “causation from association” between certain variables.¹²

Most regression analysis includes several independent variables in the analysis in order to statistically “control” for the discrete effect of each variable in relation to other variables.¹³ The selection of variables is determined in the first instance by the researcher’s understanding of the phenomenon to be studied and the hypothesis to be tested. Variables that measure the same thing or which are so closely associated that they vary from case to case in similar ways are excluded. That is, the analysis should not include a variable that is “correlated perfectly with one or more of the other explanatory variables [because] the [researcher] could not separate out the effect of the variable of interest . . . from the effect of the other variable.”¹⁴ The researcher will experiment with

¹¹ The data used in this report were taken from the Commission’s datasets. For more discussion about this data see Table A and accompanying text in the Technical Appendix to this report, *infra*.

¹² *FJC Reference Manual*, *supra* note 6, at 133, 181. Correlation and causation are different concepts. A variable that is correlated with another may not be caused by it.

[I]n interpreting the results of a multiple regression analysis, it is important to distinguish between correlation and causality. Two variables are correlated when the events associated with the variables occur more frequently together than one would expect by chance A correlation between two variables does not imply that one event causes the second. Therefore, in making causal inferences, it is important to avoid spurious correlation. Spurious correlation arises when two variables are closely related but bear no causal relationship because both are caused by a third, unexamined variable Causality cannot be inferred by data analysis alone; rather, one must infer that a causal relationship exists on the basis of an underlying causal theory that explains the relationship between the two variables. Even when an appropriate theory has been identified, causality can never be inferred directly. One must look for empirical evidence that there is a causal relationship. Conversely, the fact that two variables are correlated does not guarantee the existence of a relationship; it could be that the model – a characterization of the underlying theory – does not reflect the correct interplay among the explanatory variables.

Id. at 183-85.

¹³ Put another way, “it is a method in which a regression line is used to relate the average of one variable – the dependent variable – to the values of the other explanatory [or independent] variables.” *Id.* at 205.

¹⁴ This leads to the problem of multicollinearity. “When two or more variables are highly, but not perfectly, correlated – that is, when there is multicollinearity – the regression can be estimated, but some concerns remain. The greater the multicollinearity between two variables, the less precise is the estimate of individual regression parameters” *Id.* at 197.

different models, using different groups of variables, and test the relationships between the independent variables in order to find a model with variables that are independent from one another and not correlated in other ways.¹⁵

Modern regression analysis is done with a complex computer program¹⁶ that creates a mathematical equation using the available data. The dependent variable and each independent variable included in the analysis are represented in the equation. The computer program creates an equation that accounts for the variation in the available data to the greatest extent possible. The resulting equation assigns a numerical measure for each independent variable.¹⁷ The numerical values, known as “coefficients,” serve as an estimate of the extent to which each independent variable affected (or contributed to) the dependent variable.¹⁸

C. Interpreting Regression Analysis Results – Significance Tests and R²

Interpreting regression analysis results depends on several factors. A primary factor is the “significance test,” which asks whether the results of the analysis for any independent variable are “statistically significant.”¹⁹ Statistical significance is a determination of the probability that the measured relationship between an independent variable and the dependent variable is the result of random chance (*i.e.*, that it does not, in fact, reflect the true association). Prior to performing the analysis, the researcher will determine the statistical significance threshold that he or she wishes to use. This decision is based on a number of factors, including the amount of data available for analysis and the purpose for the analysis.²⁰ Results that do not meet that threshold level of significance are deemed to be “not statistically significant” and generally are not reported when the research results are published.²¹ This does not mean that the independent variable in question was found to have no impact on the dependent variable, but only that

¹⁵ Finkelstein, *supra* note 5, at 374-75.

¹⁶ The Commission’s Office of Research and Data staff use Statistical Analysis System (“SAS”) software to conduct regression analyses.

¹⁷ Regression analysis typically uses an ordinary least squares (“OLS”) analysis. See *Booker Report*, *supra* note 3, at B-24; see also generally *FJC Reference Manual*, *supra* note 6, at 206-08, 213 (discussing the linear regression statistic and OLS analysis).

¹⁸ A final part of the formula is the “error term,” which “represents the collective unobservable influence of any omitted variables.” *FJC Reference Manual*, *supra* note 6, at 208 (“In a linear regression, each of the terms [*i.e.*, independent variables] being added involves unknown parameters . . . , which are estimated [through the use of numerical values, *i.e.*, coefficients] by ‘fitting’ the equation to the data using [ordinary] least-squares.”).

¹⁹ *Id.* at 121-25, 191-94.

²⁰ *Id.* at 123 (“Statistical significance is determined by comparing a *p*-value to a preestablished . . . significance level.”). The computer program “compute[s] an observed significance level, or *p*-value” for each independent variable. *Id.* at 194.

²¹ See generally *id.* at 354-59.

the researcher could not dismiss the possibility that the measured impact could have occurred simply due to chance at the level of significance selected.

In the social sciences, the level of significance (or “p-value”) is commonly set at $p < 0.05$ (a probability of less than five percent).²² That is, if the possibility (as measured by the p value) that an observed result occurred solely due to chance is not less than five percent, the result is deemed not statistically significant, the results are not relied upon by the researcher in drawing conclusions, and they are not reported. Conversely, if the p-value of any variable is less than five percent, then that variable is deemed to have played a part in the observed outcome and is reported. In some research a stronger level of significance is deemed appropriate, usually due to the availability of large amounts of data, and the p-value is set to $p < 0.01$ (less than one percent) or smaller.²³ The Commission used a significance level of $p < 0.01$ in the analysis described in the *Booker Report*.²⁴ That significance level also was used for the analysis described in this report.

A second factor helpful in assessing the results of regression analysis is the R^2 (or “r-squared”). This is a numerical measure of the extent to which the computer-generated mathematical equation explains all of the variation in the data used in the analysis.²⁵ The numerical measure of R^2 “is the statistic that measures the percentage of variation in the dependent variable that is accounted for by all the explanatory variables.”²⁶ Put another way, it is the representation of the “goodness of fit” between the regression line calculated by the computer program and the particular data being analyzed.²⁷ This measure is sometimes referred to simply as the “degree of fit” of the model to the data.²⁸

The R^2 has a value of between 0 and 1 and is commonly expressed as a percentage between 0 and 100. A high R^2 means that much of the variation in the dependent variable has been accounted for by the independent variables in the model whereas a low R^2 indicates that there are one or more variables missing from the model that affect the

²² “In most scientific work, the level of statistical significance required . . . to obtain a statistically significant result[] is set conventionally at .05, or 5% . . . although reporting of more stringent 1% significance tests . . . can also provide useful information.” *Id.* at 194.

²³ Adrian E. Raftery, *Bayesian Model Selection in Social Research*, 25 *SOCIOLOGICAL METHODOLOGY* 111, 141 (1995).

²⁴ *Booker Report*, *supra* note 3, at B-24.

²⁵ The R^2 is a shorthand way of referring to the “multiple coefficient of determination.” See Jack Levin and James Alan Fox, *Elementary Statistics in Social Research* 376 (10th ed. 2006) [hereinafter Levin and Fox]; Damodar N. Gujarati, *Basic Econometrics* 175 (2d ed. 1988) [hereinafter Gujarati].

²⁶ Levin and Fox, *supra*, at 215.

²⁷ *Id.*; Gujarati, *supra* note 25, at 175; Finkelstein, *supra* note 5, at 369-70.

²⁸ See *FJC Reference Manual*, *supra* note 6, at 215.

dependent variable.²⁹ There is no set standard for determining what level of R^2 “should lead to a conclusion that the model is satisfactory.”³⁰ A high R^2 does not, by itself, prove that the variables included in the model are appropriate.³¹ Nor does the R^2 “measure the validity” of the underlying hypothesis on which the regression analysis is based.³² For this reason, it is important to consider all aspects of the model used in any analysis, and not to rely solely on a summary measure such as R^2 .^{33, 34}

D. Limitations of Regression Analysis

As is apparent, the usefulness of regression analysis is entirely dependent on the data being used. Therefore, one important concern when using regression analysis is an awareness of what data might be missing from the analysis.³⁵ The omission of one or more important variables usually causes the value of the variables that are included in the model to be overstated.³⁶ The missing variable may involve data that simply are not available because such data are not collected. Alternatively, data may be erroneously omitted due to oversight or because the impact of the omitted factor on the outcome being studied may not yet be understood.

For example, a judge sentencing two offenders convicted of similar crimes with the same criminal history score under the federal sentencing guidelines might impose a longer sentence on the offender with a more violent criminal past than on the offender with a less violent, or non-violent, criminal history.³⁷ Similarly, a judge sentencing two

²⁹ *Id.* at 215-16. When comparing the R^2 of two different models, the dependent variable must be the same. Gujarati, *supra* note 25, at 183.

³⁰ *FJC Reference Manual*, *supra* note 6, at 216.

³¹ *Id.*

³² Finkelstein, *supra* note 5, at 370.

³³ “Although R^2 is a useful summary measure its importance should not be exaggerated. What is critical is the underlying theoretical expectations about the model in terms of a priori signs of the coefficients of the variables entering the model and . . . their statistical significance.” Gujarati, *supra* note 25, at 196. *See also* Finkelstein, *supra* note 5, at 372.

³⁴ For a discussion of the R^2 used in this report, see *infra* at note 70 and accompanying text.

³⁵ *See FJC Reference Manual*, *supra* note 6, at 198 (one or more unmeasured factors that are not available for inclusion in the analysis as independent variables potentially could change the results of the analysis if they were included).

³⁶ Finkelstein, *supra* note 5, at 380.

³⁷ *See generally* United States Sentencing Commission, *United States Sentencing Commission Guidelines Manual* (2009) [hereinafter USSG] at Chapter 4. As noted in the *Booker Report*, “The presence of violent criminal history may lead the court to sentence higher in the prescribed range. The Commission’s datafile does not have information on the type of criminal history behavior. In 2002, the Commission created a datafile which took a 25 percent random sample of cases sentenced in Fiscal Year 2000. This datafile looked more closely at [an] offender’s criminal conduct, including detailed information on the type of criminal history the offender had. Using this data (the Intensive Study Sample 2000, or ISS2000), it was

offenders convicted of similar crimes might be influenced by the presence of violence in one case that was not present in the other case and was not reflected in the final offense level for those cases as determined under the sentencing guidelines.³⁸ Additionally, judges might be influenced by crimes not reflected in the criminal history score or by an offender's contacts with the criminal justice system that do not result in a conviction.³⁹ Further, an offender's employment record may have some influence on the sentence imposed. Data on these factors are not available in the Commission's datasets. Although the possibility of missing variables is a limitation common in regression analysis, it does not mean that the results of such an analysis are misleading or wrong.⁴⁰ For these reasons, the results of *any* regression analysis should be interpreted with caution.

III. ANALYSIS OF DIFFERENCES IN FEDERAL SENTENCING PRACTICES

A. The *Booker Report*: Demographic Differences in Federal Sentencing Practices

In Chapter 5 of the *Booker Report*, the Commission presented the results of a multivariate regression analysis of demographic differences in federal sentencing practices.⁴¹ The *Booker Report* analysis reviewed data from October 1, 1998, through January 11, 2006, with a primary focus on two time periods: (1) the 14 months of the

found that 24.4 percent of white offenders had violent criminal history events, as did 43.7 percent of black offenders, 18.9 percent of Hispanic offenders, and 23.7 percent of 'other' offenders." *Booker Report, supra* note 3, at 105 n.317.

³⁸ Although the use of violence is often accounted for in the sentencing guidelines through application of specific offense characteristics, which can affect an offender's final offense level, not every incidence of violence occurring within a crime is accounted for. *See generally* USSG at Chapter 1, Pt. A(1)(3). *See also generally* USSG §§1B1.1(b), 1B1.3(a).

³⁹ Under the guidelines, only criminal conduct for which the offender was convicted is counted toward establishing a criminal history score for the offender. Further, some offenses for which an offender was convicted are not counted in the computation of the criminal history score, for one of several possible reasons. *See* USSG §§4A1.1, 4A1.2.

⁴⁰ Although "[t]here is tension between any attempt to reach conclusions with near certainty and the inherently probabilistic nature of multiple regression analysis" based on incomplete data, "[t]he reality that statistical analysis generates [only] probabilities that there are relationships [between certain variables] should not be seen as an argument against the use of statistical evidence. The only other alternative might be the use of less reliable anecdotal evidence." *FJC Reference Manual, supra* note 6, at 185.

⁴¹ *See Booker Report, supra* note 3, at 105-09; *see also id.* at B-22 through B-31 (technical appendix explaining the multivariate analysis). Seven demographic differences concerning sentence lengths were examined: (1) black offenders versus white offenders; (2) Hispanic offenders versus white offenders; (3) "other" racial groups (*e.g.*, Native Americans) versus white offenders; (4) male offenders versus female offenders; (5) non-citizen offenders versus U.S. citizen offenders; (6) offenders who had any level of college education versus offenders with no college education; and (7) offenders over 25 years of age versus offenders 25 years of age or younger.

“post-PROTECT Act”⁴² period (*i.e.*, May 1, 2003, through June 24, 2004, the date of the Supreme Court’s decision in *Blakely v. Washington*);⁴³ and (2) the first year after the Supreme Court’s decision in *United States v. Booker* (*i.e.*, January 12, 2005, the date of the *Booker* decision, through January 11, 2006).

The purpose of this analysis was to determine whether any changes in sentencing practices had occurred over these periods that were statistically significant⁴⁴ after controlling for the factors in the analysis. The analysis focused on differences in sentence length associated with various demographic factors, when all sentencing guideline and other specified legal factors had been taken into account.

The dependent variable in the analysis was an offender’s sentence length. The factors examined in the *Booker Report* as independent variables were as follows:⁴⁵

- The presumptive sentence (*i.e.*, the minimum sentence, in months, to which the offender was subject under the sentencing guidelines, taking into account all guideline, statutory, and mandatory minimum provisions);⁴⁶
- Type of offense committed (violent, sexual, drug trafficking, drug possession, white collar, immigration, or other);⁴⁷

⁴² The “PROTECT Act” refers to the Prosecutorial Remedies and Other Tools to end the Exploitation of Children Today Act of 2003, Pub. L. No. 108-21, 117 Stat. 650 (2003).

⁴³ *Blakely v. Washington*, 542 U.S. 296 (2004). The analysis did not include sentences imposed between the date that *Blakely* was decided and the date of the Supreme Court’s subsequent decision in *Booker* (January 12, 2005) because “*Blakely* caused some confusion in the federal sentencing community that resulted in inconsistent guideline application and sentencing.” *Booker Report*, *supra* note 3, at B-22 n.369.

⁴⁴ For a discussion of statistical significance, see *supra* notes 18-22 and accompanying text. In the *Booker Report* model, a result for an independent variable was reported as significant only when the probability that the result measured was due to random chance was less than 1% ($p < 0.01$). *Booker Report*, *supra* note 3, at B-24.

⁴⁵ A more complete description of these variables can be found in the Technical Appendix to this report, *infra*.

⁴⁶ The presumptive sentence is the bottom of the applicable sentencing guideline range that applies in a case. Courts are required to calculate this guideline range in every felony and Class A misdemeanor case. *See Rita v. United States*, 551 U.S. 338, 347 (2007) (courts of appeal may apply a presumption of reasonableness to a district court sentence that reflects a proper application of the sentencing guidelines); *Gall v. United States*, 552 U.S. 38, 49 (2007) (“[a]s we explained in *Rita*, a district court should begin all sentencing proceedings by correctly calculating the applicable guideline range”).

⁴⁷ The offense types used in this analysis are broad. The seriousness of the several crimes varies within the offense type categories as does the demographic characteristics of the offenders convicted of those crimes. Certain crimes within an offense type are punished more severely than others (*e.g.*, those crimes involving injury not accounted for under the sentencing guidelines) and offenders of a particular demographic group may be disproportionately convicted of those crimes. If so, the offense type variables used in this analysis may not fully account for the effect on the sentence length imposed that is attributable to certain crimes.

- The offender’s criminal history (as reflected in the criminal history score assigned to the offender under the sentencing guidelines);
 - Whether the offender was convicted of violating 18 U.S.C. § 924(c) (an offense under this statute which requires imposition of a sentence consecutive to the sentence imposed for the underlying offense);
 - Whether a weapon enhancement applied (a sentencing enhancement under the sentencing guidelines for use or possession of a weapon during the offense);
 - Whether the court determined that the offender had a minor or minimal role in the offense pursuant to USSG §3B1.2;
 - Whether the court determined that the offender had an aggravating role in the offense pursuant to USSG §3B1.1;
 - Whether the offender was a career offender (*i.e.*, subject to the enhanced criminal history category and offense level pursuant to USSG §4B1.1);
 - Whether the offender was an armed career criminal (*i.e.*, subject to the enhanced criminal history category and offense level pursuant to USSG §4B1.4.);
 - Whether a statutory mandatory minimum punishment applied;
 - Whether the offender qualified for a sentence reduction upon application of the “safety valve” provision pursuant to USSG §5C1.2 (which limits the applicability of mandatory minimum sentences in certain cases);
 - Whether the court determined that a sentence outside the applicable sentencing guideline range was warranted;
 - Whether the offender pled guilty;
 - Race of the offender;
 - Gender of the offender;
 - Citizenship of the offender (whether the offender was a United States citizen);
 - Educational attainment of the offender; and
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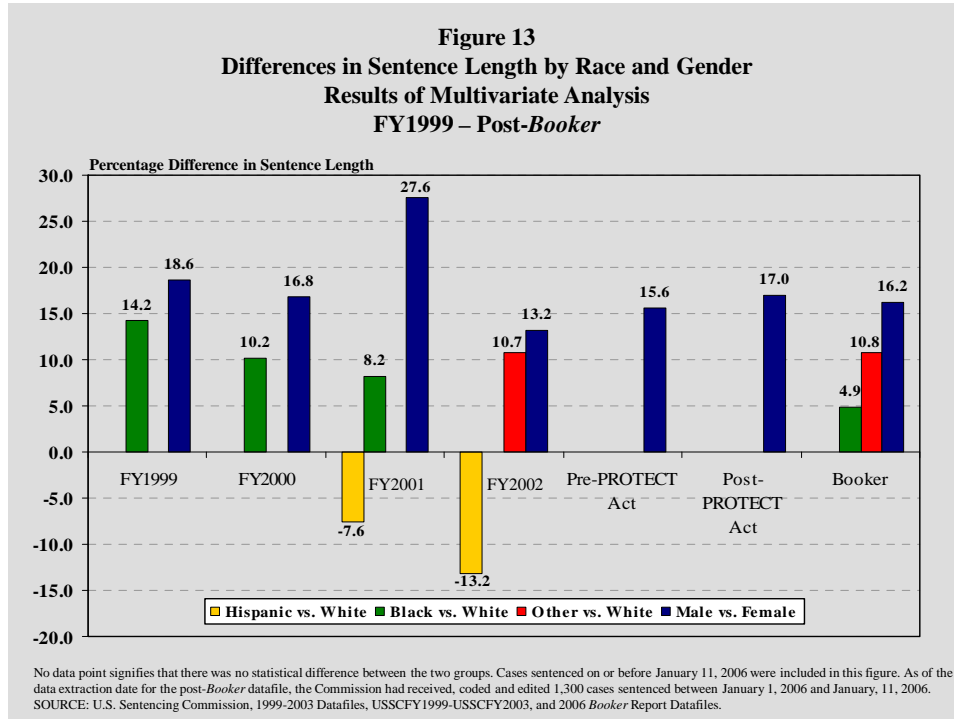
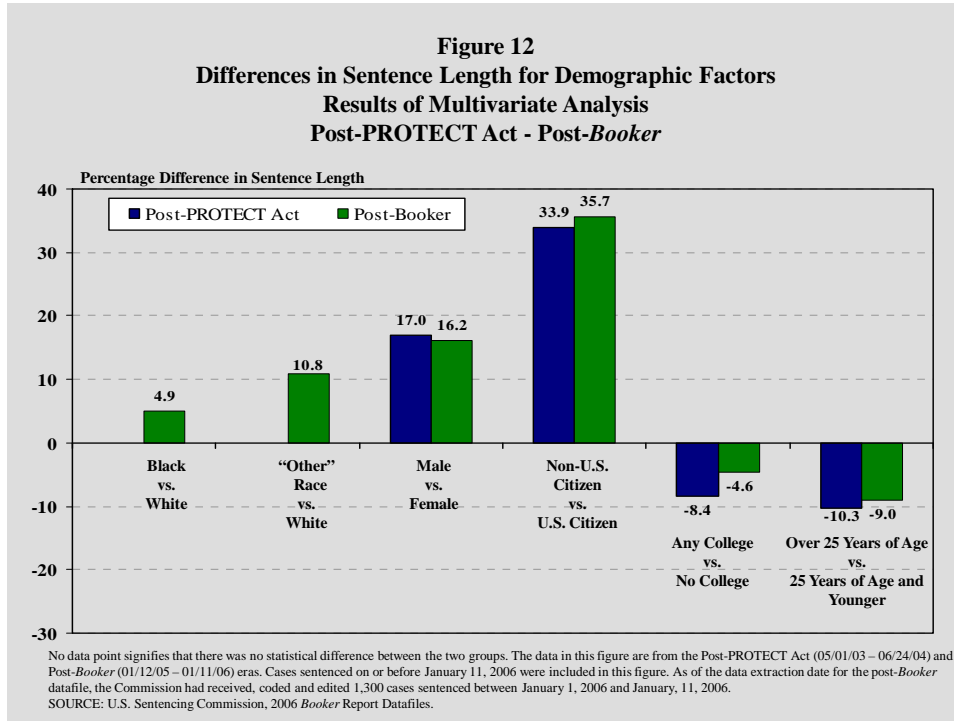
- Age of the offender.

The results of the multivariate analysis for these two time periods were set out in Figure 12⁴⁸ and Figure 13⁴⁹ of the *Booker Report*, which are reproduced here as Figure A:

⁴⁸ *Booker Report*, *supra* note 3, at 107.

⁴⁹ *Booker Report*, *supra* note 3, at 109.

Figure A



The *Booker Report* summarized the results of the multivariate analysis that were statistically significant. Certain demographic factors, namely gender, age, education and citizenship, were associated with sentence length to the same or virtually the same extent both before and after the *Booker* decision.⁵⁰ Specifically, longer sentence lengths were associated with male offenders when compared to female offenders, with non-citizens when compared to U.S. citizens, with offenders having no college education when compared to those who did have some college education, and with offenders 25 years of age and younger when compared to those over 25 years of age. Regarding race, the Commission concluded that:

Post-*Booker*, black offenders are associated with sentences that are 4.9 percent higher than white offenders, and “other” race offenders (mostly Native American offenders) are associated with sentences that are 10.8 percent higher than white offenders. Neither of these relationships was statistically significant in the post-PROTECT Act period. No difference was found between white and Hispanic offenders during either time period.^{51, 52}

B. The *Booker Report* Model

1. Update of the *Booker Report* Model Data

The Commission has updated the analysis presented in the *Booker Report* using data through the end of fiscal year 2009. This analysis employed the same methodology used in the *Booker Report*. However, to facilitate analysis of sentencing trends in light of evolving Supreme Court jurisprudence,⁵³ and specifically to illuminate any trends since the *Booker* decision, the data used in the analysis were divided into two time periods: (1) the three-year period between the *Booker* decision (January 12, 2005) and the decisions in *Kimbrough v. United States* and *Gall v. United States* (both decided on December 10, 2007) (the “Post-*Booker* Period”); and (2) the 21-month period from December 11, 2007, to the end of fiscal year 2009 (September 30, 2009) (the “Post-*Gall* Period”). The data analyzed was taken from the sentences imposed on more than 360,000 offenders.⁵⁴

⁵⁰ *Id.* at 106.

⁵¹ *Id.*

⁵² The “other” category consists of all offenders other than those who are white, black, or Hispanic, and includes offenders of Native American, Alaskan Native, and Asian or Pacific Islander origin.

⁵³ In *Gall v. United States*, 552 U.S. 38, 51 (2007), the Supreme Court held that courts of appeals must review all sentences - whether inside, just outside, or significantly outside the guideline range - under a deferential “abuse of discretion” standard. In *Kimrough v. United States*, 552 U.S. 85, 110 (2007), the Supreme Court held that a district court may consider the disparity between the treatment of crack and powder cocaine offenses in the guidelines (*i.e.*, the 100-to-1 ratio) when applying the 18 U.S.C. § 3553(a) factors to determine an offender’s sentence.

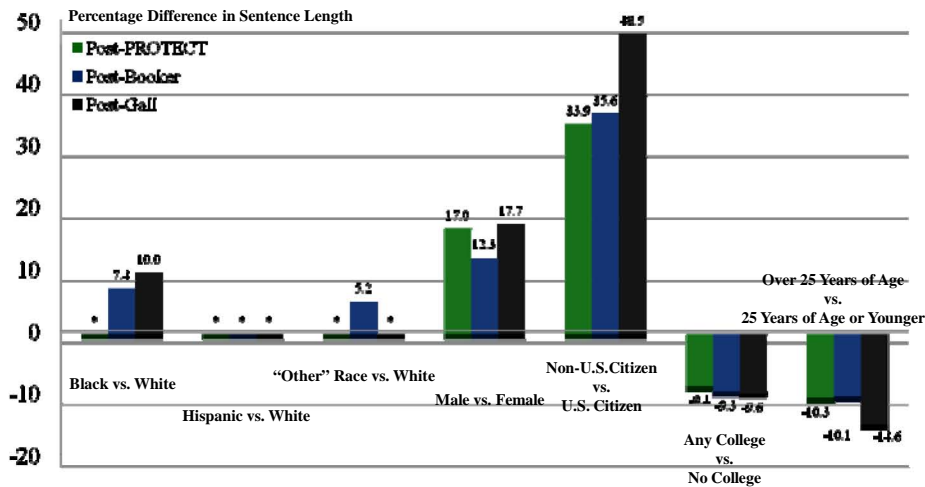
⁵⁴ See Table A, *infra* at the Technical Appendix, for more information concerning these offenders.

Figure B provides the results of the analysis for the three time periods: Post-PROTECT Act, Post-Booker, and Post-Gall.⁵⁵

Figure B

Booker Report Model: Data Through FY2009

Differences in Sentence Length for Demographic Factors
 Results of Multivariate Regression Analysis
 Post-PROTECT Act, Post-Booker, and Post-Gall



*signifies that there was no statistically significant difference between the two groups.
 SOURCE: U.S. Sentencing Commission, 2003-2009 Datafiles, USSCFY03-USSCFY09.

2. Summary of Updated Results Using the *Booker Report* Model

The multivariate analysis assessed whether any demographic factors were associated with changes in sentence lengths after *Booker*. The analysis determined that demographic factors of race, gender, citizenship, education, and age each were associated with sentence length to a statistically significant extent during some of the time periods under study. For example, the analysis indicated that male offenders were associated with longer sentences than female offenders during all time periods. Specifically, male offenders were associated with sentences that were 17.0 percent longer than sentences for female offenders during the Post-PROTECT Act Period, 12.3 percent longer in the Post-Booker Period, and 17.7 percent longer in the Post-Gall Period.

Non-U.S. citizens received sentences that were longer than those imposed on U.S. citizens in all three periods. In the Post-PROTECT Act Period, non-U.S. citizens received sentences that were 33.9 percent longer than those imposed on U.S. citizens.

⁵⁵ The asterisk (*) in this table is used to indicate that any difference between the two groups for that time period was not statistically significant. This does not mean that there was no observed difference between the two groups but, rather, that the possibility that any observed difference occurred due to chance could not be dismissed at p<0.01 level of significance. See also *supra* notes 19 to 24 and accompanying text.

Similarly, non-U.S. citizens received sentences that were 35.6 percent longer in the Post-*Booker* Period and 48.5 percent longer in the Post-*Gall* Period than those imposed on offenders who were citizens.

Education also showed an association with sentence length. During the Post-PROTECT Act Period, offenders with any college education received sentences that were 8.4 percent shorter on average than offenders with no college education. During the Post-*Booker* Period, offenders with any college education received sentences that were 9.3 percent shorter than those without any college education, and during the Post-*Gall* Period those with any college education received sentences that were 9.6 percent shorter than sentences imposed on offenders without that education.

Offenders over 25 years of age received sentences that were 10.3 percent shorter than offenders 25 years of age or younger during the Post-PROTECT Act Period. These offenders received sentences that were 10.1 percent shorter during the Post-*Booker* Period, and 14.6 percent shorter during the Post-*Gall* Period than sentences imposed on offenders who were 25 years of age or younger.

Finally, although there were no associations found between the offender's race and the sentence length during the Post-PROTECT Act Period, there were associations found between the race of some offender groups and sentence length in the Post-*Booker* and Post-*Gall* Periods. In the Post-*Booker* Period, black offenders received sentences that were 7.4 percent longer than white offenders. Offenders classified as belonging to an "other" race⁵⁶ received sentences that were 5.2 percent longer than white offenders. In the Post-*Gall* Period, black offenders received sentences that were 10.0 percent longer than white offenders. The sentences imposed on "other" race offenders were not different to a statistically significant extent when compared with white offenders. With respect to Hispanic offenders, there were no statistically significant differences in the sentences imposed when compared to sentences for white offenders in any of the three periods in the analysis.

C. The Refined Model

1. Developing Another Model

As part of the Commission's continuing review and analysis of federal sentencing practices and its commitment to pursuing continuing refinement of statistical techniques consistent with scientific literature and best practices, the Commission developed another multivariate regression model (the "refined model") to assess the impact of factors associated with sentence lengths. This refined model also was used to analyze data that have been reported to the Commission after the *Booker* decision.⁵⁷

⁵⁶ The "other" category consists of all offenders other than those who are white, black, or Hispanic, and includes offenders of Native American, Alaskan Native, and Asian or Pacific Islander origin.

⁵⁷ See Table A, *infra* at the Technical Appendix, for more information concerning these offenders.

As with the *Booker Report* model, the dependent variable used in the refined model analysis was an offender's sentence length. The factors examined as independent variables in the refined model were as follows:⁵⁸

- The presumptive sentence (*i.e.*, the minimum sentence, in months, to which the offender was subject under the sentencing guidelines, taking into account all guideline, statutory, and mandatory minimum provisions),⁵⁹
- Type of offense committed (violent, sexual, pornography, drug trafficking, white collar, immigration, or other);⁶⁰
- Whether a statutory mandatory minimum punishment applied;
- Whether the court determined that a sentence outside the applicable sentencing guideline range was warranted;
- Detention status (whether the offender had been released on bail prior to sentencing);
- Whether the offender pled guilty;
- Race of the offender paired with the gender of the offender;
- Citizenship of the offender (whether the offender was a United States citizen);
- Educational attainment of the offender; and
- Age of the offender.

The refined model differs from the methodology used in the *Booker Report* in three significant ways. First, while the *Booker Report* model separately compared racial and gender effects by comparing males to females and white offenders to black, Hispanic

⁵⁸ A more complete description of these variables can be found in the Technical Appendix to this report, *infra*.

⁵⁹ The presumptive sentence is the bottom of the applicable sentencing guideline range that applies in a case. *See supra* note 46.

⁶⁰ The offense types used in this analysis are broad. The seriousness of the several crimes varies within the offense type categories as does the demographic characteristics of the offenders convicted of those crimes. Certain crimes within an offense type are punished more severely than others (*e.g.*, those crimes involving injury not accounted for under the sentencing guidelines) and offenders of a particular demographic group may be disproportionately convicted of those crimes. If so, the offense type variables used in this analysis may not fully account for the effect on the sentence length imposed that is attributable to certain crimes.

and “other” offenders, the refined model instead pairs race and gender into eight distinct groups: white males, white females, black males, black females, Hispanic males, Hispanic females, “other” males, and “other” females. Reporting the results of the analysis in this way identifies any differences in sentence length associated with the offender’s race and gender, both individually and through any interaction of these characteristics.

Second, the refined model controls for an offender’s pre-sentence detention status in explaining differences in sentence length. In the *Booker Report*, one of the unmeasured factors cited as possibly having an effect on differences in sentence length among groups was the pretrial bail decision.⁶¹ This was thought to be potentially important because of differences among racial groups and gender in pre-sentencing custody status. As stated in the *Booker Report*, offenders with low sentencing guideline ranges who are held in pre-sentencing custody typically do not receive probationary sentences and, instead, are usually given credit for the time served in pre-sentencing custody. Offenders who are not held in pre-sentencing custody may receive probationary sentences. Therefore, two similarly situated offenders with differing pre-sentencing custody status may receive different sentences as a result of this status.⁶² If this status is associated with race or gender, then it may confound the results. The refined model controls for that possibility by including the custody status of the offender as an independent variable in the model.⁶³

Third, the refined model does not include some case characteristic variables that were included in the analysis discussed in the *Booker Report*. These guideline factors were omitted from the refined model because they directly contribute to or are highly correlated with the value of another variable that is already included in the analysis, *i.e.*, the presumptive sentence.⁶⁴ The factors included in the *Booker Report* model but excluded from the refined model are: (1) the number of criminal history points; (2) whether the offender received a “safety valve” adjustment (in drug cases);⁶⁵ (3) whether

⁶¹ *Booker Report*, *supra* note 3, at 105.

⁶² *Id.* at 105 n.318 (Offenders who are not given the opportunity to post bail, or may not be able to afford bail, are detained for the entire period before their sentencing. Thus, if an offender’s final sentencing range is 6-12 months, and the offender serves 10 months in prison before the final adjudication of the sentence, the court could sentence the offender to “time served,” and the sentence would be 10 months. An offender who was out on bail during this process may get a 6-month sentence for the same behavior, which the court may have wanted to give to the first offender if the bail circumstances were similar.).

⁶³ This approach has been reported in the literature. See Brian D. Johnson, Jeffery T. Ulmer, and John H. Kramer, *The Social Context of Guidelines Circumvention: The Case of Federal District Courts*, 46 CRIMINOLOGY 737 (2008); Cassia Spohn, *Sentencing decision in three U.S. district courts: testing the assumption of uniformity in the federal sentencing process*, 7 JUST. RES. & POL’Y 1, 8-9 (2005).

⁶⁴ These factors were included in the *Booker Report* model along with presumptive sentence variable in order to account for any extra weight such factors may have had in sentencing decisions “beyond the weight they are given in the guidelines.” *Booker Report*, *supra* note 3, at B-23.

⁶⁵ See 18 U.S.C. § 3553(f) (referenced at USSG §5C1.2).

the offender was convicted of an offense under 18 U.S.C. § 924(c); (4) whether the offender received a specific offense characteristic (“SOC”) enhancement for use of a weapon; (5) whether the Career Offender enhancement applied;⁶⁶ (6) whether the Armed Career Criminal enhancement applied;⁶⁷ and (7) the offender’s role, if any, in the offense (as reflected by a mitigating role adjustment, an aggravating role adjustment, or no role adjustment).

Including these variables in the *Booker Report* model required the application of statistical techniques that somewhat artificially overstated the impact of the presumptive sentence variable and, as a result, understated the impact of some of the other independent variables.⁶⁸ By excluding the variables listed above, the refined model uses only those variables that are independent of and not correlated with one another.⁶⁹ Under the refined model, each independent variable has a coefficient value attributed to it that reflects the contribution of that variable to the overall sentence. Direct comparison of the results of the two models should not be made because of the differences in the methodologies used.

As a result of these modifications, the refined model explains more of the variation within the data in the Commission’s datasets than did the *Booker Report* model. As discussed above, most regression analysis computer programs provide a quantifiable measure (the R^2) of the amount of variation in the dependent variable that is explained by a particular model to which the program is applied. In general terms, a higher R^2 indicates that more of the variation in the available data is accounted for (or explained) by the model and, therefore, the more the model “fits” the data. The *Booker Report* model accounted for between 54 percent to 65 percent of the variation in the data, depending on the period being analyzed. The refined model accounted for a higher percentage of variation in the data in each of the three time periods studied.⁷⁰

⁶⁶ See USSG §4B1.1.

⁶⁷ See USSG §4B1.4.

⁶⁸ See *infra* note 77 and accompanying text for a further explanation of the purpose for undertaking this statistical approach.

⁶⁹ Although they were included in the *Booker Report* model for specific analytical reasons, the decision to include them required that the analysis be “restricted,” namely, that the coefficient for the presumptive sentence variable be set artificially (thus, restricted) at a value of one. Such an approach does not permit the computerized regression software to establish the coefficient for this variable independently, as it normally does for all variables. As a result, the coefficient for some of the other independent variables also could be altered. This approach made it difficult to evaluate the full effect of some of the variables on the results.

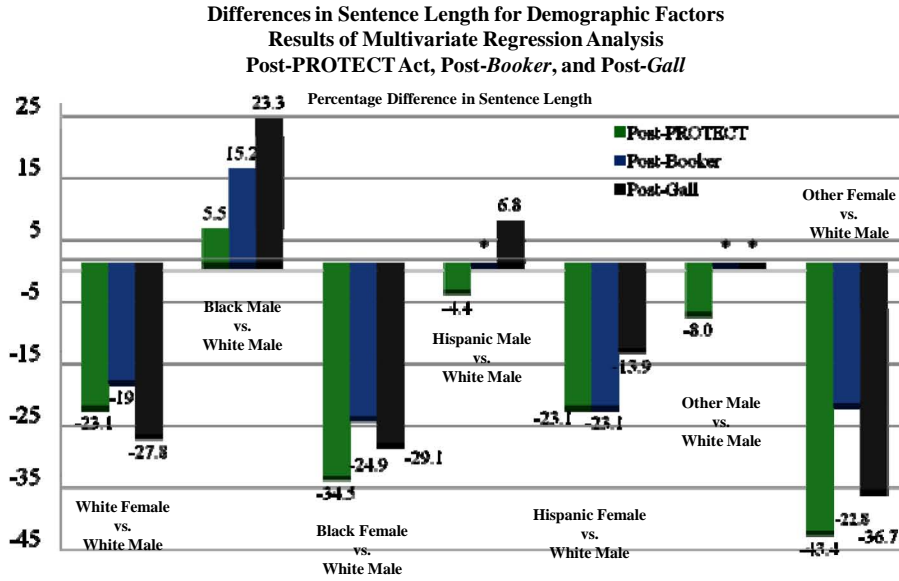
⁷⁰ The R^2 for the updated *Booker Report* model analysis was 65.3% for the Post-PROTECT Act Period; 62.4% for the Post-*Booker* Period (as defined above); and 53.8% for the Post-*Gall* Period. The R^2 for the refined model was 71.7% for the Post-PROTECT Act Period and 67.4% for the Post-*Booker* Period; and 61.8% for the Post-*Gall* Period. This comparison can be made because the dependent variable in both models is the same. See Gujarati, *supra* note 25.

Figure C sets forth the results of the refined model for the following three periods: Post-PROTECT Act, Post-*Booker*, and Post-*Gall*.⁷¹

⁷¹ The asterisk (*) in this table is used to indicate that any difference between the two groups for that time period was not statistically significant. This does not mean that there was no observed difference between the two groups but, rather, that the possibility that any observed difference occurred due to chance could not be dismissed at p<0.01 level of significance. *See also supra* notes 19 to 24 and accompanying text.

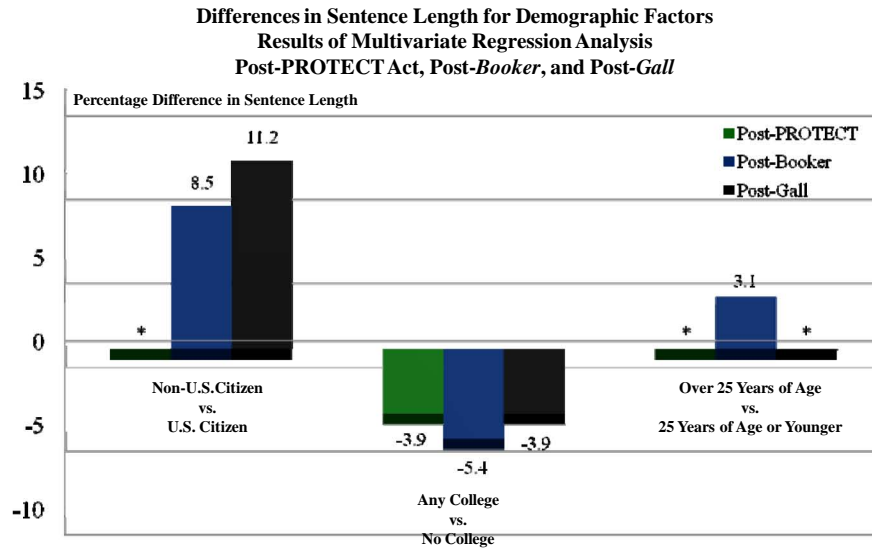
Figure C

Refined Model



*Indicates that the difference between the two groups was not statistically significant.
SOURCE: U.S. Sentencing Commission, 2003-2009 Datafiles, USSCFY03-USSCFY09.

Refined Model



*Indicates that the difference between the two groups was not statistically significant.
SOURCE: U.S. Sentencing Commission, 2003-2009 Datafiles, USSCFY03-USSCFY09.

2. Summary of Results Using the Refined Model

Consistent with the *Booker Report* model, the analysis using the refined model determined that demographic factors are associated with sentence length to a statistically significant extent during some of the time periods under study. The presence and relative magnitude of these associations were also generally consistent with the findings using the *Booker Report* model.

Female offenders, regardless of the offender's race, received sentences that were shorter than sentences for white male offenders in each of the three time periods studied. In the Post-PROTECT Act Period, white female offenders received sentences that were 23.1 percent shorter than white males. By comparison, sentences for black females were 34.5 percent shorter when compared to white males in that period. Sentences for Hispanic females were 23.1 percent shorter, and sentences for "other" females were 43.4 percent shorter when compared to white males.

In the Post-*Booker* Period, sentences imposed on white female offenders were 19.0 percent shorter than those imposed on white male offenders. Sentences for black female offenders were 24.9 percent shorter than those imposed on white male offenders, sentences for Hispanic female offenders were 23.1 percent shorter, and those imposed on "other" females were 22.8 percent shorter. Finally, in the Post-*Gall* Period, sentences for white female offenders were 27.8 percent shorter than those for white males. By comparison, sentences for black female offenders were 29.1 percent shorter than those for white male offenders. Sentences imposed on Hispanic females were 13.9 percent shorter and sentences imposed on "other" females were 36.7 percent shorter than those for white male offenders.

Black male offenders received longer sentences than white males in each time period. In the Post-PROTECT Act Period, black male offenders received sentences that were 5.5 percent longer than those for white males. In the Post-*Booker* Period, black male offenders received sentences that were 15.2 percent longer, and in the Post-*Gall* Period black male offenders received sentences that were 23.3 percent longer than those imposed on white males.

The association between Hispanic male sentences and white male sentences was statistically significant in two of the three time periods studied. In the Post-PROTECT Act Period, Hispanic males received sentences that were 4.4 percent shorter than sentences imposed on white males; however, in the Post-*Gall* Period Hispanic men received sentences that were 6.8 percent longer than sentences for white men. In the intervening Post-*Booker* Period, however, there was no statistically significant difference between the sentences for the two groups.

The sentences imposed on "other" male offenders differed from those imposed on white male offenders in a statistically significant manner only in the Post-PROTECT Act Period, where "other" males received sentences that were 8.0 percent shorter than those

imposed on white males. In the other time periods any differences between these two groups of offenders were not statistically significant.

Offenders who are not United States citizens were associated with sentences that were longer than sentences for United States citizens in the *Post-Booker* and *Post-Gall* Periods. Non-citizens received sentences that were 8.5 percent longer in the *Post-Booker* Period and 11.2 percent longer in the *Post-Gall* Period than sentences imposed on United States citizens. In the *Post-PROTECT Act* Period, any difference observed between the sentences imposed on these two groups of offenders was not statistically significant.

The sentences of offenders with at least some college education were statistically significantly different from sentences of offenders with no college education in all periods. In the *Post-PROTECT Act* Period, offenders having at least some college education received sentences that were 3.9 percent shorter than sentences imposed on offenders with no college experience. In the *Post-Booker* Period, offenders having at least some college education received sentences that were 5.4 percent shorter than sentences of those with no college experience. In the *Post-Gall* period, offenders having some college education received sentences 3.9 percent shorter than sentences of those with no college experience.

Finally, there were no statistically significant associations in the sentences of offenders over the age of 25 compared with those 25 years of age or younger during the *Post-PROTECT Act* and *Post-Gall* Periods. However, in the *Post-Booker* Period, offenders over the age of 25 received sentences that were 3.1 percent longer than those imposed on offenders who were 25 years of age or younger.

CONCLUSION

As part of its ongoing statutory duties under 28 U.S.C. § 995(a) to collect and analyze sentencing data on federal sentencing practices, the Commission will continue to monitor whether any sustained trends indicate that differences in sentencing practices are associated with the demographic characteristics of offenders.

TECHNICAL APPENDIX

APPENDIX A

A. The Data

The data described in this report were submitted to the United States Sentencing Commission by the United States courts.⁷² All data were received, coded, and edited by Commission staff as part of the ongoing activities of the Commission. The data used in this analysis are available in the Commission's annual datasets, made available to the public through the Interuniversity Consortium for Political and Social Research.⁷³ A summary descriptive statistics table of the data analyzed in this report is attached to this Technical Appendix as Appendix A.

The data presented in this report have been divided into three time periods:

(1) the Post-PROTECT Act Period (May 1, 2003, the date of enactment of the PROTECT Act, through June 24, 2004, the date of the Supreme Court's decision in *Blakely v. Washington*);

(2) the Post-*Booker* Period (January 12, 2005, the date of the Supreme Court's decision in *United States v. Booker*, through December 10, 2007, the date of the Supreme Court's decisions in *Kimbrough v. United States* and *Gall v. United States*); and

(3) the Post-*Gall* Period (December 11, 2007, through September 30, 2009).

B. The *Booker Report* Model

The multivariate analysis used in the *Booker Report* treated an offender's sentence length (including imprisonment as well as any alternative confinement) as the dependent variable and used, as independent variables, both "case characteristic" variables (most of which concerned specific guideline application issues) and "demographic" variables. The following case characteristic variables were used: (1) the "presumptive sentence"⁷⁴ (*i.e.*, the bottom of the

⁷² The courts are required to submit this information to the Commission. See 28 U.S.C. § 994(w)(1).

⁷³ For more information about ICPSR see <http://www.icpsr.umich.edu/icpsrweb/ICPSR>.

⁷⁴ Using the "presumptive sentence" (*i.e.*, the bottom of the applicable guideline) was considered to be a superior method of capturing the many individual guidelines calculations that are part of a typical federal sentencing calculus – as opposed to including each individual guideline calculation issue as a separate independent variable. See, *e.g.*, Rodney Engen & Randy Gainey, *Modeling the Effects of Legally Relevant and Extralegal Factors Under Sentencing Guidelines: The Rules Have Changed*, 38 CRIMINOLOGY 1207 (2000) (discussing the "presumptive sentence" model of regression analysis of guidelines sentencing data). For a recent study also using the presumptive sentence as an independent variable see Jill K. Doerner & Stephen Demuth, *The Independent and Joint Effects of Race/Ethnicity, Gender, and Age on Sentencing Outcomes in U.S. Federal Courts*, 27 JUST. Q. 1 (2010).

The *Booker Report* model includes some of the separate guideline factors (*e.g.*, an offender's role in the offense) – in addition to the presumptive sentence – in order to account for any extra weight such factors may have had in sentencing decisions "beyond the weight they are given in the guidelines." *Booker Report*, *supra* note 3, at B-23.

applicable guidelines' sentencing range, including the effect of any statutory mandatory minimum penalty or consecutive sentencing enhancement); (2) the type of offense (violent, sexual, drug, immigration, white collar, and "other"); (3) the number of criminal history points; (4) whether the offender received a "safety valve" adjustment (in application of the drug guideline); (5) whether the offender was convicted of an offense under 18 U.S.C. § 924(c); (6) whether the offender received a specific offense characteristic ("SOC") enhancement for use of a weapon; (7) the offender's departure status (upward, downward-government initiated, downward-court initiated, substantial assistance departure, or none); (8) whether the offender went to trial (as opposed to pleading guilty); (9) whether the offender was subject to a mandatory minimum statutory sentence; (9) whether the Career Offender enhancement applied; (10) whether the Armed Career Criminal enhancement applied; and (11) the offender's role, if any, in the offense (mitigating role adjustment, aggravating role adjustment, or no role adjustment).

With respect to demographic variables, the following were used: (1) race of the offender (white, black, Hispanic, or "other"); (2) age of the offender (*i.e.*, whether the offender was over 25 years of age); (3) level of education (*i.e.*, whether the offender attended any college); (4) gender of the offender; and (5) whether the offender was a U.S. citizen.

In the multivariate analysis employed by the *Booker Report*, statistical significance was determined at the more stringent $p < 0.01$ rather than the $p < 0.05$ level.⁷⁵ The R^2 for the approach used in the *Booker Report* was 65.3 percent for the Post-PROTECT Act Period and 61.5 percent for the one-year Post-*Booker* Period (as defined in the *Booker Report*). The R^2 for the updated *Booker Report* model analysis was 65.3 percent for the Post-PROTECT Act Period, 62.4 percent for the Post-*Booker* Period (as defined above), and 53.8 percent for the Post-*Gall* Period.

Finally, attached at Appendix B is a list of the variables used in the *Booker Report* model. Also included in Appendix B is Table B-1, an updated version of Table B-1 in the Technical Appendix to the *Booker Report* (at B-30 through B-31) which corresponded to Figure 12 of the *Booker Report*. Table B-1 presented here corresponds to Figure B above, and reflects the results of the updated multivariate analysis using data through the end of fiscal year 2009 and broken down into the three periods discussed above.

C. The Refined Model

The analysis using the refined model also treated an offender's sentence length (including imprisonment as well as any alternative confinement) as the dependent variable and used, as independent variables, both "case characteristic" variables and "demographic" variables. However, the refined model uses fewer case characteristic variables than the *Booker Report* model and also includes some additional variables that were not included in that analysis.

The following case characteristic variables were used in the refined model: (1) the "presumptive sentence"⁷⁶ (*i.e.*, the bottom of the applicable sentencing guideline range, including

⁷⁵ *Id.* at B-24.

⁷⁶ *See supra* note 74.

the effect of any statutory mandatory minimum penalty or consecutive sentencing enhancement); (2) the type of offense (violent, sexual abuse, pornography, drug, immigration, white collar, and “other”); (3) the offender’s departure status (upward, substantial assistance departure, below range, or none); (4) whether the offender went to trial (as opposed to pleading guilty); (5) whether the offender was subject to a mandatory minimum statutory sentence; and (6) the offender’s bail status.

The case characteristic variables used in the approach discussed in the *Booker Report* but which were excluded from the refined model include: (1) the number of criminal history points; (2) whether the offender received a “safety valve” adjustment (in drug cases); (3) whether the offender was convicted of an offense under 18 U.S.C. § 924(c); (4) whether the offender received a specific offense characteristic (“SOC”) enhancement for use of a weapon; (5) whether the Career Offender enhancement applied; (6) whether the Armed Career Criminal enhancement applied; and (7) the offender’s role, if any, in the offense (mitigating role adjustment, aggravating role adjustment, or no role adjustment). These guideline factors directly contribute to or are highly correlated with the presumptive sentence variable used in the analysis. Including these variables in the *Booker Report* approach allowed the Commission to examine the influence of these variables over and above their respective contributions to the presumptive sentence. To accomplish this, however, required that the regression analysis be “restricted” by artificially setting (or restricting) the coefficient for the presumptive sentence variable to a value of one.⁷⁷ The refined model uses an “unrestricted” methodology which does not constrain any of the coefficients. As a result, each variable in the refined model has a coefficient value attributed to it that reflects the contribution of that variable to the overall sentence.

With respect to demographic variables, the refined model paired the traditional race and gender variables to create eight “race/gender” pairings: (1) white males; (2) white females; (3) black males; (4) black females; (5) Hispanic males; (6) Hispanic females; (7) “other” males; and (8) “other” females. Additional demographic variables include age of the offender (*i.e.*, whether the offender was over 25 years of age); level of education (*i.e.*, whether the offender attended any college); and whether the offender was a U.S. citizen.

As with the multivariate analysis employed by the *Booker Report*, the level of statistical significance was determined at $p < 0.01$. The R^2 for the refined model was 71.7 percent for the Post-PROTECT Act Period, 67.4 percent for the Post-*Booker* Period, and 61.8 percent for the Post-*Gall* Period.

Finally, attached at Appendix C is a list of the variables used in the Refined Model. Also included in Appendix C is Table C-1, similar to Table B-1 in Technical Appendix to the 2006 *Booker Report* (at B-30-B-31). Table C-1 corresponds to Figure C above.

⁷⁷ See Shawn D. Bushway & Anne M. Phiel, *Judging Judicial Discretion: Legal Factors and Racial Discrimination in Sentencing*, 35 LAW & SOC’Y REV. 733, 748 (2001).

Table A
Descriptive Statistics
Post-PROTECT Act, Post-Booker, and Post-Gall Periods
Booker Model Variables

Race and Gender	Number	Percent	Sentence Imposed		Presumptive Sentence	
			Mean	Median	Mean	Median
Post-PROTECT Act						
Total	63,750	100.0	54	30	60	37
White	19,896	31.2	48	27	55	30
Black	15,797	24.8	78	48	88	57
Hispanic	25,464	39.9	44	30	49	33
Other	2,593	4.1	44	24	49	27
Male	55,040	86.3	58	36	65	37
Female	8,710	13.7	25	12	32	15
Post-Booker						
Total	178,418	100.0	56	33	64	37
White	52,118	29.2	51	30	60	37
Black	44,333	24.8	82	57	95	60
Hispanic	74,338	41.7	44	27	50	33
Other	7,629	4.3	49	27	56	33
Male	154,863	86.8	60	37	69	41
Female	23,555	13.2	27	12	35	18
Post-Gall						
Total	119,443	100.0	52	30	62	37
White	34,341	28.8	49	27	61	37
Black	27,919	23.4	82	60	96	63
Hispanic	52,490	44.0	39	24	45	24
Other	4,693	3.9	45	24	55	33
Male	104,491	87.5	56	32	66	37
Female	14,952	12.5	26	12	36	18

Table A (cont.)
Descriptive Statistics
Post-PROTECT Act, Post-Booker, and Post-Gall Periods
Revised Model Variables

Race and Gender	Number	Percent	Sentence Imposed		Presumptive Sentence	
			Mean	Median	Mean	Median
Post-PROTECT Act						
Total	63,750	100.0	54	30	60	37
White Male	16,528	25.9	53	30	59	33
White Female	3,368	5.3	27	12	34	15
Black Male	13,346	20.9	88	60	98	63
Black Female	2,451	3.8	24	8	30	12
Hispanic Male	23,079	36.2	45	30	51	33
Hispanic Female	2,385	3.7	26	15	31	18
Other Male	2,087	3.3	50	27	54	30
Other Female	506	0.8	22	8	28	12
Post-Booker						
Total	178,418	100.0	56	33	64	37
White Male	43,161	24.2	56	33	65	37
White Female	8,957	5.0	28	12	38	21
Black Male	38,339	21.5	91	63	105	70
Black Female	5,994	3.4	26	10	34	15
Hispanic Male	67,246	37.7	45	30	52	36
Hispanic Female	7,092	4.0	26	13	33	18
Other Male	6,117	3.4	54	30	62	37
Other Female	1,512	0.8	26	12	34	18
Post-Gall						
Total	118,741	100.0	52	30	62	37
White Male	28,036	23.6	55	30	66	39
White Female	5,911	5.0	26	12	38	18
Black Male	24,354	20.5	90	63	105	70
Black Female	3,401	2.9	26	12	35	18
Hispanic Male	47,805	40.3	40	24	46	27
Hispanic Female	4,574	3.8	25	12	33	18
Other Male	3,778	3.2	50	27	59	37
Other Female	882	0.7	25	12	38	24

APPENDIX B

BOOKER REPORT MODEL LIST OF VARIABLES

Dependent Variable

Length of confinement: The length of confinement imposed (including any alternative incarceration), with a cap of 470 months (for example, a sentence imposed of life was coded as 470). The logarithm was used, with all sentences of zero months given the value of 0.01 months as the logarithm of zero is not mathematically possible. This variable was used for the ordinary least squares analyses. The variable used was SENSPLT0.

Independent Variables

Guideline minimum: The minimum sentence, in months, the offender was subject to, taking into account all guideline, statutory and mandatory minimums. The logarithm of this variable was used, with all minimums of zero months given the value of 0.01 months, as the logarithm of zero is not mathematically possible. Minimums of life imprisonment were coded as 470 months. The variable used was GLMIN.

Type of offense committed (the variable used was GDLINEHI):

Violent offense: Offenders whose guideline sentence was controlled by the following guidelines were considered violent offenders: Chapter Two Part K offenders (“Offenses involving Public Safety”), USSG §§2A1.1-2A1.5, 2A2.1-2A2.4, 2A4.1-2A4.2, 2A5.1-2A5.3, 2A6.1, 2A6.2, 2E1.3, 2E1.4, 2E2.1, 2B3.1, 2B3.2, and 2B3.3.

Sexual abuse offense: Offenders whose guideline sentence was controlled by the following guidelines: USSG §§2A3.1-2A3.4, 2G1.1-2G1.3, and 2G2.1-2G2.5.

Drug trafficking offense: Offenders whose guideline sentence was controlled by the following guidelines: USSG §§2D1.1, 2D1.2, 2D1.5, 2D1.6, 2D1.7, 2D1.8, 2D1.9, 2D1.10, 2D1.11, 2D1.12, and 2D1.13.

Other drug offenses: Offenders whose guideline sentence was controlled by the following guidelines: USSG §§2D2.1 and 2D2.2.

White collar offenses: Offenders whose guideline sentence was controlled by the following guidelines: USSG §§2B1.1, 2B1.6, 2B4.1, 2B5.1, 2B5.3, 2F1.1, 2F1.2, 2R1.1, Chapter Two Part S offenses (“Money Laundering and Monetary Transaction Reporting”), and Chapter Two Part T offenses (“Offenses Involving Taxation”).

Immigration offenses: Offenders whose guideline sentence was controlled by offenses in Chapter Two Part L (“Offenses Involving Immigration, Naturalization and Passports”).

Other type offenses: Offenders whose guideline sentence was controlled by offenses not in the violent, sexual abuse, drug trafficking, other drug offenses, white collar offenses, and immigration offenses.

Criminal History Points: The number of criminal history points assigned to the offender. The variable used was SORCHPT.

Conviction for 18 U.S.C. § 924(c): Conviction by the court under this statute carries a consecutive mandatory minimum. The variable used was IS924C.

Weapon SOC enhancement: The application of an enhancement for use or possession of a weapon during the offense. The variable used was WEAPSOC.

Mandatory minimum application: If the statutory minimum for the offense was greater than zero, a mandatory minimum applies in the case. The variable used was STATMIN.

Career offender applied: Whether the offender was subject to the enhanced criminal history level and offense level under USSG §4B1.1. The variable used was CAROFFAP.

Armed career criminal application: Whether the offender was subject to the enhanced criminal history level and offense level under USSG §4B1.4. The variable used was ACCAP.

Sentence placement relative to guideline range: Prior to the Booker decision, this was more commonly referred to as “departure status.” Pre-Booker the variable used was DEPART. Upward departures were coded as “above range sentence”, downward departures were coded as “below range sentence” and substantial assistance departures retained their identity. Post-Booker, the variable BOOKERCD was used. “Above range sentence” was coded if the values were “upward departure - guideline reason,” “upward departure - guideline and 18 U.S.C. §3553 (3553) reason,” “above range with Booker and 3553 reason,” and “other above range.” “Below range - Court” was coded if the values were “downward departure”, “downward departure - with Booker,” “below range with Booker,” and “remaining other below range.” Below range - government” was coded if the values were “early disposition/§5K3.1” and “government sponsored - below range.” Substantial assistance departures retained their identity.

Safety valve: The application of safety valve under USSG §5C1.2 (Limitation of Applicability of Statutory Minimum Sentences in Certain Cases). The variable used was SAFE.

Trial: Whether the offender was tried either by jury or by the court. The variable used was NEWCNVTN.

Mitigating role: Court determination that the offender had a minor or minimal role in the offense according to USSG §3B1.2 in the guidelines manual. The variable used was MITROLHI.

Aggravating role: Court determination that the offender had an aggravating role in the offense

according to USSG §3B1.1 in the guidelines manual. The variable used was AGGROLHI.

Race of offender: The variable NEWRACE (race or ethnicity of the offender) was used.

Gender of offender: The variable MONSEX (gender of the offender) was used.

Age of offender: This was coded as a dichotomous variable, separating those who were 25 years of age and younger from the those older than 25 years of age. The variable used was AGE.

Educational attainment: This was coded as a dichotomous variable, separating those offenders who attended college for any period of time and those who never attended college. The variable used was EDUCATN.

Citizenship: The variable NEWCIT was used.

Table B-1
Booker Report Model
Post-PROTECT Act, Post-Booker, and Post-Gall

Variable	Post-PROTECT	Post-Booker	Post-Gall
	Percent Difference	Percent Difference	Percent Difference
R ²	65.3	62.4	53.8
Demographic Variables			
Race of offender (reference category = White offenders)⁷⁸			
Black	NS	7.4	10.0
Hispanic	NS	NS	NS
“Other”	NS	5.2	NS
Other Demographic Variables			
Male (Female) ⁷⁹	17.0	12.3	17.7
Attending College (No college)	-8.4	-9.3	-9.6
Over 25 Years of age (25 and younger)	-10.3	-10.1	-14.6
Non United States Citizen (U.S. Citizen)	33.9	35.6	48.5

⁷⁸ The reference category for all races is white offenders. This should be interpreted as, for example, in the Post-Booker Period black offenders received sentences 7.4 percent longer than white offenders after controlling for all variables in the model, while in the Post-Gall Period, black offenders received sentences 10.0 percent longer than white offenders.

⁷⁹ Reference categories are in parentheses. This should be interpreted as, for example, in the Post-PROTECT Act Period, male offenders are sentenced 17.0 percent longer than female offenders after controlling for all variables in the model, while in the Post-Booker Period male offenders received sentences 12.3 percent longer than female offenders, and in the Post-Gall Period, male offenders received sentences 17.7 percent longer than female offenders.

**Table B-1 (cont.)
Booker Report Model
Post-PROTECT Act, Post-Booker, and Post-Gall**

Variable	Post-PROTECT	Post-Booker	Post-Gall
	Percent Difference	Percent Difference	Percent Difference
R ²	65.3	62.4	53.8
Case Characteristic Variables			
Offense Type (reference category = Drug Trafficking)⁸⁰			
Violent	-9.5	-10.5	-9.3
Sexual Abuse	-20.5	-8.9	NS
Other Drug	367.7	160.9	143.2
Immigration	43.0	41.2	77.2
White Collar	NS	-12.9	-16.1
Other offenses	-12.4	-17.8	-25.2
Criminal History			
Career Offender application ⁸¹	30.4	27.7	52.3
Criminal History Points ⁸¹	-1.5	-0.6	-1.8
Armed Career Criminal application ⁸¹	NS	11.2	27.6
Role in the Offense⁸²			
Aggravating Role ⁸¹	NS	NS	NS
Mitigating Role ⁸¹	-15.1	-15.2	-19.6

⁸⁰ The reference category for all offense types is drug trafficking offenses. This should be interpreted as, for example, in the Post-PROTECT Act Period, offenders convicted of violent offenses received sentences 9.5 percent shorter than those convicted of drug trafficking offenses after controlling for all variables in the model, while in the Post-Booker Period violent offenders received sentences 10.5 percent shorter than drug trafficking offenders, and in the Post-Gall Period violent offenders received sentences 9.3 percent shorter than drug trafficking offenders.

⁸¹ This is a variable that is part of the calculation of the presumptive sentence. Therefore, the percent difference for these variables should be interpreted as that variable's contribution to the sentence above or below the amount it already contributes to the presumptive sentence.

⁸² The reference category for role in the offense is "no role in the offense."

**Table B-1 (cont.)
Booker Report Model
Post-PROTECT Act, Post-Booker, and Post-Gall**

Variable	Post-PROTECT	Post-Booker	Post-Gall
	Percent Difference	Percent Difference	Percent Difference
R ²	65.3	62.4	53.8
Case Characteristic Variables			
Place in Range (reference category = Within Range)⁸³			
Above Range	383.8	429.8	401.1
Below Range - Court	-73.0	-73.0	-77.0
Below Range - Government	-66.8	-68.5	-76.7
Substantial Assistance	-79.9	-79.2	-81.8
Other Case Characteristic Variables			
Trial ⁸⁴ (Plea)	-10.6	NS	NS
18 U.S.C. § 924(c) conviction ⁸⁴	NS	NS	NS
Weapon SOC ⁸⁴	NS	NS	NS
Mandatory Minimum Applied ⁸⁴	6.0	15.3	22.3
Safety Valve ⁸⁴	-17.8	-11.0	-19.5

⁸³ The reference category for all place in range variables is within range sentences.

⁸⁴ This is a variable that is part of the calculation of the presumptive sentence. Therefore, the percent difference for this variable should be interpreted as that variable's contribution to the sentence above or below the amount it already contributes to the presumptive sentence.

SOURCE: U.S. Sentencing Commission, 2003 - 2009 Datafiles, USSCFY03-USSCFY09.

Booker Report Model
Post-PROTECT

The REG Procedure
Model: MODEL1
Dependent Variable: logsplit

NOTE: Restrictions have been applied to parameter estimates.

Number of Observations Read 68203
Number of Observations Used 68203

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	271433	10053	4760.99	<.0001
Error	68176	143957	2.11155		
Corrected Total	68203	415390			

Root MSE 1.45312 R-Square 0.6534
Dependent Mean 2.79776 Adj R-Sq 0.6533
Coeff Var 51.93871

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate
Intercept	1	0.24040	0.02690	8.94	<.0001	0
logmin	1	1.00000	0	Inf	<.0001	1.05953
violent	1	-0.10001	0.02163	-4.62	<.0001	-0.01468
sexual	1	-0.22936	0.04538	-5.05	<.0001	-0.01233
drug	1	1.54266	0.04932	31.28	<.0001	0.07461
immigration	1	0.35779	0.02419	14.79	<.0001	0.05797
othtype	1	-0.13196	0.03313	-3.98	<.0001	-0.01017
whitecoll	1	-0.04478	0.02175	-2.06	0.0396	-0.00710
sorchpt	1	-0.01509	0.00121	-12.48	<.0001	-0.03358
IS924C	1	-0.04925	0.03445	-1.43	0.1528	-0.00346
WEAPSOC	1	0.01557	0.02788	0.56	0.5767	0.00131
valve	1	-0.19592	0.02072	-9.46	<.0001	-0.02809
ACCAP	1	0.13800	0.06286	2.20	0.0281	0.00530
CAROFFAP	1	0.26512	0.03449	7.69	<.0001	0.01862
upward	1	1.57658	0.04787	32.94	<.0001	0.07499
downgovt	1	-1.10299	0.02398	-45.99	<.0001	-0.11021
downcourt	1	-1.31031	0.02369	-55.32	<.0001	-0.12636
subasst	1	-1.60618	0.01602	-100.26	<.0001	-0.24106
mandmin	1	0.05801	0.01806	3.21	0.0013	0.01053
NEWCNVTN	1	-0.11256	0.02680	-4.20	<.0001	-0.00974
mitigate	1	-0.16379	0.02064	-7.94	<.0001	-0.01981
aggravate	1	-0.03416	0.02542	-1.34	0.1791	-0.00312
black	1	0.01877	0.01551	1.21	0.2262	0.00330
hisp	1	-0.01009	0.01757	-0.57	0.5658	-0.00200

Booker Report Model
Post-PROTECT

The REG Procedure
Model: MODEL1
Dependent Variable: logsplit

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate
other	1	-0.03405	0.02957	-1.15	0.2496	-0.00273
agedummy	1	-0.11580	0.01376	-8.42	<.0001	-0.01957
educ	1	-0.08743	0.01476	-5.92	<.0001	-0.01453
male	1	0.15663	0.01715	9.13	<.0001	0.02188
NEWCIT	1	0.29181	0.01751	16.67	<.0001	0.05543
RESTRICT	-1	-78790	733.02136	-107.49	<.0001*	.

* Probability computed using beta distribution.

Booker Report Model
Post-Booker

The REG Procedure
Model: MODEL1
Dependent Variable: logsplit

NOTE: Restrictions have been applied to parameter estimates.

Number of Observations Read 179872
Number of Observations Used 179872

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	620558	22984	11039.1	<.0001
Error	179844	374439	2.08202		
Corrected Total	179871	994997			

Root MSE 1.44292 R-Square 0.6237
Dependent Mean 2.92128 Adj R-Sq 0.6236
Coeff Var 49.39356

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate
Intercept	1	0.17987	0.01704	10.56	<.0001	0
logmin	1	1.00000	0	Inf	<.0001	1.00374
violent	1	-0.11086	0.01334	-8.31	<.0001	-0.01686
sexual	1	-0.09362	0.02375	-3.94	<.0001	-0.00626
drugposs	1	0.95902	0.04726	20.29	<.0001	0.03011
immigration	1	0.34541	0.01469	23.52	<.0001	0.06145
othtype	1	-0.19540	0.02046	-9.55	<.0001	-0.01572
whitecoll	1	-0.13777	0.01360	-10.13	<.0001	-0.02200
totchpts	1	-0.00580	0.00073239	-7.92	<.0001	-0.01373
is924c	1	0.00003799	0.01983	0.00	0.9985	0.00000300
weapsoc	1	-0.00203	0.01480	-0.14	0.8907	-0.00020902
valve	1	-0.11669	0.01304	-8.95	<.0001	-0.01735
accap	1	0.10575	0.03693	2.86	0.0042	0.00445
caroffap	1	0.24420	0.01998	12.22	<.0001	0.01909
upward	1	1.66727	0.02385	69.90	<.0001	0.10219
downgovt	1	-1.15400	0.01189	-97.09	<.0001	-0.15279
downcourt	1	-1.30961	0.01062	-123.36	<.0001	-0.18518
subasst	1	-1.57106	0.01023	-153.54	<.0001	-0.24209
mandmin	1	0.14229	0.01091	13.05	<.0001	0.02799

Booker Report Model
Post-Booker

The REG Procedure
Model: MODEL1
Dependent Variable: logsplit

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate
newcnvtn	1	-0.03379	0.01652	-2.05	0.0408	-0.00306
mitigate	1	-0.16557	0.01277	-12.96	<.0001	-0.02078
aggravate	1	0.02618	0.01662	1.58	0.1151	0.00235
black	1	0.07117	0.00972	7.32	<.0001	0.01308
hisp	1	-0.02578	0.01092	-2.36	0.0183	-0.00540
other	1	0.05125	0.01774	2.89	0.0039	0.00441
male	1	0.11600	0.01064	10.90	<.0001	0.01675
agedummy	1	-0.10697	0.00874	-12.24	<.0001	-0.01828
educ	1	-0.09738	0.00920	-10.58	<.0001	-0.01681
newcit	1	0.30425	0.01084	28.08	<.0001	0.06145
RESTRICT	-1	-171107	1071.22223	-159.73	<.0001*	.

* Probability computed using beta distribution.

Booker Report Model
Post-Gall

The REG Procedure
Model: MODEL1
Dependent Variable: logsplit

NOTE: Restrictions have been applied to parameter estimates.

Number of Observations Read 119443
Number of Observations Used 119443

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	27	360537	13353	5145.60	<.0001
Error	119415	309891	2.59507		
Corrected Total	119442	670428			

Root MSE 1.61092 R-Square 0.5378
Dependent Mean 2.81236 Adj R-Sq 0.5377
Coeff Var 57.28019

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate
Intercept	1	0.22303	0.02395	9.31	<.0001	0
logmin	1	1.00000	0	Infty	<.0001	1.04036
violent	1	-0.09746	0.01870	-5.21	<.0001	-0.01431
sexual	1	-0.00027857	0.02991	-0.01	0.9926	-0.00002063
drugposs	1	0.88860	0.07266	12.23	<.0001	0.02458
immigration	1	0.57224	0.02021	28.32	<.0001	0.10765
othtype	1	-0.29109	0.02857	-10.19	<.0001	-0.02292
whitecoll	1	-0.17582	0.01889	-9.31	<.0001	-0.02691
totchpts	1	-0.01871	0.00102	-18.27	<.0001	-0.04304
is924c	1	-0.04251	0.02885	-1.47	0.1406	-0.00313
weapsoc	1	-0.00631	0.02023	-0.31	0.7552	-0.00064959
valve	1	-0.21730	0.01862	-11.67	<.0001	-0.03120
accap	1	0.24361	0.05055	4.82	<.0001	0.01016
caroffap	1	0.42065	0.02751	15.29	<.0001	0.03270
upward	1	1.61167	0.03045	52.92	<.0001	0.10546
downgovt	1	-1.45869	0.01537	-94.92	<.0001	-0.20262
downcourt	1	-1.46897	0.01338	-109.79	<.0001	-0.22857
subasst	1	-1.70152	0.01476	-115.30	<.0001	-0.25053

Booker Report Model
Post-Gall

The REG Procedure
Model: MODEL1
Dependent Variable: logsplit

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate
mandmin	1	0.20157	0.01482	13.60	<.0001	0.03889
newcnvtn	1	-0.00593	0.02494	-0.24	0.8120	-0.00048280
mitigate	1	-0.21759	0.01840	-11.83	<.0001	-0.02620
aggravate	1	0.06020	0.02338	2.58	0.0100	0.00523
black	1	0.09550	0.01382	6.91	<.0001	0.01706
hisp	1	0.02129	0.01461	1.46	0.1449	0.00446
other	1	-0.04593	0.02527	-1.82	0.0691	-0.00377
male	1	0.16325	0.01497	10.90	<.0001	0.02280
agedummy	1	-0.15755	0.01215	-12.97	<.0001	-0.02632
educ	1	-0.10108	0.01287	-7.85	<.0001	-0.01707
newcit	1	0.39523	0.01518	26.03	<.0001	0.08123
RESTRICT	-1	-148022	1012.58565	-146.18	<.0001*	.

* Probability computed using beta distribution.

APPENDIX C REFINED MODEL LIST OF VARIABLES

Dependent Variable

Length of confinement: The length of confinement imposed (including any alternative incarceration), with a cap of 470 months (for example, a sentence imposed of life was coded as 470). The logarithm was used, with all sentences of zero months given the value of 0.01 months as the logarithm of zero is not mathematically possible. This variable was used for the ordinal least squares analyses. The variable used was SENSPLT0.

Independent Variables

Guideline minimum: The minimum sentence, in months, the offender was subject to, taking into account all guideline, statutory and mandatory minimums. The logarithm of this variable was used, with all minimums of zero months given the value of 0.01 months, as the logarithm of zero is not mathematically possible. Minimums of life imprisonment were coded as 470 months. The variable used was GLMIN.

Type of offense committed (the variable used was GDLINEHI):

Violent offense: Offenders whose guideline sentence was controlled by the following guidelines were considered violent offenders: Chapter Two Part K offenders (“Offenses involving Public Safety”), USSG §§2A1.1-2A1.5, 2A2.1-2A2.4, 2A4.1-2A4.2, 2A5.1-2A5.3, 2A6.1, 2A6.2, 2E1.3, 2E1.4, 2E2.1, 2B3.1, 2B3.2, and 2B3.3.

Sexual abuse offense: Offenders whose guideline sentence was controlled by the following guidelines: USSG §§2A3.1-2A3.4, and 2G1.1-2G1.3.

Pornography offense: Offenders whose guideline sentence was controlled by the following guidelines: USSG §§ 2G2.1-2G2.5.

Drug trafficking offense: Offenders whose guideline sentence was controlled by the following guidelines: USSG §§2D1.1, 2D1.2, 2D1.5, 2D1.6, 2D1.7, 2D1.8, 2D1.9, 2D1.10, 2D1.11, 2D1.12, and 2D1.13.

White collar offenses: Offenders whose guideline sentence was controlled by the following guidelines: USSG §§2B1.1, 2B1.6, 2B4.1, 2B5.1, 2B5.3, 2F1.1, 2F1.2, 2R1.1, Chapter Two Part S offenses (“Money Laundering and Monetary Transaction Reporting”), and Chapter Two Part T offenses (“Offenses Involving Taxation”).

Immigration offenses: Offenders whose guideline sentence was controlled by offenses in Chapter Two Part L (“Offenses Involving Immigration, Naturalization and Passports”).

Other type offenses: Offenders whose guideline sentence was controlled by offenses not in the violent, sexual abuse, pornography, drug trafficking, white collar offenses, and immigration offenses.

Sentence placement relative to guideline range: Prior to the *Booker* decision, this was more commonly referred to as “departure status.” Pre-*Booker* the variable used was DEPART. Upward departures were coded as “above range sentence”, downward departures were coded as “below range sentence” and substantial assistance departures retained their identity. Post-*Booker*, the variable BOOKERCD was used. “Above range sentence ” was coded if the values were “upward departure - guideline reason,” “upward departure - guideline and 18 U.S.C. §3553 (3553) reason,” “above range with *Booker* and 3553 reason,” and “other above range.” “Below range sentence” was coded if the values were “downward departure - guideline reason,” downward departure - guideline and 3553 reason,” “below range with *Booker* and 3553 reason,” “other below range,” “other below range,” “early disposition/§5K3.1” and “government sponsored - below range.” Substantial assistance departures retained their identity.

Trial: Whether the offender was tried either by jury or by the court. The variable used was NEWCNVTN.

Mandatory minimum application: If the statutory minimum for the offense was greater than zero, a mandatory minimum applies in the case. If the sentencing court was relieved from application of the mandatory either via a substantial assistance departure or application of safety valve, the mandatory minimum does not apply and this variable was coded as “0.” The variables used were STATMIN, BOOKERCD, DEPART and SAFE.

Pre-sentence custody status: The offender’s pre-sentence detention status. The variable used was PRESENT.

Race and gender of offender: The variables NEWRACE (race or ethnicity of the offender) and MONSEX (gender of the offender) were merged to form one value for each offender.

Age of offender: This was coded as a dichotomous variable, separating those who were 25 years of age and younger from the those older than 25 years of age. The variable used was AGE.

Educational attainment: This was coded as a dichotomous variable, separating those offenders who attended college for any period of time and those who never attended college. The variable used was EDUCATN.

Citizenship: The variable NEWCIT was used.

Table C-1
Refined Model
Post-PROTECT Act, Post-Booker, and Post-Gall

Variable	Post-PROTECT	Post-Booker	Post-Gall
	Percent Difference	Percent Difference	Percent Difference
R ²	71.7	67.4	61.8
Demographic Variables			
Race and Gender of offender (reference category = White Male offenders)⁸⁵			
White Female	-23.1	-19.0	-27.8
Black Male	5.5	15.2	23.3
Black Female	-34.5	-24.9	-29.1
Hispanic Male	-4.4	NS	6.8
Hispanic Female	-23.1	-23.1	-13.9
“Other” Male	-8.0	NS	NS
“Other” Female	-43.4	-22.8	-36.7
Other Demographic Variables			
Attending College (No college) ⁸⁶	-3.9	-5.4	-3.9
Over 25 Years of age (25 and younger)	NS	3.1	NS
Non United States Citizen (U.S. Citizen)	NS	8.5	11.2

⁸⁵ The reference category for all races and gender pairings is white male offenders. This should be interpreted as, for example, in the Post-PROTECT Act Period, white females received sentences 23.1 percent shorter than white males after controlling for all variables in the model, while in the Post-Booker Period white female offenders received sentences 19.0 percent shorter than white male offenders, and in the Post-Gall Period white female offenders receive sentences 27.8 percent shorter than white male offenders.

⁸⁶ Reference categories are in parenthesis. This should be interpreted as, for example, in the Post-PROTECT Act period, offenders who attended college had sentences 3.9 percent shorter than offenders who did not attend college after controlling for all variables in the model, while in the Post-Booker Period those who attended college received sentences 5.4 percent shorter than those who did not attend college, and in the Post-Gall Period 3.9 percent shorter.

Table C-1 (cont.)
Refined Model
Post-PROTECT Act, Post-Booker, and Post-Gall

Variable	Post-PROTECT	Post-Booker	Post-Gall
	Percent Difference	Percent Difference	Percent Difference
R ²	71.7	67.4	61.8
Case Characteristic Variables			
Presumptive Sentence	101.6	102.2	90.6
Trial (Plea) ⁸⁷	24.2	36.2	51.0
In Pre-conviction Custody (not in custody)	98.9	107.1	131.5
Sentence subject to Mandatory Minimum	40.8	38.7	60.2
Offense Type (reference category = Violent)⁸⁸			
Drug Trafficking	14.1	15.0	8.5
Sexual Abuse	NS	NS	NS
Pornography	NS	38.0	56.6
Immigration	22.0	11.7	8.0
White Collar	-29.7	-31.5	-34.4
Other offenses	-34.8	-37.9	-50.2
Place in Range (reference category = Within Range)⁸⁹			
Below Range	-60.6	-59.7	-62.1
Substantial Assistance	-72.0	-68.6	-68.5
Above Range	207.0	274.6	249.7

⁸⁷ Reference categories are in parenthesis. This should be interpreted as, for example, in the Post-PROTECT Act Period, offenders who went to trial had sentences 24.2 percent longer than offenders who pled guilty after controlling for all variables in the model, while in the Post-Booker Period those who went to trial received sentences 36.2 percent longer than those who pled guilty, and in the Post-Gall Period those who went to trial received sentences 51.0 percent longer than those who pled guilty.

⁸⁸ The reference category for all offense types is violent offenders. This should be interpreted as, for example, drug trafficking offenders in the Post-PROTECT Act Period received sentences 14.1 percent longer than offenders convicted of violent offenses after controlling for all variables in the model, while in the Post-Booker Period drug trafficking offenders received sentences 15.0 percent longer than offenders convicted of violent offenses, and in the Post-Gall Period drug trafficking offenders received sentences 8.5 percent longer than offenders convicted of violent offenses.

⁸⁹ The reference category for place in range are offenders with sentences within the guideline range.

SOURCE: U.S. Sentencing Commission, 2003 - 2009 Datafiles, USSCFY03-USSCFY09.

Refined Model
Post-PROTECT

The REG Procedure
Model: MODEL1
Dependent Variable: logsplit

Number of Observations Read 63750
Number of Observations Used 63750

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	23	262379	11408	7006.62	<.0001
Error	63726	103755	1.62814		
Corrected Total	63749	366133			

Root MSE 1.27599 R-Square 0.7166
Dependent Mean 2.85964 Adj R-Sq 0.7165
Coeff Var 44.62052

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate
Intercept	1	0.61972	0.02795	22.17	<.0001	0
logmin	1	0.70087	0.00254	275.64	<.0001	0.73059
drugtraff	1	0.13157	0.01707	7.71	<.0001	0.02685
sexual2	1	0.14899	0.06296	2.37	0.0180	0.00516
porn	1	0.12196	0.05021	2.43	0.0151	0.00539
immigration	1	0.19885	0.02163	9.19	<.0001	0.03356
othtype	1	-0.42711	0.02997	-14.25	<.0001	-0.03379
whitecoll	1	-0.35248	0.01971	-17.88	<.0001	-0.05714
upward	1	1.12157	0.04604	24.36	<.0001	0.05174
downdep	1	-0.93116	0.01614	-57.70	<.0001	-0.12854
subasst	1	-1.27297	0.01460	-87.19	<.0001	-0.19978
mandmin2	1	0.34250	0.01665	20.57	<.0001	0.05174
newcnvtn	1	0.21649	0.02471	8.76	<.0001	0.01899
custody	1	0.68759	0.01331	51.66	<.0001	0.13279
whitefemale	1	-0.26209	0.02455	-10.67	<.0001	-0.02446
blackmale	1	0.05346	0.01536	3.48	0.0005	0.00907
blackfemale	1	-0.42348	0.02813	-15.06	<.0001	-0.03398
hispmale	1	-0.04531	0.01689	-2.68	0.0073	-0.00909
hispfemale	1	-0.26309	0.02893	-9.09	<.0001	-0.02083
othermale	1	-0.08359	0.03026	-2.76	0.0057	-0.00621
otherfemale	1	-0.56858	0.05780	-9.84	<.0001	-0.02105
agedummy	1	0.01955	0.01242	1.57	0.1154	0.00340
educ	1	-0.03990	0.01338	-2.98	0.0029	-0.00680
citizen	1	-0.02114	0.01626	-1.30	0.1935	-0.00416

Refined Model
Post-Booker

The REG Procedure
Model: MODEL1
Dependent Variable: logsplit

Number of Observations Read 178418
Number of Observations Used 178418

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	23	644083	28004	16031.0	<.0001
Error	178394	311627	1.74685		
Corrected Total	178417	955709			

Root MSE 1.32168 R-Square 0.6739
Dependent Mean 2.95157 Adj R-Sq 0.6739
Coeff Var 44.77895

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate
Intercept	1	0.55903	0.01786	31.30	<.0001	0
logmin	1	0.70384	0.00171	412.35	<.0001	0.70205
drugtraff	1	0.14012	0.01072	13.07	<.0001	0.02949
sexual2	1	0.05343	0.03813	1.40	0.1611	0.00196
porn	1	0.32204	0.02565	12.56	<.0001	0.01861
immigration	1	0.11072	0.01320	8.39	<.0001	0.02007
othtype	1	-0.47651	0.01875	-25.41	<.0001	-0.03900
whitecoll	1	-0.37897	0.01255	-30.21	<.0001	-0.06158
upward	1	1.32065	0.02210	59.76	<.0001	0.08187
downdep	1	-0.90906	0.00795	-114.34	<.0001	-0.16695
subasst	1	-1.16007	0.00956	-121.39	<.0001	-0.18196
mandmin2	1	0.32716	0.00989	33.06	<.0001	0.05362
newcnvtn	1	0.30897	0.01511	20.45	<.0001	0.02841
custody	1	0.72786	0.00852	85.41	<.0001	0.14086
whitefemale	1	-0.21120	0.01563	-13.51	<.0001	-0.01993
blackmale	1	0.14130	0.00968	14.59	<.0001	0.02508
blackfemale	1	-0.28593	0.01858	-15.39	<.0001	-0.02226
hispmale	1	-0.00996	0.01071	-0.93	0.3523	-0.00209
hispfemale	1	-0.26311	0.01757	-14.98	<.0001	-0.02221
othermale	1	0.02567	0.01832	1.40	0.1611	0.00202
otherfemale	1	-0.25818	0.03473	-7.43	<.0001	-0.01023
agedummy	1	0.03029	0.00797	3.80	0.0001	0.00526
educ	1	-0.05544	0.00844	-6.57	<.0001	-0.00971
citizen	1	-0.08864	0.01003	-8.84	<.0001	-0.01823

Refined Model
Post-Gall

The REG Procedure
Model: MODEL1
Dependent Variable: logsplit

Number of Observations Read 118741
Number of Observations Used 118741

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	23	402618	17505	8344.26	<.0001
Error	118717	249052	2.09787		
Corrected Total	118740	651671			

Root MSE 1.44840 R-Square 0.6178
Dependent Mean 2.83456 Adj R-Sq 0.6178
Coeff Var 51.09791

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate
Intercept	1	0.63754	0.02456	25.96	<.0001	0
logmin	1	0.64491	0.00219	295.12	<.0001	0.66895
drugtraff	1	0.08163	0.01479	5.52	<.0001	0.01672
sexual2	1	0.05923	0.05163	1.15	0.2513	0.00213
porn	1	0.44858	0.03099	14.47	<.0001	0.02977
immigration	1	0.07655	0.01788	4.28	<.0001	0.01458
othtype	1	-0.69802	0.02572	-27.13	<.0001	-0.05562
whitecoll	1	-0.42206	0.01737	-24.30	<.0001	-0.06541
upward	1	1.25204	0.02766	45.27	<.0001	0.08244
downdep	1	-0.96985	0.01024	-94.68	<.0001	-0.18725
subasst	1	-1.15429	0.01350	-85.48	<.0001	-0.17214
mandmin2	1	0.47111	0.01338	35.21	<.0001	0.07625
newcnvtn	1	0.41221	0.02233	18.46	<.0001	0.03397
custody	1	0.83958	0.01177	71.31	<.0001	0.15461
whitefemale	1	-0.32638	0.02116	-15.43	<.0001	-0.03030
blackmale	1	0.20955	0.01337	15.67	<.0001	0.03612
blackfemale	1	-0.34452	0.02688	-12.82	<.0001	-0.02453
hispmale	1	0.06546	0.01401	4.67	<.0001	0.01370
hispfemale	1	-0.14940	0.02384	-6.27	<.0001	-0.01227
othermale	1	0.01706	0.02541	0.67	0.5019	0.00128
otherfemale	1	-0.45668	0.04971	-9.19	<.0001	-0.01674
agedummy	1	0.02346	0.01084	2.16	0.0304	0.00396
educ	1	-0.04022	0.01158	-3.47	0.0005	-0.00686
citizen	1	-0.11857	0.01370	-8.65	<.0001	-0.02467