Article

Assessing Risk Assessment in Action

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INTRODUCTION

In recent years, criminal justice has been marked by a surge in the popularity of evidence-based practices.[1] The evidence-based criminal justice movement promises to lower both incarceration rates and crime through the use of big data, science, new technology, and smart-on-crime policies. This idea has broad appeal across the political spectrum and has had a large impact on law and policy, particularly since the budgetary crises of the recent recession.[2]

At the forefront of the evidence-based criminal justice movement are algorithmic risk assessment tools.[3] Risk assessment tools are designed to predict the likelihood that someone will commit crime in the future.[4] They are generated by statistically analyzing large data sets to identify correlations between future crime (as measured by rearrest or reconviction) and factors such as age, gender, criminal record, employment status, education level, etc. The predictions of the risk assessment are used to help determine restrictions on liberty: pretrial custody status, the length of the sentence, probation supervision levels, parole, and more.[5] Their use has been rapidly expanding across the country. As Professor Sonja Starr puts it: "It is an understatement to refer to risk assessment as a criminal justice trend. Rather, we are

1. *See infra* Part I.A (providing examples of evidence-based practices and ideas integrated into law).

2. *See* Cecelia Klingele, *The Promises and Perils of Evidence-Based Corrections*, 91 NOTRE DAME L. REV. 537, 566–67 (2015) (discussing the extent to which evidence-based practices have been incorporated into law); *infra* Part I.A (providing examples of evidence-based practices and ideas integrated into law).

3. Risk assessments are listed as number one on multiple lists of evidence-based practices in criminal justice. *See, e.g.*, CRIME & JUSTICE INST., IMPLEMENTING EVIDENCE-BASED PRACTICE IN COMMUNITY CORRECTIONS: THE PRINCIPLES OF EFFECTIVE INTERVENTION 3 (2004), https://s3.amazonaws.com/static.nicic.gov/Library/019342.pdf; NAT'L INST. CORR., A FRAMEWORK FOR EVIDENCE-BASED DECISION MAKING IN LOCAL CRIMINAL JUSTICE SYSTEMS 13 (2010), https://s3.amazonaws.com/static.nicic.gov/Library/024372.pdf.

4. *See generally infra* Part III.F (defining risk assessment tools and introducing their methods).

5. *See* ANGÈLE CHRISTIN ET AL., DATA & CIVIL RIGHTS, COURTS AND PREDICTIVE ALGORITHMS 2–3 (2015), http://www.law.nyu.edu/sites/default/files/upload_documents/Angele%20Christin.pdf (describing how risk assessment is used around the country).

already in the risk assessment era."[6] Proponents of risk assessment argue that by replacing the subjective, error-prone, and adhoc assessments of judges with scientifically validated prediction tools it is possible to dramatically reduce incarceration rates without affecting public safety.[7] In one of the most carefully executed instances of the literature, the authors conduct a policy simulation that shows "[c]rime reductions up to 24.7% with no change in jailing rates, or jailing rate reductions up to 41.9% with no increase in crime rates" as the result of making pretrial custody decisions on the basis of a risk assessment algorithm.[8] Critics of risk assessment raise a number of issues, but the question that has perhaps received the most attention is the extent to which risk assessment tools are racist themselves. This concern was voiced by former Attorney General Eric Holder,[9] and reflected in a widely-read study by ProPublica that claimed that black defendants who did not reoffend were more than twice as likely to be wrongly classified as high risk than white defendants.[10]

Despite the heated rhetoric on both sides of the aisle, virtually nothing is known about how the implementation of risk assessment affects key outcomes: incarceration rates, crime, misconduct, or racial disparities.[11] The empirical research evaluating whether outcomes are improved by incorporating algorithmic risk assessment into the decision-making framework is beyond thin; it is close to non-existent.[12] Many of the "facts" that are cited about the impacts of risk assessment come from

6. Sonja B. Starr, *The Risk Assessment Era: An Overdue Debate*, 27 FED. SENT'G REP. 205, 205 (2015).

7. *See, e.g.*, Shima Baradaran & Frank L. McIntyre, *Predicting Violence*, 90 TEX. L. REV. 497, 553 (2012); Jon Kleinberg et al., *Human Decisions and Machine Predictions*, 133 Q. J. ECON. 237, 240–41 (2018).

8. Kleinberg et al., *supra* note 7, at 238.

9. Massimo Calabresi, *Exclusive: Attorney General Eric Holder to Oppose Data-Driven Sentencing*, TIME (July 31, 2014), http://time.com/3061893/holder-to-oppose-data-driven-sentencing (discussing Holder's concerns that risk assessment will disadvantage the poor and minorities).

10. Jeff Larson et al., *How We Analyzed the COMPAS Recidivism Algorithm*, PROPUBLICA (May 23, 2016), https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm.

11. *See* Richard Berk, *An Impact Assessment of Machine Learning Risk Forecasts on Parole Board Decisions and Recidivism*, 13 J. EXPERIMENTAL CRIMINOLOGY 193, 194 (2017) (stating that debates around risk assessment "have unfolded with scant information about how actuarial risks assessments have affected practices and outcomes"); *infra* Part II.C (offering an overview of the risk assessment evaluation literature).

12. Berk, *supra* note 11.

sources that range from detail-light non-academic reports put out by the agencies who designed the risk tool to nothing more than a single slide in a Power Point presentation.[13] Somehow, criminal justice risk assessment has gained the near-universal reputation of being an evidence-based practice despite the fact that there is virtually no research showing that it has been effective.

There is ample research by social scientists suggesting that risk assessment tools *should* have beneficial effects.[14] Risk assessment tools have been shown to be predictive of future arrest, and there is research suggesting (although not definitively) that they are better at predicting future arrest than judges are. This is the evidence that has earned risk assessment the "evidence-based" moniker, and the sheen of scientific credibility that this moniker entails likely contributed to the exponential growth in its use. But transforming a practice that *should* be beneficial to one that *actually does* provide benefit is not always straightforward. The same human foibles that champions of risk assessment point to when arguing for the adoption of risk assessment tools also complicate risk assessment as a policy. For instance, risk assessment tools may not be used as designed: they may be ignored or used off-label to accomplish something other than what was intended.[15] Judges may not understand exactly what the risk score is measuring, or what level of statistical risk is associated with each risk category. The tool may be good at predicting misconduct, but the interventions taken to ameliorate risk may actually exacerbate it. The pressures of re-election or re-appointment may impact how and when the risk tool is used.

This Article attempts to shift the conversation on risk assessment away from the abstract and toward the practical. While it might seem futuristic to use artificial intelligence to determine someone's freedom, the impacts of risk assessment depend on the same good-old-fashioned factors that have helped and hindered reform for centuries: context, incentives, and details of implementation. Behind risk assessments are people and design choices. What level of judicial discretion to allow? What

13. *See infra* note 224 and accompanying text.

14. *See infra* Part II.A (outlining scholarship that discusses the effectiveness of human intuition as compared to actuarial tools).

15. Erin Collins, *Punishing Risk*, GEO. L.J. (forthcoming 2018) (arguing that the risk assessment tools used at sentencing were not designed for that purpose); Sandra Mayson, Off-Label Law Enforcement (unpublished manuscript) (on file with author) (discussing various ways criminal law is used to accomplish something other than intended).

criminal justice interventions to recommend for each risk group? How to communicate statistical risk to the decision-makers? What accountability measures are in place? Getting these choices right may take time and revision; determining what constitutes right takes discussion amongst stakeholders.[16]

This Article also presents some of the first rigorous empirical evidence on the impacts of risk assessment in practice. In particular, it focuses on the role of risk assessment in the rapidly proliferating bail reform movement. In the last few years, dozens of jurisdictions have reduced the use of monetary bail and adopted risk assessment tools to help determine pretrial custody.[17] In doing so, they have followed in the footsteps of one of bail reform's pioneers: the bluegrass state of Kentucky.[18] The bail reform bill recently adopted by California's legislature was modeled after Kentucky's "shining example."[19] The most widely-used pretrial risk assessment tool in the country, the Public Safety Assessment (PSA), was developed and piloted in Kentucky.[20] The bipartisan bail reform bill proposed by Senators Rand Paul (R-KY) and Kamala Harris (D-CA) would induce states to adopt a Kentucky-style pretrial system.[21]

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16. *See generally* Christopher Slobogin, *Principles of Risk Assessment: Sentencing and Policing*, 15 OHIO ST. J. CRIM. L. 583 (2018) (providing a framework for determining how risk assessments should be used, based on the fit principle, validity principle, and the fairness principle).

17. *See infra* Part I.C (discussing the current bail reform movement).

18. *See, e.g.*, CRIMINAL JUSTICE POLICY PROGRAM, HARVARD LAW SCH., MOVING BEYOND MONEY: A PRIMER ON BAIL REFORM 19 (2016), http://cjpp.law.harvard.edu/publications/primer-bail-reform (highlighting Kentucky's use of pretrial risk assessment as an example that other jurisdictions are following); ARTHUR W. PEPIN, CONFERENCE OF STATE COURT ADM'RS, EVIDENCE-BASED PRETRIAL RELEASE 8–9 (2012–2013), https://www.pretrial.org/download/policy-statements/Evidence%20Based%20Pre-Trial%20Release%20-%20COSCA%202012.pdf (citing Kentucky as an example of "successful implementation of evidence-based pretrial assessments"); Shaila Dewan, *Judges Replacing Conjecture with Formula for Bail*, N.Y. TIMES (June 28, 2015), https://www.nytimes.com/2015/06/27/us/turning-the-granting-of-bail-into-a-science.html?_r=0 ("Kentucky has used a risk-assessment tool for decades, and is a leader among states when it comes to court appearance rates and low recidivism.").

19. Samantha Young, *To Fix 'Unfair' Bail System, Will California Copy Kentucky?*, L.A. DAILY NEWS (Aug. 13, 2017), https://www.dailynews.com/2017/08/13/to-fix-unfair-bail-system-will-california-copy-kentucky.

20. *See infra* note 260, at 3, 5.

21. *See* Kamala D. Harris & Rand Paul, Opinion, *To Shrink Our Jails, Let's Reform Bail*, N.Y. TIMES (July 21, 2017), https://www.nytimes.com/2017/07/20/opinion/kamala-harris-and-rand-paul-lets-reform-bail.html (stating that their proposed bill empowers states to build on best practices, citing Kentucky's use of risk assessments as an example of such practices).

Using detailed data on more than a million criminal cases, this Article analyzes the use of pretrial risk assessment in Kentucky. Kentucky has had some sort of pretrial risk tool available to judges since 1976; however, its use was optional and many judges disregarded it. In 2011, Kentucky passed a law (House Bill 463, or HB 463)[22] that made use of pretrial risk assessment mandatory and declared a presumptive default of immediate, non-monetary release for all low and moderate-risk defendants.[23] Despite being crafted with the explicit goal of lowering incarceration rates,[24] HB 463 led to only a trivial increase in pretrial release.[25] Furthermore, the increase in the release rate was matched by an uptick in failure-to-appear (FTA) rates and pretrial crime;[26] a disappointing counter to hopes that all three margins could be improved simultaneously. The low increase in releases is partly because judges took advantage of the discretion allowed to them by law and ignored the presumptive default of non-monetary release in more than two-thirds of cases.[27] But this is not the whole story. In fact, HB 463 led to a marked change in bail-setting practices. There was a 63% increase in the rate at which judges granted non-monetary release for low-risk

22. Public Safety and Offender Accountability Act, H.B. 463, 2011 Gen. Assemb., Reg. Sess. (Ky. 2011).

23. Ninety percent of defendants were ranked as low or moderate risk. KY. REV. STAT. ANN. § 431.066(2) (West 2011) (codifying H.B. 463) (instructing judges to consider the risk assessment when considering release and bail); *id.* § 431.066(3) (instructing release on unsecured bond or own recognizance for low risk defendants); *id.* § 431.066(4) (instructing release on unsecured bond or own recognizance for moderate risk defendants with possible supervision, monitoring or other conditions of release); *id.* § 27A.096(1)–(3) (West 2011) (instructing judges to follow guidelines set by the Supreme Court on pretrial release or supervision for moderate and high risk defendants); SUPREME COURT OF KY., ORDER APPROVING JUDICIAL GUIDELINES FOR PRETRIAL RELEASE AND MONITORED CONDITIONAL RELEASE (2011–2012), http://courts.ky.gov/courts/supreme/Rules_Procedures/201112.pdf (generally affirming the centrality of the risk assessment tool in the release decision although granting judges the latitude to deviate from it; instructing pretrial services to develop a risk reduction plan including various conditions of release for judges to consider for high risk defendants).

24. HB 463 was drafted with the goals of reducing incarceration rates while maintaining public safety. *See* Senator Tom Jensen & Representative John Tilley, HB 463 – Statement from the Sponsors, *in* CRIMINAL LAW REFORM: THE FIRST YEAR OF HB 463 1 (2012), http://c.ymcdn.com/sites/kybar.site-ym.com/resource/resmgr/2012_Convention_Files/ac2012_2.pdf.

25. *See infra* Part III.D (discussing risk assessment's impact on bond-setting practices).

26. *Infra* Figure 7.

27. Based on author's own calculations.

defendants, and a more moderate increase in release for moderate-risk defendants.[28] High-risk defendants were released at lower rates.[29] Thus, while there was a change in the *type* of defendants released, as well as the *conditions* of release, the net effects on the overall release rate were small. Furthermore, they were not permanent: the sharp change in practices and outcomes that occurred right after the law was implemented eroded over time as judges returned to their previous bail-setting practices.[30] Within a couple of years, the pretrial release rate was lower than it was before the bill, and lower than the national average.[31]

As for racial disparities, the story is less straightforward. Facially, HB 463 benefited white defendants more than blacks.[32] However, this is not because the risk assessment was more racially biased than judicial discretion. Rather, it is due to regional differences in how judges responded to HB 463.[33] Judges from predominantly white rural counties liberalized their bail setting practices more than judges from more racially mixed urban areas, but *within* the same county, white and black defendants saw similar increases in release.[34] Once county effects were taken into account, racial disparities remain constant throughout the time period of the analysis.[35]

In 2013 Kentucky adopted a new risk assessment tool called the PSA.[36] This tool was developed by the Laura & John Arnold Foundation using a nationally representative dataset of more than 1.5 million observations.[37] Since it was first piloted in Kentucky, it has received considerable national attention and has

28. *See infra* Part III.D (discussing the empirical effects of H.B. 463).

29. *Id.*

30. The fact that judges drifted back to their previous bail setting habits means that a randomized control trial that evaluated only short term effects would overstate its impact.

31. In 2015, twenty-six percent of Kentucky's felony defendants were released within a day. In contrast, fifty percent of felony defendants were released within a day of arrest in the most comprehensive national-level dataset available. BRIAN A. REAVES, BUREAU OF JUSTICE STATISTICS, FELONY DEFENDANTS IN LARGE URBAN COUNTIES, 2009 – STATISTICAL TABLES 18 (2013).

32. *Infra* Figure 11.

33. *See infra* Part III.F (evaluating whether risk assessment affected racial disparities in bond-setting practices).

34. *Id.*

35. *Id.*

36. *See infra* Part III.A (offering an overview of Kentucky's use of pretrial risk assessments).

37. LAURA & JOHN ARNOLD FOUND., PUBLIC SAFETY ASSESSMENT: RISK FACTORS AND FORMULA 2 (2013–2016), https://www.arnoldfoundation.org/wp-content/uploads/PSA-Risk-Factors-and-Formula.pdf.

become one of the most widely used pretrial risk assessment tools.[38] The switch from Kentucky's local risk assessment tool to the PSA did not result in any noticeable improvement in outcomes. There was a small increase in the use of non-financial bond, and essentially no effect on releases, FTAs, pretrial crime, or racial disparities in detention.[39]

As a case study, Kentucky offers important lessons for the bail reform movement, as well as for jurisdictions that have implemented or are considering implementing risk assessment in other criminal justice contexts.[40] First, Kentucky's experience should temper hopes that risk assessment is a magic bullet that will increase the number of people released pretrial with no concomitant costs in terms of the crime or appearance rate. Risk assessment may offer improvements over the status quo, but have-your-cake-and-eat-it-too promises are, as of yet, unsubstantiated.[41] Second, the Kentucky findings should ease (but not eliminate) concerns that risk assessment tools will exacerbate racial disparities. While pretrial risk assessment did not affect racial disparities in Kentucky once regional trends were accounted for, scholars should continue to evaluate this question in other jurisdictions. Third, Kentucky demonstrates the challenges of trying to change criminal justice decision-making through technocratic reform. Kentucky's statutes express a strong presumption of pretrial release, which accords with the stated goals of the bill's sponsors.[42] If judges followed the action-

38. *See* LAURA & JOHN ARNOLD FOUND., THE PUBLIC SAFETY ASSESSMENT: A RE-VALIDATION AND ASSESSMENT OF PREDICTIVE UTILITY AND DIFFERENTIAL PREDICTION BY RACE AND GENDER IN KENTUCKY 5 (2018), http://www.arnoldfoundation.org/the-psa-a-re-validation-and-assessment-of-predictive-utility-and-differential-prediction-by-race-and-gender-in-kentucky/ (stating that the PSA is currently being used in thirty-eight jurisdictions including three entire states) [hereinafter LAURA & JOHN ARNOLD FOUND., A RE-VALIDATION].

39. *See infra* Parts III.D, III.E, and III.F.

40. Dozens of jurisdictions have recently adopted risk assessment tools, and others are actively considering it. *See* LAURA & JOHN ARNOLD FOUND., A RE-VALIDATION, *supra* note 38, at 5 (reporting that the PSA, piloted in Kentucky in 2013, is now in use in thirty-eight jurisdictions including three entire states, three of the largest cities, and two of the largest jail systems); Starr, *supra* note 6, at 1 (observing that risk assessment is being used in sentencing in at least twenty states).

41. *See infra* Part II.C (offering an overview of the risk assessment evaluation literature).

42. *See* Senator Jensen & Representative Tilley, *supra* note 24, at 2 ("The reforms in House Bill 463 are expected to bring a gross savings of $422 million over ten years by reducing the state's burgeoning prison population.").

directives associated with the risk assessment—the statutory instructions that set a presumptive default for how defendants with differing risk levels are to be treated—90% of defendants would be granted immediate non-financial release. In practice, only 29% are released on non-monetary bond at the first bail-setting. If judges are not convinced or coerced to follow statutory guidelines, a risk assessment tool will not be an effective method of liberalizing release.

Ultimately, this Article calls for a change in how evidence-based criminal justice is practiced and conceived. A practice should not be considered evidence-based because it references big data sets and sophisticated techniques—it should be considered evidence-based because its impacts have been carefully researched and understood. Rapid proliferation of a method with no knowledge of its effects is risky. Further, it precludes meaningful dialogue between the many well-intentioned individuals who want our criminal justice system to improve but have differing expectations about what the new tool will bring.

This Article proceeds as follows: Part I provides a brief overview of evidence-based criminal justice, risk assessments, and the current bail reform movement. Part II discusses the empirical literature on risk assessment: the papers that claim that risk assessment tools are better at predicting future crime than judges, the recent studies of racial bias in risk assessments, and the slim set of research on the impacts of risk assessment in practice. In discussing the literature, Part II also explores some of the reasons why the impacts of risk assessment may be different or more complicated than expected. Part III presents an empirical evaluation of pretrial risk assessment in Kentucky. In particular, it uses graphical time-trend analysis to show how HB 463 and the adoption of the PSA affected bail practices, release rates, pretrial misconduct, and racial disparities. Part IV discusses various lessons that can be drawn from Kentucky's experience with risk assessment.

I. A BRIEF OVERVIEW OF EVIDENCE-BASED CRIMINAL JUSTICE, RISK ASSESSMENT, AND BAIL REFORM

A. EVIDENCE-BASED CRIMINAL JUSTICE

The "evidence-based" moniker is used in a variety of subjects and refers to the idea that practices should be rigorously evaluated for their efficacy.[43] The phrase was first used in the medical literature of the early 1990s:[44] "evidence-based medicine" became the key term to describe a movement toward practices that had been proven effective in clinical trial as opposed to those supported only by anecdote or opinion.[45] The phrase "evidence-based" was first applied to criminal justice in the late 1990s,[46] but a shift toward evaluating criminal justice programs for their efficacy had begun long before that.[47] In 1974, Robert Martinson published a synthesis of research in correctional programs that was broadly interpreted as showing that nothing works (i.e., that programs designed to rehabilitate offenders do not actually lower crime).[48] This study was one of the factors that led to a shift away from the rehabilitative model of corrections that had previously dominated the field and is often marked by scholars as the beginning of the New Penology:[49] a paradigm in criminal justice which prioritizes risk management, not rehabilitation.[50] Criminologists, however, did not abandon hopes that certain criminal justice programs were effective. The rapid expansion of computer power in the 1980s and 1990s paralleled a rapid expansion of criminal justice research, and scholars began to iden-

43. *See* STAN ORCHOWSKY, AN INTRODUCTION TO EVIDENCE-BASED PRACTICES 2 (2014).

44. Gordon Guyatt et al., *Evidence-Based Medicine: A New Approach to Teaching the Practice of Medicine*, 268 JAMA 2420, 2420 (1992).

45. ORCHOWSKY, *supra* 43, at 2–3. A 1976 report from the U.S. Office of Technology Assessment stated that "only 10 to 20% of all procedures used in present medical practice have been proven by clinical trial." OFFICE OF TECH. ASSESSMENT, ASSESSING THE EFFICACY AND SAFETY OF MEDICAL TECHNOLOGIES 7 (1978).

46. ORCHOWSKY, *supra* note 43, at 3.

47. *Id.* at 2–4.

48. Robert Martinson, *What Works?—Questions and Answers About Prison Reform*, 35 PUB. INT. 22, 25 (1974).

49. Malcolm M. Feeley & Jonathan Simon, *The New Penology: Notes on the Emerging Strategy of Corrections and Its Implications*, 30 CRIMINOLOGY 449, 449–50 (1992).

50. *Id.* at 455.

tify a selection of policies that appeared to be effective at reducing crime.[51] The idea that nothing works slowly lost ground in favor of the idea that some methods *do* work. The evidence-based criminal justice movement aims to identify and expand the use of practices that social science research has demonstrated to be effective.[52] Partly as a result of efforts by organizations such as the National Institute of Corrections and the Justice Reinvestment Initiative, the ideas associated with evidence-based criminal justice gained popularity throughout the 2000s and are now core to law and policy around the country.[53]

The Office of Justice Programs provides a useful definition of key terms. It considers practices to be evidence-based "when their effectiveness has been demonstrated by causal evidence obtained through high-quality outcome evaluations."[54] Outcome evaluations refer to social science research that attempts to infer the causal impact of a particular program or policy by comparing outcomes for a group of people affected by that policy to outcomes for a control group of people not affected by that policy.[55] The extent to which research can be interpreted as evidence of a causal relationship between a policy and an outcome depends on the extent to which other explanations for the correlation can be ruled out.[56] Determining whether a particular policy is evidence-based depends on the quality, quantity, and consistency of the social science research demonstrating its impact.[57]

The ideas and practices associated with evidence-based criminal justice have made significant headway into law and policy at the state, local, and federal level.[58] This includes general

51. *See* ORCHOWSKY, *supra* note 43, at 3–4; Klingele, *supra* note 2, at 544–55.

52. CRIME & JUSTICE INST., *supra* note 3, at 1–3.

53. See Klingele, *supra* note 2, at 551–67 for an excellent overview of the rise of evidence-based criminal justice.

54. *Glossary: Evidence-Based Programs*, CRIMESOLUTIONS.GOV, https://www.crimesolutions.gov/GlossaryDetails.aspx?ID=15 (last visited Oct. 22, 2018).

55. For example, this Article compares pretrial release rates for the group of defendants who were booked right before HB 463 was introduced, to pretrial release rates for defendants who were booked right after HB 463 was implemented.

56. *See* CRIMESOLUTIONS.GOV, *supra* note 54.

57. The term evidence-based is sometimes used in a looser way, as simply integrating the best available research into decision making and practice.

58. *See* ELIZABETH DAVIES ET AL., URBAN INST., THE JUSTICE REINVESTMENT INITIATIVE: THINKING LOCAL FOR STATE JUSTICE REINVESTMENT 1 (2015). The Justice Reinvestment Initiative has helped spread evidence-based practices into twenty-four states. *Annual Report 2016: Director's Message*, U.S.

instructions to use evidence-based principles,[59] specific instructions for the fraction of state expenditures that must be spent on evidence-based practices,[60] and orders to adopt specific evidence-based practices.[61]

B. CRIMINAL JUSTICE RISK ASSESSMENT

Evaluating the risk of future criminal activity has long been part of practice in criminal justice. The term "risk assessment," however, usually refers to the use of formal, actuarial, and algorithmic methods of predicting the likelihood of future crime or misconduct.[62] (In practice, however, they predict what is visible: arrest, conviction, reincarceration, probation revocation, etc.)[63] Actuarial risk assessment tools have been in use in criminal justice since the 1920s,[64] but their use has rapidly accelerated over recent years.[65] These tools help to determine bail or the conditions of release, set the sentence length, determine the level of supervision for probationers, evaluate a request for parole, and

COURTS (2016), http://www.uscourts.gov/statistics-reports/annual-report-2016. The director of the Administrative Office of the U.S. Courts attributes a decline in recidivism to their use of evidence-based practices.

59. *See, e.g.*, ARIZ. ADMIN. CODE § 6-201.01 (2017) (instructing probation departments to develop evidence-based policies and procedures); IDAHO CODE § 20-219-5 (2016) (instructing the state board of corrections to use evidence-based practices in supervising probationers and parolees).

60. *See, e.g.*, KY. REV. STAT. ANN. § 27A.097(5) (West 2011) (stating that, by July 1, 2016, seventy-five percent of "state moneys expended on supervision and intervention programs . . . shall be for programs that are in accordance with evidence-based practices").

61. *See, e.g.*, 42 PA. CONS. STAT. § 2154.7 (2016) (adopting a risk assessment instrument in sentencing); S.B. 6204, 624 Leg. 1st Spec. Sess. §§ 11.1, 11.2 (Wash. 2012) (adopting swift and certain sanctions in community supervision).

62. *See* NAT'L INST. CORR., *supra* note 3, at 13 (noting that risk assessment tools help to predict "risk of reoffense more effectively than professional judgement alone").

63. *See* Sonja Starr, *Evidence-Based Sentencing and the Scientific Rationalization of Discrimination*, 66 STAN. L. REV. 803, 855–57 (2014) (noting that evidence-based sentencing tools do not actually tell judges how much crime a defendant will commit in the future, but rather, the judge is told how risky a defendant is based upon their past conduct).

64. *See generally* Howard G. Borden, *Factors for Predicting Parole Success*, 19 J. AM. INST. CRIM. L. & CRIMINOLOGY 328 (1928) (discussing actuarial risk assessment tools).

65. *See* Sandra G. Mayson, *Dangerous Defendants*, 127 YALE L. J. 490, 493 (2017) ("It is hard to overstate the momentum behind this shift . . . Jurisdictions around the country are increasingly turning to risk assessment as the keystone of pretrial reform.").

choose the appropriate rehabilitative program or restriction on liberty for juvenile offenders.[66]

Most risk assessment tools currently in use are fairly simple checklist-style tools.[67] These tools take a set of inputs, usually between seven and fifteen, and assign a certain number of points to each input.[68] The points assigned to each input are determined through statistical analyses that evaluate how well each input predicts the outcome.[69] The inputs to a risk assessment algorithm almost always include criminal history or criminal-justice-related misconduct.[70] Some also include socio-economic factors such as education level, marital status, or home neighborhood.[71] Age and gender are often included, but race is not.[72] The risk score is then calculated by summing the points assigned to each input.[73] Usually, the risk score is then aggregated to a small group of risk classifications: people with the lowest scores are labeled low risk, those with medium scores are labeled moderate risk, and those with the highest scores are labeled high risk.[74] The decision about what fraction of defendants belong in each bin is a normative one.[75]

In addition to the checklist-style risk assessments described above, there are more complicated methods of evaluating risk that are developed through a method called machine learning.[76] Machine-learned risk assessment tools are designed by a computer itself with a little guidance from the person that develops them.[77] The researcher tells the computer which inputs to use,

66. *See* CHRISTIN ET AL., *supra* note 5, at 2–3 and accompanying text (noting that risk assessment tools help to determine restrictions on liberty).

67. Mayson, *supra* note 65, at 509.

68. *Id.* at 511.

69. *See id.* at 513 (explaining the construction of common pretrial risk assessment instruments).

70. *See id.* at 512.

71. *See* Melissa Hamilton, *Adventures in Risk: Predicting Violent and Sexual Recidivism in Sentencing Law*, 47 ARIZ. ST. L. J. 1, 14–18 (2015) (explaining the construction of risk assessment instruments predicting violent or sexual crime); Mayson, *supra* note 65, at 507–18 (explaining the construction of common pretrial risk assessment instruments).

72. CHRISTIN ET AL., *supra* note 5, at 1, 6.

73. Mayson, *supra* note 65, at 509.

74. *Id.* at 513.

75. *See id.* at 510–15 (discussing risk assessment tools and noting that classifications are validated against a class of individuals with known outcomes).

76. Richard Berk & Jordan Hyatt, *Machine Learning Forecasts of Risk to Inform Sentencing Decisions*, 27 FED. SENT'G REP. 222, 222–24 (2015) (providing an overview of machine learned risk predictions in criminal justice).

77. *Id.*

which outcomes to predict, and which learning method to use.[78] The computer does the rest. Machine-learned risk assessments tend to be black-box mechanisms; it is hard to understand why they yield the predictions that they do.[79] This is because the relationship between the inputs and the risk score is non-linear and varied.[80] For example, a machine-learned risk instrument might show that the impact age has on the likelihood of future arrest is different for people who are facing drug charges than for those who are facing domestic violence charges.[81] Machine-learned predictions can be more accurate than the simpler checklist-style tools.[82] However, they are still uncommon in criminal justice. The black-box nature of the tool makes them non-transparent, which raises legal and ethical issues:[83] it is difficult to challenge a high-risk classification if one does not know the reasons behind the classification.[84] Furthermore, they require a higher level of technical training to build and implement.[85]

Often, the risk classifications come with explicit action-directives that specify how people in each of the risk categories are to be treated.[86] These action-directives take the form of statutory instructions, rules, or local policy.[87] A common principle is that

78. *Id.* at 223–27 (explaining the process of building criminal justice risk assessments using machine learning tools).

79. Kelly Hannah-Moffat, *Actuarial Sentencing: An "Unsettled" Proposition*, 30 JUST. Q. 270, 284 (2013).

80. *Id.* at 285.

81. *See* Mayson, *supra* note 65, at 508, 514, 564 (noting that some traits, like drug addiction, require some subjective judgement, that algorithms have been developed to predict rearrest for domestic violence charges, and that age is not an accurate predictor of violent crimes).

82. Berk & Hyatt, *supra* note 76, at 222.

83. *See* Melissa Hamilton, *Risk-Needs Assessment: Constitutional and Ethical Challenges*, 52 AM. CRIM. L. REV. 231, 267–71 (2015) (discussing legal issues related to transparency in risk assessment); Hannah-Moffatt, *supra* note 79, at 284–86 (discussing transparency concerns with risk assessment).

84. Hannah-Moffat, *supra* note 79, at 286.

85. *See id.* at 273 (noting that there is required training in order to use general risk tools).

86. John Logan Koepke & David G. Robinson, *Danger Ahead: Risk Assessment and the Future of Bail Reform*, WASH. L. REV. (forthcoming 2018). What I call action-directives are sometimes also referred to as "structured decision-making process," "pretrial decision-making matrix," or a "decision making framework."

87. *See id.* at 41–42 (discussing the influence of local governments and communities on policy judgements).

both rehabilitative interventions and restrictions on liberty increase as the risk level increases.[88] The choice of what type of risk to predict (i.e. what outcome in what time window), which algorithm to use to predict that risk, how to divide the group into different classification levels, and which criminal justice actions (e.g. bail amounts, sentence lengths, etc.) are appropriate for each risk level are all choices that depend, at least partially, on the normative and legal landscape.[89]

Risk assessment tools are one of the most prominent and widely adopted methods associated with the evidence-based criminal justice movement.[90] The National Institute of Corrections, an organization that has been deeply involved in the advancement of evidence-based criminal justice, ranks risk assessment tools at number one in a list of evidence-based ways to reduce recidivism.[91] Risk assessment tools are so closely tied to the evidence-based movement that the terminology is sometimes interchangeable: the use of risk assessment in sentencing is often referred to as simply evidence-based sentencing.[92]

C. RISK ASSESSMENT IN BAIL REFORM

The method of determining which defendants are released, released on conditions, or detained pretrial has been one of the most rapidly changing areas of criminal justice over the last couple of years.[93] The current bail reform movement encourages decision-making based on the risk of flight or future crime, not the ability to pay bail.[94] Critics of the monetary bail system argue that conditioning release on money results in racial and wealth-based disparities in detention, a waste of taxpayer money, and

88. *See* Mayson, *supra* note 65, at 515 (explaining different pretrial options based upon defendant risk level).

89. *See* Hannah-Moffat, *supra* note 79, at 289–90 (discussing the various choices that institutions make when instituting evidence-based sentencing).

90. Starr, *supra* note 63, at 805.

91. NAT'L INST. CORR., *supra* note 3, at 13.

92. *See* Starr, *supra* note 63, at 805 (discussing risk assessment tools in the context of "evidence-based sentencing").

93. For an overview of the history of bail, see TIMOTHY R. SCHNACKE, NAT'L INST. CORR., FUNDAMENTALS OF BAIL: A RESOURCE GUIDE FOR PRETRIAL PRACTITIONERS AND A FRAMEWORK FOR AMERICAN PRETRIAL REFORM 40–41 (2014).

94. *See, e.g.*, AM. BAR ASS'N, Res. 112C, at 1, 6 (2017) (urging the prohibition of policies that result in pretrial detention solely on the ability to pay, and providing that judges can order detention for those who have been shown, with clear and convincing evidence, that no conditions of release will reasonably ensure appearance in court or public safety).

harm to public safety.[95] Defendants who pose a low risk of crime or flight, they argue, should not be detained due to an inability to pay monetary bail.[96] Conversely, wealthy defendants who pose a high risk of serious crime should not be released simply because they can afford bail.[97] Many, including this author, have argued that pretrial detention or electronic monitoring should be reserved for those who pose a high risk of violent crime or flight.[98] According to Chief Justice Rehnquist, "[i]n our society liberty is the norm, and detention prior to trial or without trial is the carefully limited exception."[99]

Dozens, if not hundreds, of jurisdictions are pursuing or have recently implemented wholesale changes to their bail practices.[100] By a recent count, bail reform efforts are active in all but a handful of states.[101] Supporters of reform can be found across party lines and across agencies: public defenders, district attorneys, judges, governors, sheriffs, and so forth.[102]

95. CRIMINAL JUSTICE POLICY PROGRAM, *supra* note 18, at 6–8.

96. *Id.* at 6.

97. *See id.* at 12 (observing that paying bail may not be an adequate incentive for some very wealthy defendants to appear).

98. Megan T. Stevenson & Sandra G. Mayson, *Pretrial Detention and Bail*, *in* REFORMING CRIMINAL JUSTICE, PRETRIAL AND TRIAL PROCESSES 21, 23 (Erik Luna ed., 2017).

99. United States v. Salerno, 481 U.S. 739, 755 (1987).

100. PRETRIAL JUSTICE INST., WHERE PRETRIAL IMPROVEMENTS ARE HAPPENING 1–5 (2017) (providing an overview of recent changes to pretrial practices across the United States).

101. *Id.* at 15–17.

102. *See, e.g.*, Tamara Aparton, *SF Public Defenders Stand Up to Money Bail*, S.F. PUB. DEFENDER (Oct. 25, 2017), http://sfpublicdefender.org/news/2017/10/sf-public-defenders-stand-up-to-money-bail ("In response to a pair of major statewide developments in the fight to abolish money bail, San Francisco public defenders will file challenges in every criminal case in which bail is set."); Megan Cassidy, *Bond Companies 'Extremely Worried' as Arizona Moves Away From Cash Bail Bonds*, AZ CENT. (June 21, 2017), https://www.azcentral.com/story/news/local/arizona/2017/06/21/arizona-courts-back-away-cash-bail-system-bond-companies-worried/400209001 ("The state's Supreme Court directs judges to minimize cash system bail bonds for pretrial release in favor of risk-based analysis."); Katie Greer, *Bail System Failures Justify Reform*, RIGHT ON CRIME (Sept. 5, 2017), http://rightoncrime.com/2017/09/bail-system-failures-justify-reform ("[C]ash based bail systems have failed to ensure public safety or equal access to justice by jailing defendants who simply couldn't afford to pay bail."); Christopher Keating, *House Passes Governor's Bail Reform*, HARTFORD COURANT (June 3, 2017), http://www.courant.com/politics/hc-legislature-bail-reform-20170603-story.html ("The state House of Representatives voted Saturday to approve bail reform for those arrested for some misdemeanors, one of Gov. Dannel P. Malloy's highest priorities."); Richard A. Oppel Jr., *Defendants Can't Be Jailed Solely Because of Inability to Post Bail, Judge Says*, N.Y. TIMES (July 17, 2017), https://www.nytimes.com/2017/07/17/us/chicago-bail-reform

Bail reform is a rare area of bipartisan cooperation in the U.S. Senate: Senator Kamala Harris (D-CA) and Senator Rand Paul (R-KY) recently introduced a joint bill to use federal funding to encourage states to reform or replace the practice of money bail.[103] Change has come in the form of new legislation,[104] revisions to state constitutions,[105] new judiciary rules as decreed by state courts,[106] and as the result of civil rights litigation.[107] Class action lawsuits have been filed in jurisdictions across the country claiming that current bail practices violate due process protections and the Equal Rights Amendment.[108] These lawsuits have resulted in a number of consent decrees entailing reform to local pretrial processes, as well as a landmark federal ruling, *ODonnell v. Harris County*, ordering the pretrial release of misdemeanor defendants who cannot afford bail.[109]

In shifting the emphasis toward risk as opposed to the ability to pay bail, the recent bail reform movement has been inti-

.html ("Cook County sheriff, Tom Dart, who supports bail-reform efforts. . . ."); *Real Change in the DA's Office*, LARRY KRASNER FOR DA, https://krasnerforda .com/platform (last visited Oct. 22, 2018) ("[Larry] will . . . reform our broken cash bail system . . . [H]e will seek alternatives to incarceration – dramatically reducing the number of prisoners held, saving millions of tax dollars, and letting wounded communities begin to heal.") (hereinafter KRASNER).

103. Pretrial Integrity and Safety Act, S. 1593, 115th Cong. (2017).

104. *See, e.g.*, Mark Pazniokas & Keith M. Phaneuf, *Bail Reform Wins Final Passage in Senate*, CONN. MIRROR (June 7, 2017), https://ctmirror.org/2017/06/07/bail-reform-wins-final-passage-in-senate (describing new bail reform law and its impact in Connecticut).

105. *See infra* note 114 and accompanying text.

106. *See, e.g.*, Michael Dresser, *Maryland Court of Appeals: Defendants Can't Be Held in Jail Because They Can't Afford Bail*, BALT. SUN (Feb. 8, 2017), http://www.baltimoresun.com/news/maryland/bs-md-bail-rule-20170207 -story.html (discussing a new rule by Maryland's highest court that is designed to reduce the use of cash bail).

107. Litigation designed to reform bail practices is either active or recently resolved in Texas, Louisiana, Illinois, Massachusetts, Georgia, Tennessee, Alabama, California, Oklahoma, Kansas, Mississippi, and Missouri. *See Challenging the Money Bail System*, C.R. CORPS, http://www.civilrightscorps.org/work/wealth-based-detention (last visited Oct. 22, 2018) [hereinafter Challenging the Money Bail]; *Ending Wealth-Based Pretrial Detention*, C.R. CORPS, https://web .archive.org/web/20170817195205/http://civilrightscorps.org/ending-wealth -based-pretrial-detention (last visited Oct. 22, 2018) [hereinafter *Ending Wealth-Based Pretrial Detention*]; *see also Ending American Money Bail*, EQUAL JUST. UNDER L., https://equaljusticeunderlaw.org/money-bail-1 (last visited Oct. 22, 2018).

108. *See, e.g.*, *Ending Wealth-Based Pretrial Detention*, *supra* note 107 (describing the cases as ending "unconstitutional wealth-based pretrial detention policies"); EQUAL JUSTICE UNDER L., *supra* note 107.

109. ODonnell v. Harris Cty., 227 F. Supp. 3d 706, 706 (S.D. Tex. 2016).

mately linked with the adoption of actuarial risk assessment instruments.[110] While exact details differ across jurisdictions, the new model generally involves reducing or eliminating the use of monetary bail and adopting a risk assessment tool to help judges make decisions about pretrial custody.[111] This has resulted in a rapid proliferation of the use of pretrial risk assessments. The pretrial risk assessment tool developed by the Arnold Foundation has been adopted by dozens of jurisdictions and three entire states in the last few years.[112] The Harris-Paul bail reform bill encourages states to replace money bail with pretrial risk assessment.[113] States such as New Jersey and New Mexico have revised their constitution to allow for direct orders of detention on the basis of risk as determined, at least in part, by actuarial risk assessment.[114] Across the country, as a result of changes enacted by the executive branch, legislature, and the judiciary, jurisdictions are adopting pretrial risk assessment.[115]

The current wave of bail reform is still in flux. The extent and exact nature of the changes depends partially on battles that are being waged in city halls, courthouses, and the court of public opinion around the country.[116] Risk assessments are controversial, and not all agree that they should play a central role in bail reform.[117] Currently, however, risk assessments are a dominant theme in a rapidly accelerating reform movement.

110. *See* Mayson, *supra* note 65, at 492–99 (providing an overview of the recent bail reform movement).

111. PRETRIAL JUSTICE INST., *supra* note 100, at 5 (listing adoption of risk assessment as part of bail reform in many jurisdictions).

112. *See* LAURA & JOHN ARNOLD FOUND., A RE-VALIDATION, *supra* note 38.

113. *See* Press Release, Kamala D. Harris, U.S. Senator for Cal., Harris, Paul Introduce Bill to Encourage States to Reform or Replace Unjust, Costly Money Bail System (July 20, 2017), https://www.harris.senate.gov/news/press-releases/harris-paul-introduce-bill-to-encourage-states-to-reform-or-replace-unjust-costly-money-bail-system.

114. *See* Matthew Coyte, *New Pretrial Risk Assessment More Fair*, ALBUQUERQUE J. (June 14, 2017), https://www.abqjournal.com/1017512/new-pretrial-risk-assessment-more-fair.html (discussing New Mexico's recent constitutional changes and the implementation of risk assessment in Albuquerque's most populous county); *see also infra* note 231, at 3 (discussing role of risk assessment in New Jersey's reforms).

115. PRETRIAL JUSTICE INST., *supra* note 100, at 10–14.

116. *See supra* note 107 and accompanying text.

117. *See, e.g.*, John Raphling, *Human Rights Watch Advises Against Using Profile-Based Risk Assessment in Bail Reform*, HUM. RTS. WATCH (July 17, 2017), https://www.hrw.org/news/2017/07/17/human-rights-watch-advises-against-using-profile-based-risk-assessment-bail-reform (arguing against the use of risk assessment tools in bail reform).

II. RISK ASSESSMENT: THE SLIM EVIDENCE

This Part provides an overview of the empirical literature that has influenced expectations about the impacts of risk assessment.[118] Section A summarizes research on whether risk assessment algorithms are better at predicting future crime than judges. Section B discusses the literature on racial bias in risk assessment. Section C presents some of the reasons why risk assessment in practice may be different than expected. It also discusses the slim evidence on how the use of risk assessment affects outcomes relative to the status quo method of making decisions.

A. ALGORITHMIC PREDICTION VS. HUMAN INTUITION

The most common argument in support of risk assessment is that formal, actuarial, and algorithmic methods of prediction perform better than the intuitive methods used by judges or other experts.[119] Thus, by making smarter decisions about who to release, jurisdictions could decrease detention rates while keeping crime and non-appearance rates constant, or vice versa. The idea that actuarial tools outperform human intuition in predicting crime has become broadly accepted.[120] Indeed, there is a long list of papers claiming to have demonstrated this empirically. A commonly cited meta-analysis, published in 2000, claims

118. This Section does not include studies showing that risk assessments are effective at predicting criminal activity unless the study compares the predictive power of risk assessments to the informal predictions of judges or other criminal justice practitioners.

119. SARAH PICARD-FRITSCHE ET AL., CTR. FOR COURT INNOVATION, DEMYSTIFYING RISK ASSESSMENT: KEY PRINCIPLES AND CONTROVERSIES 8 (2017) ("On balance, actuarial—or data-driven—risk models have tended to outperform the judgments of individual practitioners, including clinical professionals, in accurately assessing risk. Thus the rationale behind expanding the use of formal risk assessment tools is that they offer the potential for helping justice agencies make more informed decisions."); *cf.* Samuel R. Wiseman, *Fixing Bail*, 84 GEO. WASH. L. REV. 417, 438–54 (2016) (arguing for adopting risk assessment as a way to counter a principal-agent problem because by shielding judges from personal responsibility, their actions may closer reflect society's interests).

120. Eric S. Janus & Robert A. Prentky, *Forensic Use of Actuarial Risk Assessment with Sex Offenders: Accuracy, Admissibility and Accountability*, 40 AM. CRIM. L. REV. 1443, 1444 (2003) ("Our thesis is straightforward: actuarial methods have proven equal or superior to clinical judgements."); Steven L. Chanenson & Jordan M. Hyatt, *The Use of Risk Assessment at Sentencing: Implications for Research and Policy* (Villanova Univ. Charles Widger Sch. of Law Pub. Law & Legal Theory, Working Paper No. 2017-1040, 2016) ("[T]here is a significant literature that suggests that, with regard to accuracy, statistical methods generally outperform subjective clinical judgments.").

that "[o]n average, mechanical [i.e., actuarial and algorithmic] prediction techniques were about 10% more accurate than clinical [i.e., human] predictions."[121] This meta-analysis includes ten papers that compare algorithmic to human predictions in the criminal justice context.[122] These papers, however, are dated: All were published before 1988, and most use small samples and questionable analytic techniques.[123] In addition to the older literature, a number of more recent papers argue that statistical tools are better at predicting future offending than judges or magistrates.[124] These papers use much larger data sets and more advanced methodologies than the earlier literature. However, both the earlier papers and the more recent ones follow a similar pattern and are susceptible to many of the same critiques.

Proving that algorithms can predict better than human beings is not easy. Ideally, research comparing the two methods of prediction would be explicitly set up as a horse race between the two approaches. Both humans and algorithms would make predictions about a particular, well-defined outcome, and a winner would be declared based on the accuracy of their predictions. Unfortunately, most prior studies comparing different methods of predicting crime do not follow such an approach. Instead, most prior papers consist of post-hoc observational analyses that rely on numerous tenuous assumptions in order to draw inference. This is best demonstrated by example.

A recently released paper called *Human Decisions and Machine Predictions* is one of the more carefully executed instances of the literature and is a good demonstration of its strengths and

121. William M. Grove et al., *Clinical Versus Mechanical Prediction: A Meta-Analysis*, 12 PSYCHOL. ASSESSMENT 19, 19 (2000).

122. *Id.* at 22–24.

123. *Id. But see* Thomas R. Litwack, *Actuarial Versus Clinical Assessments of Dangerousness*, 7 PSYCHOL. PUB. POL'Y & L. 409, 417 (2001) (critiquing analytic techniques relied upon by Grove et al.); *see also* Starr, *supra* note 63, at 850–55 (arguing that there is not yet any persuasive evidence that actuarial instruments outperform judges' predictions).

124. *See, e.g.*, Baradaran & McIntyre, *supra* note 7, at 553–54 ("Even with this increase in releases, because we are better targeting which defendants to release, pretrial violent-crime rates would decrease."); Kleinberg et al., *supra* note 7, at 271 ("We find the algorithm dominates each judge in our data set that sees a large enough caseload to let us construct a meaningful comparison."); Jongbin Jung et al., Simple Rules for Complex Decisions (Apr. 4, 2017) (unpublished manuscript) (on file with author) ("In nearly every instance, the statistical decision rules outperform the human decision-maker.").

limitations.[125] This paper uses detailed data on pretrial defendants in New York City to estimate the risk of failing to appear in court or committing another crime.[126] The authors use machine-learning techniques—complex computer-based methods of predicting risk—to build a prediction for each defendant.[127] The inputs to the model include criminal history, current offense, and age as predictors for misconduct (rearrest or nonappearance in court) among the group of defendants who were released pretrial.[128] The authors then conduct a policy simulation in which they estimate what the crime rate would have been if, instead of following the status quo procedure, the decision on whether to release or detain a defendant had been made solely by the machine-learned algorithm.[129] They estimate that if the detention decision was made by their tool that crime could be dramatically lowered while the detention rate remains constant, or that the detention rate could be dramatically lowered while the crime rate remains constant.[130]

One of the main challenges to determining whether the algorithm outperforms the judges is that the authors do not directly observe the judges' predictions. They attempt to infer the predictions by looking at which defendants were detained pretrial.[131] There is undoubtedly a connection between the predictions of the judge and the detention status of defendants, but this connection is noisy and mediated by several other factors. Most notably, judges are not, by and large, directly determining detention. They are setting bail, and the defendant will be released if he or she posts bail. The bail amount is not supposed to keep a defendant detained (although it can be used that way); it is supposed to provide incentive for a released defendant to return to court. Thus, the judges must predict several unknowns simultaneously: the risk of crime or FTA, the likelihood the defendant will post a given amount of bail, and the impact that bail will have on the defendant's pretrial misconduct. A defendant who was detained pretrial is not necessarily someone who the judge considered higher risk than one who was released.

125. Kleinberg et al., *supra* note 7.

126. *Id.* at 246.

127. *See id.* at 252–53 (describing the model).

128. *See id.* at 239.

129. *See id.* at 241.

130. *See id.* at 270–71.

131. *See id.* at 245–46 ("Judges may be making mistakes in predicting either crime risk or ability to pay, which may complicate our ability to isolate misprediction of risk.").

Second, judges are likely to have more complicated preferences than the algorithm. For one, they may be taking into account factors other than risk. For example, a judge might find it inappropriate to detain someone on very minor charges, even if they pose a relatively high statistical risk of future offending.[132] Further, there are multiple types of risk that judges consider—FTA, violent crime, drug crime, etc.—and judges are likely to vary in the extent to which they are concerned with each. Aggregating multiple judges together means that even if each were performing optimally according to his or her own preferences, a risk algorithm could outperform the group average on any single dimension.

Third, the ability to compare the risk prediction tool to the judges' intuition relies on assumptions about the crime risk of detained defendants. The policy simulation cited in the introduction to this Article—which states that, by adopting risk assessment, the detention rate can be lowered by 41.9% without affecting the crime rate—is based on the assumption that the crime rate of a detained defendant will be the same as the crime rate of a released defendant with similar visible characteristics (i.e., criminal record, etc.).[133] This is almost certainly not true. For more serious crimes, where release rates are low, the released defendants will not be at all representative.

These three problems—using an imperfect proxy as a measure for the human's prediction,[134] the implausible assumption

132. Several authors have found some evidence of this. *See, e.g.*, Kleinberg et al., *supra* note 7, at 284 ("Judges are most likely to release high-risk people if their current charge is minor, such as a misdemeanor, and are more likely to detain low-risk people if their current charge is more serious."). In fact, it is not uncommon to find policies that declare a presumption of pretrial release for defendants who are facing relatively low-level charges, and thus would be unlikely to receive carceral sentences. *See* KY. REV. STAT. ANN. § 218A.135(1) (West 2012) (declaring that those facing charges for which a conviction may result in presumptive probation should be released on his or her own recognizance or unsecured bond); KRASNER, *supra* note 102 (ending the practice of requesting cash bond for certain low-level offenses). This is even though research suggests that the seriousness of the current charge is a relatively poor predictor of future criminal activity, compared to factors such as prior convictions and age. *See* Kristin Bechtel et al., *Identifying the Predictors of Pretrial Failure: A Meta-Analysis*, 75 FED. PROB. 78, 80–82 (2011) (stating numerous factors, including age and prior convictions, as being strongly correlated with re-arrest or failure to appear; however, the current offense itself was not significantly correlated with re-arrest or failure to appear).

133. *See* Kleinberg et al., *supra* note 7, at 271.

134. *See, e.g.*, Douglas Mossman, *Assessing Predictions of Violence: Being Accurate About Accuracy*, 62 J. CONSULTING & CLINICAL PSYCHOL. 783, 784 (1994)

that the human's objective is exactly the same as the algorithm's,[135] and an inability to measure accuracy because of missing or distorted outcome variables[136]—are common to most attempts to compare human and algorithmic prediction.[137] Kleinberg et al. are aware of these confounds to the research design and make some attempts to address them in their paper.[138] They make some headway in providing evidence that the confounds cannot entirely explain away their results. However, these are not minor issues, but rather fundamental challenges to the research design. Ultimately, it is unclear how much more accurate the risk prediction algorithm is, if at all.

In January 2018, an undergraduate computer-studies major and her advisor published a study that challenged many commonly-held beliefs about the relative accuracy of human intuition and algorithmic predictions.[139] Using an experimental method that was explicitly set up as a horse race between survey respondents and algorithmic risk assessment models, they found no evidence that algorithms were more accurate in predicting recidivism than human beings.[140] The survey participants were Mechanical Turk users: random people who were unlikely to have much criminal justice experience.[141] They were given short

("One commonly used approach [for quantifying decision-maker accuracy in predicting future violence] . . . assumes that clinicians' recommendations about hospitalization or release represent judgments about the likelihood of future violence.").

135. Kleinberg et al. call this "omitted-payoff bias." *See* Kleinberg et al., *supra* note 7, at 272 ("One potential concern is that when making release decisions, judges might have additional objectives beyond the outcome the algorithm is predicting.").

136. In observational studies, actions taken to ameliorate risk (i.e., incarceration, supervision, rehabilitative programming, secured bail, etc.) make it hard to estimate what the risk level would have been in the absence of such interventions. *See, e.g.*, Jongbin Jung et al., Algorithmic Decision Making in the Presence of Unmeasured Confounding (May 4, 2018) (unpublished manuscript) (on file with arxiv.org) ("For example, in the judicial context we only observe whether or not a particular defendant failed to appear at trial *given the action the judge actually took* (i.e., requiring bail or not); we do not observe what would have happened under the alternative judicial action." (emphasis added)).

137. While a full literature review is beyond the scope of this Article, these problems can also be found in Baradaran & McIntyre, *supra* note 7, Jung et al., *supra* note 136, and many of the older papers cited in Grove et al., *supra* note 121.

138. Kleinberg et al., *supra* note 7, at 273–80.

139. Julia Dressel & Hany Farid, *The Accuracy, Fairness, and Limits of Predicting Recidivism*, 4 SCI. ADVANCES 1, 1 (2018).

140. *Id.* at 1.

141. *Id.*

descriptions of defendants that contained the following information: sex, age, charge, degree of charge, number of prior convictions, and number of prior juvenile felony and misdemeanor charges.[142] In some versions of the experiment the authors also provided the defendant's race.[143] The respondents were asked to predict whether or not the defendant would be rearrested within two years.[144] Since the survey respondent's payment was five times greater if their accuracy level was above a certain bar, they were incentivized to be as accurate as possible.[145] Each respondent provided predictions on fifty cases and received real-time feedback on whether their prediction was correct as well as the overall accuracy rate.[146] The authors compared the accuracy of the survey respondents against several algorithms: COMPAS, a prominent risk assessment tool offered by a for-profit company; a non-linear machine-learning prediction algorithm that the authors developed themselves; and a simple logistic regression prediction tool built off of only two inputs, age and prior convictions.[147] The authors found no evidence that any of the algorithms could outperform the predictions of a random group of online respondents.[148]

This study is notable because it is less vulnerable to some of the confounds listed above. Instead of relying on an imperfect prediction-proxy, in a setting where the humans may have had objectives other than risk, this study was designed to elicit specific predictions about a well-defined outcome. This enables a cleaner accuracy comparison between the survey respondents and the COMPAS algorithm.

Like any study, one should wait and see if it can be replicated in other contexts and with other data sets before drawing firm conclusions. And even if the results themselves are internally valid, one cannot infer too much about judges based on a Mechanical Turk study. The contexts are very different. On the one hand, one might expect that judges, who are not only experts but have a lot more information about the case, should be able to outperform a random online participant who has only seven

142. *Id.*
143. *Id.* at 4.
144. *Id.* at 1.
145. *Id.* at 4.
146. *Id.*
147. *Id.* at 3.
148. *Id.*

data points per defendant. On the other hand, the extra information that judges have may lead them to put too much weight on extraneous factors, like whether a defendant is sufficiently polite. Furthermore, judges do not get real-time feedback about their accuracy. Nonetheless, these results certainly temper the expectation that algorithms provide a substantial improvement over human intuition.

Algorithms have proven themselves highly successful in many contexts—outperforming world masters in chess and Go, for instance[149]—so it remains reasonable to think that a well-built actuarial tool can out-predict a judge on future offending. This is likely to be particularly true in the rapid, assembly-line style proceedings that characterize many bail hearings. However, the margin of improvement remains unclear.

B. RACIAL DISPARITIES AND RISK ASSESSMENT

The last couple of years have seen increased debate about whether risk assessment tools will worsen racial disparities in criminal justice.[150] Risk assessment proponents argue that the objective rankings of a risk tool will be less biased than the subjective evaluations of potentially-racist judges.[151] Critics counter that the risk tools themselves may be racially biased.[152] Some of the confusion lies in a lack of clear language about what constitutes racial bias in risk assessment.[153] For the purposes of this Article, I consider a tool to be racially biased if it systematically

149. *See, e.g.*, *Deep Learning Machine Teaches Itself Chess in 72 Hours, Plays at International Master Level*, MIT TECH. REVIEW (Sep. 14, 2015), https://www.technologyreview.com/s/541276/deep-learning-machine-teaches-itself-chess-in-72-hours-plays-at-international-master/.

150. For a brief summary of the debate, see Justin Breaux et al., *Could Risk Assessment Contribute to Racial Disparity in the Justice System?*, URB. INST.: URB. WIRE (Aug. 11, 2014), https://www.urban.org/urban-wire/could-risk-assessment-contribute-racial-disparity-justice-system (acknowledging the concern that using risk prediction assessment could "exacerbate class and race disparities in the criminal justice system").

151. *See, e.g.*, Robert D. Hoge, *Standardized Instruments for Assessing Risk and Need in Youthful Offenders*, 29 CRIM. JUST. & BEHAV. 380, 387 (2002) (noting the use of standardized risk and need assessment tools would "significantly reduce the operations of individual biases . . .").

152. *See, e.g.*, Bernard E. Harcourt, *Risk as a Proxy for Race: The Dangers of Risk Assessment*, 27 FED. SENT'G REP. 237, 238 (2015) (explaining the tie between race, prior criminal history, and the assessment of risk through risk instruments).

153. Sandra G. Mayson, *Bias In, Bias Out*, 128 YALE L.J. (forthcoming 2019) (unpublished manuscript) (on file with author) (noting the various definitions of bias).

assigns higher risk scores to defendants from a particular race than their true risk warrants. (While true risk is hard to define or measure on the individual level, on the group level it refers to the average incidence of the predicted outcome.)[154] This is how the term "bias" is used in statistics[155] and is similar to the common language usage of the term.[156]

Using this definition, there are a number of reasons why risk assessment tools could be biased against blacks.[157] The most common argument is that inputs to risk assessment—prior convictions, prior incarceration sentences, education, employment, etc.—are themselves the result of racially disparate practices.[158] While two defendants may pose a similar crime risk, the defendant living in a heavily-policed minority neighborhood is likely to have a lengthier criminal record and thus a higher risk score than one who lives in a less heavily-policed neighborhood.[159] Similarly, a risk algorithm that is trained to predict an outcome that is the result of racially disparate law enforcement or prosecution practices also incorporates bias into the algorithm.[160] While these sources of potential bias almost certainly affect the risk assessment, they are hard to correct for, and few even try.[161]

154. *See, e.g.*, *id.* at 10 n.45 (explaining that bias is a "deviation of a statistical calculation" from the "true value" of the item calculated); s*ee also id.* at 12 (describing "true positive" as the correct prediction of an arrest).

155. "Systematic error or bias refers to deviations that are not due to chance alone. The simplest example occurs with a measuring device that is improperly calibrated so that it consistently overestimates (or underestimates) the measurements by X units." Penn State Eberly Coll. of Sci., *Lesson 4: Bias and Random Error*, *in* STAT 509 DESIGN AND ANALYSIS OF CLINICAL TRIALS, https://onlinecourses.science.psu.edu/stat509/node/26 (last visited Oct. 22, 2018).

156. The online Oxford English Dictionary defines "bias" as "Inclination or prejudice for or against one person or group, especially in a way considered to be unfair." *Bias*, OXFORDDICTIONARIES.COM, https://en.oxforddictionaries.com/definition/bias (last visited Oct. 22, 2018).

157. *See generally* Solon Barocas & Andrew D. Selbst, *Big Data's Disparate Impact*, 104 CALIF. L. REV. 671, 677–92 (2016) (discussing ways in which data mining can discriminate).

158. *See* Breaux et al., *supra* note 150 (explaining that black probationers have their probation revoked and are "subsequently incarcerated at much higher rates" than whites or Hispanics); Harcourt, *supra* note 152, at 240 ("[R]eliance on criminal history has proven devastating to African American communities . . . .").

159. *See, e.g.*, CHRISTIN ET AL., *supra* note 5, at 2 (acknowledging that "[r]acial discrimination takes place at every step of the criminal justice system," including policing); Breaux et al., *supra* note 150 (noting that black individuals are "more likely than whites to be arrested for marijuana use and possession").

160. *See* Harcourt, *supra* note 152, at 238 ("[R]isk today has collapsed into prior criminal history, and prior criminal history has become a proxy for race.").

161. *See* Julia Angwin et al., *Machine Bias*, PROPUBLICA (May 23, 2016),

Actual rates of offending are unknown and the gap between behavior and criminal record can only be guessed at.

Another place where bias can enter the risk tool is in the design of the instrument.[162] In the simpler, checklist-style instruments the designers choose both the inputs and the weights on the inputs. If a designer puts more weight on inputs that correlate with race than their crime-predictiveness warrants, the tool will be biased. In machine-learned risk assessment tools this type of bias is less of a concern. The weight the algorithm places on different inputs will generally reflect only the extent to which these inputs are predictive of what it is trained to predict.

Empirical research on racial bias in risk assessment is both thin and recent. In 2016, ProPublica released a study that claimed to have found evidence that a proprietary risk assessment tool called COMPAS, used to help make decisions about pretrial release in Broward County, Florida, was biased against black defendants.[163] To support this claim, they show that "black defendants who did not recidivate over a two-year period were nearly twice as likely to be misclassified as higher risk compared to their white counterparts. . . ."[164] In technical terms, this is a disparity in false positive rates, or the fraction of non-recidivating defendants who were ranked as high risk.[165] Many researchers countered this argument with the point that disparate false positive rates will be present every time there are disparate rates of offending—and thus disparate average risk levels—across groups.[166] The intuition behind this is simple. A false positive rate is a ratio: the denominator is the total number of people

https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sententcing (noting that the sentencing commission did not carry out risk score studies after a warning from the U. S. Attorney General that the risk scores may be biased).

162. *See id.* (explaining that, even after running statistical tests that "isolated the effect of race from criminal history and recidivism, as well as from defendant's age and gender," black defendants were still seventy-seven percent "more likely to be pegged as at higher risk of committing a future violent crime").

163. *Id.* ("There's software used across the country to predict future criminals. And it's biased against blacks.").

164. Julia Angwin et al., *How We Analyzed the COMPAS Recidivism Algorithm*, PROPUBLICA (May 23, 2016), https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm.

165. *See* Mayson, *supra* note 153 (explaining, briefly, the mechanics of a "false positive").

166. *See, e.g.*, William Dieterich et al., *COMPAS Risk Scales: Demonstrating Accuracy Equity and Predictive Parity*, NORTHPOINTE, at 1, 8 (July 8, 2016), https://university.pretrial.org/viewdocument/compas-risk-scales

who do not recidivate and the numerator is the number of people who do not recidivate but are classified as high risk. As the risk level of a group increases, there will be fewer people who do not recidivate and more people who are labeled high risk.[167] Since there are fewer non-recidivists, the denominator will decrease. Since there are more people labeled "high risk"—some fraction of which do not recidivate—the numerator increases. Thus, in simple mathematical terms, as the risk level goes up, the false positive rate will go up too. In other words, differing levels of offending will lead to disparate false positive rates *even if we knew the true risk of each group and even if the tool is completely unbiased.*[168] In fact, when there are disparate base rates of offending, one would have to program a risk tool to *be* biased (so that one group systematically gets a lower or higher risk classification than their true risk level warrants) in order to eradicate disparate false positive rates.[169]

While ProPublica framed this as being about actuarial risk assessment,[170] it is actually relevant to the entire project of using risk to make decisions in criminal justice. The key points apply equally regardless of how the risk evaluation was conducted: through proprietary black box risk assessment tools, transparent checklist instruments, or judges' intuitive assessment of risk. If it is concerning that black defendants who do not recidivate are more likely to be labeled high risk than white defendants who do not recidivate (and there are plenty of reasons why

-demonstrating-a (explaining that the false positive rates are a "natural consequence of using unbiased scoring rules"); Jennifer L. Doleac & Megan Stevenson, *Are Criminal Risk Assessment Scores Racist?*, BROOKINGS INST. (Aug. 22, 2016), https://www.brookings.edu/blog/up-front/2016/08/22/are-criminal-risk-assessment-scores-racist ("Disparate false-positive rates will be present every time there are disparate rates of reoffending . . . .").

167. *See* Doleac & Stevenson, *supra* note 166 (explaining, briefly, the equation of the "false positive").

168. While disparate impact is not inherently unfair, it can be unfair when the costs are born by a marginalized group and the benefits accrue to the dominant group. The unfairness arises not from the disparate impact per se, but from the presumption that the benefits to the dominant group were given disproportionate weight in the policy decision, while the costs to the marginalized group were discounted.

169. *See* Jon Kleinberg et al., *Inherent Trade-Offs in the Fair Determination of Risk Scores*, ARXIV (Nov. 17, 2016), https://arxiv.org/pdf/1609.05807.pdf (showing that, except for in very specialized circumstances, achieving equal false positive rates would require a risk tool where the same risk classification would correspond with different levels of actual risk across the two groups).

170. *See generally* Angwin et al., *supra* note 164 (explaining the ProPublica study on risk assessment).

this should be concerning!), then this calls into question the entire regime of using risk as a basis of restricting liberties, not simply actuarial risk assessment instruments.

Disparate false positive rates are not a measure of racial bias under the definition used in this Article. Most other researchers do not measure racial bias using disparate false positive rates either.[171] Instead, they measure bias using predictive parity: similar recidivism rates among white and black defendants with the same risk score.[172] If a risk score is racially biased using the definition provided above, then the likelihood of committing crime would be lower for black defendants than it would be for white defendants with the same risk score. The company that owns COMPAS responded to ProPublica's article by showing that there is no evidence that the tool is biased using predictive parity tests.[173] Similar results have been found for the Post Conviction Risk Assessment (PCRA) in a detailed study of racial disparities and risk assessment.[174] The PSA likewise shows predictive parity for white and black defendants,[175] as does the Virginia Pretrial Risk Assessment Instrument (VPRAI).[176]

171. *See* Jennifer L. Skeem & Christopher T. Lowenkamp, *Risk, Race, and Recidivism: Predictive Bias and Disparate Impact*, 54 CRIMINOLOGY 680, 685 (2016) ("There is substantial agreement on the empirical criteria that indicate when a test is . . . biased . . . the paramount indicator of test bias is *predictive bias* . . . .").

172. *See generally* Dietrich et al., *supra* note 166, at 9 (explaining predictive parity in relation to risk score).

173. *Id.* at 2–3 (noting that if the "correct classifications statistics are used," then claims of racial bias are "not supported").

174. Skeem & Lowenkamp, *supra* note 171, at 690 (stating that test findings were "generally consistent" with the hypothesis that there would be "little evidence that the accuracy of the PCRA in predicting rearrest depends on whether offenders are Black or White").

175. *See* LAURA & JOHN ARNOLD FOUND., RESULTS FROM THE FIRST SIX MONTHS OF THE PUBLIC SAFETY ASSESSMENT – COURT KENTUCKY 1, 4 (2014), https://arnoldfoundation.org/wp-content/uploads/2014/02/PSA-Court-Kentucky-6-Month-Report.pdf [hereinafter FIRST SIX MONTHS]. This study has been recently removed from the Arnold Foundation's website but is on file with the author. Representatives of the Arnold Foundation explained that it was removed due to concerns about the quality of the data used in the report.

176. *See* Mona J.E. Danner et al., *Race and Gender Neutral Pretrial Risk Assessment, Release Recommendations, and Supervision: VPRAI and Praxis Revised*, LUMINOSITY, at 1, 8, https://www.dcjs.virginia.gov/sites/dcjs.virginia.gov/files/publications/corrections/race-and-gender-neutral-pretrial-risk-assessment-release-recommendations-and-supervision.pdf ("Taken as a whole, the analyses support the neutrality of the VPRAI in classifying People of Color and Whites by risk of pretrial failure.").

However, there are reasons to question the predictive parity approach. First, it is impossible to test for predictive parity in rates of reoffending; one can only test for predictive parity in something visible, like arrest or conviction. Given the differences in how different neighborhoods are policed—as well as the many other opportunities for racial bias or racial disparity to affect the likelihood of arrest or conviction—a group of black defendants who are rearrested at the same rate as a group of white defendants may have committed fewer crimes.[177] The race gap between the rate of offense and rate of rearrest is thought to be lower for violent crimes than for less serious crimes.[178] The Skeem & Lowenkamp study on racial bias in the PCRA focuses primarily on predictive parity for violent crime rearrest for this express reason.[179]

A second concern with using predictive parity as a measure is that the *rate* of reoffending does not directly measure the *risk* of reoffending at the time the risk was evaluated.[180] Actual reoffending is a joint combination of a person's propensity to commit crime and the opportunities and incentives that she faces.[181] Risk evaluations, both formal and informal, influence these opportunities and incentives.[182] In particular, they influence the likelihood that a defendant will be incarcerated, supervised, provided treatment, and so forth.[183] If judges treat black defendants differently than white defendants this would bias measures of predictive parity. For example, if judges are more

177. *See* Breaux et al., *supra* note 150 (noting that black individuals are "more likely than whites to be arrested for marijuana use and possession," despite similar rates of use).

178. *See, e.g.*, Skeem & Lowenkamp, *supra* note 171, at 690 (noting that "violent arrests" are "the most unbiased criterion available" since they involve less police discretion than do "victimless" crimes).

179. *Id.* at 690 (describing why they chose risk of violent crime as the main focus of their analysis).

180. *See* Doleac & Stevenson, *supra* note 166 ("Recidivism rates do not tell us what a person's propensity to commit another crime was *at the time the risk score was calculated*.").

181. *See* Shawn Bushway & Jeffrey Smith, *Sentencing Using Statistical Treatment Rules: What We Don't Know Can Hurt Us*, 23 J. QUANTITATIVE CRIMINOLOGY 377, 378 (2007) ("[I]t is impossible without additional strong assumptions to distinguish the 'true' behavior of individual offenders from the behavior that results from their non-random treatment within the existing system.").

182. *See id.* (explaining that "judges, prosecutors, parole boards and other actors in the criminal justice system" use the "information available to them," formal or informal, to "assign punishments").

183. *See id.*; *see also* Doleac & Stevenson, *supra* note 166 (noting that "risk scores influence sentencing, and sentencing influences recidivism").

likely to assign white defendants to enter an effective drug treatment program, their rate of reoffending will be lower than black defendants who were less likely to be assigned to the effective program.[184]

Determining whether a risk tool is racially biased is probably redundant. As Princeton computer scientist Aylin Caliskan says, "[M]achines are trained on human data. And humans are biased."[185] The important question is whether the use of actuarial risk assessment tools results in more disparate outcomes than the status quo, or other viable alternatives. Outside of the research presented in this study, the empirical research on this is next to non-existent.[186]

C. RESEARCH ON THE IMPACTS OF RISK ASSESSMENT

The discourse around risk assessment has focused primarily on the tools themselves.[187] But risk assessments are merely tools, and their impact will depend on how they are used. A variety of contextual and policy details are influential: the amount of judicial discretion allowed, the judge's incentive structure, the fraction of defendants in each risk classification, the specific action-directives associated with each risk classification, the court culture, etc.[188] Even if risk assessments are racially biased, their use may result in lower racial disparities than the status quo.

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184. *See* Doleac & Stevenson, *supra* note 166 (discussing the interplay between risk score and court sentencing).

185. Brian Resnick, *How Artificial Intelligence Learns to Be Racist*, VOX (Apr. 17, 2017), https://www.vox.com/science-and-health/2017/4/17/15322378/how-artificial-intelligence-learns-how-to-be-racist.

186. *See* THE JUSTICE POLICY INST., REDUCING DISPROPORTIONATE MINORITY CONFINEMENT: THE MULTNOMAH COUNTY, OREGON SUCCESS STORY AND ITS IMPLICATIONS (2002), http://www.justicepolicy.org/uploads/justicepolicy/documents/multnomah.pdf (outlining the only study that the author is aware of that could even tentatively be taken as evidence on how risk assessment in practice affects racial disparities relative to the status quo).

187. This is starting to change. *See, e.g.*, Brandon L. Garrett & John Monahan, *Judging Risk* (Univ. of Va. Sch. of Law, Pub. Law & Legal Theory Research Paper Series, Paper No. 2018–44), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3190403 (proposing a regulatory framework for the use of risk assessment); Koepke & Robinson, *supra* note 86 (highlighting the importance of the decision-making framework around risk assessments).

188. *See, e.g.*, Joel Miller & Carrie Maloney, *Practitioner Compliance with Risk/Needs Assessment Tools: A Theoretical and Empirical Assessment*, 40 CRIM. JUST. & BEHAV. 716, 719 (2003) (explaining how practitioners may not complete the risk assessment tools, may carelessly use the tools, manipulate the tools, or not adhere to tool recommendations).

Even if risk assessment tools are significantly better than humans at predicting future offending, that does not automatically mean that their adoption will lead to large benefits.

Risk assessments are usually used as a supplement to human discretion; judges or other criminal justice authorities retain wide latitude to make the final decision.[189] Discretion is justified in principle because the individual facts of a case may make a defendant higher or lower risk than her risk score indicates.[190] Ideally, discretion is used only to correct a mistaken risk evaluation. In practice, however, it may be hard to identify when individual factors are influential enough to render the risk assessment score incorrect. Judges may ignore the risk tool in cases where it is correct, or place too much credence on it when it is incorrect.[191] The evidence suggests that judges and criminal justice practitioners do not have a lot of faith in risk assessment tools. In a recent survey of judicial attitudes toward risk assessment at sentencing, less than 10% thought that the actuarial tools would predict better than judges.[192] A survey of more than two thousand probation and parole officers found that even among the most compliant officers, "practitioners routinely exercise substantial discretion to choose interventions that are more restrictive or intensive than the tool recommends."[193] With such low confidence and adherence, risk assessment may only change behavior in exceptional circumstances. Are these circumstances in which the tool provides significant informational gain over human intuition? If not, then the tool will provide little benefit in practice.

Expanding upon this theme, judges may use the risk assessment tools differently for white defendants than they do for black defendants.[194] A judge may think a black defendant is higher risk

189. *See, e.g.*, Garrett & Monahan, *supra* note 187, at 7 ("[T]he process [of adopting risk assessment] has often been ad hoc and involves conveying risk information to judges and other decisionmakers, who retain traditional discretion.").

190. *See id.* at 13–14 (noting the concern that certain individual factors, such as how common or uncommon the offense and time at which the offense was committed, could lead to inaccurate predictions by risk assessment instruments).

191. *See id.* at 19–20 (describing the instances when judges could have assigned alternative sentences to those categorized as "least violent offenders" but opted not to).

192. *See* Chanenson & Hyatt, *supra* note 120, at 10.

193. Miller & Maloney, *supra* note 188, at 728.

194. *See, e.g.*, Hannah-Moffat, *supra* note 79, at 280 ("[R]ace and ethnicity can influence practitioners' attribution of risk factors to offenders . . . .").

than their risk score indicates because of racist stereotypes. Alternatively, she may think a black defendant is lower risk than is indicated by the risk score because she is aware that racially disparate policing practices contributed to his previous arrests. While the question of racial disparity is often posed as a choice between biased instruments or biased judges, in practice, the important question is "how do the two interact?"

The way the criminal justice administrator (judge, parole board member, etc.) uses a risk tool is not just an idiosyncratic function of her personality—it is likely to be influenced by the institutional background and her incentive structure.[195] Someone who is elected will be attuned to the concerns of re-election and may be wary of taking actions that would lead to a loss of political support. Someone who is appointed is likely to have concerns about re-appointment, and will take efforts to please the appointing body. These career concerns will play out differently if there is transparency and accountability in the way the tool is used. If there is little oversight, the judge will be more likely to follow her own sensibility.[196]

The impacts of risk assessment depend also on numerous policy decisions. First, the jurisdiction must choose whether to report actual statistical risk, (i.e., a defendant has an x percent chance of y happening within z months) or risk labeling (i.e., low, moderate, or high).[197] Most jurisdictions use a risk labeling approach.[198] This approach requires defining the cutoffs in statistic risk that determine each classification.[199] In other words, it requires a normative decision about what fraction of defendants should receive the stigmatic high-risk label versus more the benign low-risk label.[200] These risk labels then translate, either explicitly or implicitly, into action-directives. Many jurisdictions

195. *See generally* Miller & Maloney, *supra* note 188, at 720 (describing reasons for practitioner noncompliance with risk assessment tools, including the desire to "obtain a desirable outcome, or avoid an adverse one").

196. *See generally* Hannah-Moffat, *supra* note 79, at 285–86 (discussing transparency in the use of a risk instrument).

197. *See* Daniel A. Kraus et al., *Risk Assessment Communication Difficulties: An Empirical Examination of the Effects of Categorical Versus Probabilistic Risk Communication in Sexually Violent Predator Decisions*, BEHAV. SCI. & L. (forthcoming 2018) (manuscript at 3) (on file with author) (explaining categorical and numerical-based predictive probabilities).

198. See *id.* (manuscript at 4) (noting that judges seem to prefer categorical over numeric-based estimates).

199. *See id.* (manuscript at 6) (describing the range of categories in risk labeling).

200. *See id.*

implement specific schemas for how defendants in different risk classifications are to be treated. For instance, it is common in the pretrial context to direct judges to grant non-financial release for low-risk defendants, conditional release (with supervision or low cash bond) for moderate-risk defendants, and detention for high risk defendants.[201] Even if the policy is not explicit about what actions should be taken with each group, there may still be implicit recommendations.[202] High-risk defendants should be treated as high-risk defendants are supposed to be treated in that particular jurisdiction; usually this entails greater restrictions on liberty.[203] A jurisdiction must decide whether the decision-maker has full discretion when it comes to following the action-directives, or whether certain actions are banned/required based on the risk score.[204] It must decide whether to impose any costs, in terms of time, convenience, or otherwise, of deviating from the action-directive. Finally, a jurisdiction must decide what degree of transparency and accountability to require in the use of risk assessment tools.[205]

An evaluation of the impacts of risk assessment in practice will always be a joint evaluation of the tool itself, the manner in which it is used, and the policy structure it is embedded in. Such evaluations are very scarce. Outside of the results reported in this Article, I am aware of only two rigorous, third party studies that compare outcomes when a risk assessment tool is being used to outcomes under the status quo method of making decisions. A study by Richard Berk showed that parole board members in Pennsylvania did not change their release decisions very much when risk assessments were available.[206] Berk found tentative evidence that the risk assessment tool lowered recidivism

201. *See, e.g.*, SENTENCING PROJECT, REDUCING RACIAL DISPARITY IN THE CRIMINAL JUSTICE SYSTEM: A MANUAL FOR PRACTITIONERS AND POLICYMAKERS 1, 31 (2008), https://www.sentencingproject.org/wp-content/uploads/2016/01/Reducing-Racial-Disparity-in-the-Criminal-Justice-System-A-Manual-for-Practitioners-and-Policymakers.pdf (describing the pretrial risk scale that was used in Minnesota's Fourth Judicial District, which called for variated release conditions based on level of risk).

202. *See, e.g.*, Miller & Maloney, *supra* note 188, at 720 (explaining how some policies may allow practitioner override of the tool recommendation).

203. *See, e.g.*, Angwin et al., *supra* note 161 (noting that risk scores can decide bond amounts to more "fundamental decisions about defendants' freedom").

204. *See, e.g.*, Chanenson & Hyatt, *supra* note 120, at 4 (pointing out the possibility of practitioner discretion over using the risk results).

205. *See id.* at 6 (noting that individual jurisdictions oft evaluate possible levels of transparency when deciding if to implement a risk-assessment tool).

206. Berk, *supra* note 11, at 203 tbl.2.

rates, but cautioned against firm conclusions due to weakness in the research design.[207] A different paper by Berk and coauthors used a large randomized control trial to evaluate different methods of assigning convicts to prison.[208] Inmates in the treatment group were assigned to prisons by the machine learning risk assessment tool: higher-risk defendants were assigned to higher-security prisons.[209] In the control group, inmates were assigned to prisons using the existing scoring system.[210] There was no decrease in inmate misconduct for defendants who were assigned to facilities using the risk assessment tool,[211] but the misconduct was shifted toward higher-security facilities, suggesting that the tool was effective in predicting misconduct.[212] The little evidence that is available about the impacts of pretrial risk assessment in particular come from detail-light, non-academic reports usually put out by the organization who designed or implemented the tool. Two of the most commonly cited reports use data from Kentucky.[213] One is a report put out by Kentucky Pretrial Services

207. *See id.* at 213 (noting that rearrests "look to have declined" after "forecasts and reliabilities were regularly made available," but that the treatment affect estimates may have been inflated due to practice changes when the learning forecasts and reliabilities were introduced).

208. Richard A. Berk et al., *A Randomized Experiment Testing Inmate Classification Systems*, 2 CRIMINOLOGY & PUB. POL'Y 215, 216 (2003).

209. *See id.* at 219 (explaining that a goal of the new classification system was to "better predict inmate misconduct and place them accordingly").

210. *See id.* at 216 (explaining the scoring system in place by the Center for Disease Control).

211. *See id.* at 232–33 (noting that there lacked "any important differences in misconduct" between the experimental and control groups).

212. *Id.* at 233 ("[T]he new system shifted the misconduct into the higher security levels . . . ."). This study is better thought of as an evaluation of supervision levels than an evaluation of risk assessment, since it does not compare decision making with risk assessment against the status quo decision-making method. Virginia is also cited as an example of successful use of risk assessment in sentencing, but the studies cited to support this claim also do not compare decision making with and without risk assessment and thus cannot demonstrate whether risk assessment brought any improvement. *See* BRIAN J. OSTROM ET AL., OFFENDER RISK ASSESSMENT IN VIRGINIA: A THREE-STAGE EVALUATION 15 (2002), https://www.ncjrs.gov/pdffiles1/nij/grants/196815.pdf; Mathew Kleiman et al., *Using Risk Assessment to Inform Sentencing Decisions for Nonviolent Offenders in Virginia*, 53 CRIME & DELINQ. 106, 112 (2007).

213. A third study also analyzes HB 463, but relies heavily on data from Kentucky Pretrial Services. JOHN D. MINTON, JR. ET AL., REPORT ON IMPACT OF HOUSE BILL 463: OUTCOMES, CHALLENGES AND RECOMMENDATIONS 11 (2012). This study argues that judicial discretion has undermined the effectiveness of HB 463. *See also* Robert Veldman, *Pretrial Detention in Kentucky: An Analysis of the Impact of House Bill 463 During the First Two Years of Its Implementation,* 102 KY. L. J. 777, 778 (2013) ("To improve the bill's effectiveness and keep

evaluating HB 463.[214] Another is a report put out by the Laura & John Arnold Foundation evaluating the adoption of their risk assessment tool, the PSA.[215]

Both reports are brief and show simply that the average detention and pretrial rearrest rates are lower in the period after the risk assessment change than they were in the period before.[216] (The Kentucky Pretrial Services report also claims that FTA rates were lowered.[217]) While these findings are often cited as evidence that risk assessment can jointly decrease both detention rates and crime, the articles provide little evidence that the changes cited come from the risk assessment. For instance, it is possible that there was a steady decline in both detention rates and rearrest that started long before the period of analysis and had nothing to do with risk assessment. However, there is a more fundamental reason why the statistics presented in these reports cannot be interpreted as an evaluation of risk assessment. Both reports were published very soon after the change they are analyzing and before all the cases in the sample were resolved.[218] The analysts do not correct for the fact that defendants whose cases were not yet resolved had, on average, less time

with the legislative intent, judicial discretion should be curtailed to prevent the dominance of subjective decision making.").

214. MINTON ET AL., *supra* note 213.

215. FIRST SIX MONTHS, *supra* note 175, at 1. This study has recently been removed from the Arnold Foundation's website but is on file with the author. Representatives of the Arnold Foundation explained that it was removed due to concerns about the quality of the data used in the report. *Research Report: Results from the First Six Months of the Public Safety Assessment – Court in Kentucky*, LAURA & JOHN ARNOLD FOUND. (Aug. 8, 2016), https://www.arnoldfoundation.org/research-report-results-first-six-months-public-safety-assessment-court-kentucky.

216. MARK HEYERLEY, KY. PRETRIAL SERVS., PRETRIAL REFORM IN KENTUCKY 6 (2013), https://university.pretrial.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=95c0fae5-fe2e-72e0-15a2-84ed28155d0a; FIRST SIX MONTHS, *supra* note 215, at 1.

217. HEYERLEY, *supra* note 216, at 6.

218. The publication date of HEYERLEY, *supra* note 216 is June 2012. The post–HB 463 period is the year from June 2011–June 2012. HEYERLEY, *supra* note 216, at 6. Thus, the post–HB 463 period includes many cases which have not yet been adjudicated. The publication date of FIRST SIX MONTHS, *supra* note 175 is July 2014. The post-PSA period extends from July–December 2013 while the comparison group includes cases from July 2009–July 2013. FIRST SIX MONTHS, *supra* note 175, at 1. Only 83% of the released defendants whose cases originated in the six-month post-PSA period were resolved by the date of the Arnold publication, compared with 97% of the pre-PSA cases. The report contains a footnote acknowledging that pretrial rearrest rates may rise since some cases remain open. In fact, the fraction of released defendants who were arrested pretrial rose an additional 2.5% since the publication of the report,

in which to be rearrested than defendants whose original arrest occurred earlier.[219] This artificially deflates the rearrest rate for defendants whose arrest occurred after the adoption of the risk assessment. In statistical terms, this is called "truncation bias," and it erroneously made it appear like risk assessment led to lower instances of misconduct.[220] Part IV of this Article provides evidence that neither the 2011 law nor the adoption of the PSA led to a lower rate of pretrial rearrest or FTA.[221]

It is not uncommon to find statistics from other jurisdictions cited as evidence that pretrial risk assessment led to a decrease in detention rates, FTAs, and crime, but the research supporting these claims are as tenuous—or more so—than the studies cited above. The Arnold Foundation released a report stating that the use of their risk assessment tool in Lucas County, Ohio, led to a doubling in the number of defendants granted non-financial release and a decrease in pretrial rearrest and FTA, but the one-page press release contains little detail besides that.[222] A court document shows that the pretrial detention rate actually increased in Lucas County after risk assessment was adopted.[223] Mecklenburg County, North Carolina is also supposed to have seen a dramatic drop in their jail population after adopting the

demonstrating that the PSA did not lead to a reduction in pretrial crime. For a discussion of the increase in pretrial arrests, see *infra* note 292 and accompanying text.

219. External pressures forced a rapid release of this report despite significant concerns about the data that were expressed by the head of Kentucky Pretrial Services. Telephone Interview with Tara Boh Blair, Chief Operations Officer, Ky. Pretrial Servs. (May 15, 2017).

220. The same error is responsible for the erroneous conclusion in HEYERLEY, *supra* note 216, at 6 that rates of non-appearance were lower after HB 463 than before. The Arnold Foundation report acknowledges in a footnote that the post-PSA rearrest and non-appearance rates may rise since some cases remained open. FIRST SIX MONTHS, *supra* note 175, at 2 n.2. However, in conversations with them, they expressed the opinion that the differences in results are mostly due to differences in how the data were pulled and processed.

221. The Arnold Foundation also released a report stating that non-financial release is up, and crime and FTAs are down in Lucas County, Ohio after implementing the PSA. *See New Data: Pretrial Risk Assessment Tool Works to Reduce Crime, Increase Court Appearances*, LAURA & JOHN ARNOLD FOUND. (Aug. 8, 2016), https://www.arnoldfoundation.org/new-data-pretrial-risk-assessment-tool-works-reduce-crime-increase-court-appearances [hereinafter LAURA & JOHN ARNOLD FOUND, *New Data*]. There are not enough details in the report to assess these claims. *See id.*

222. *See id.*

223. Notice of Filing Copy of Presentation Assessing Impact of Public Safety Assessment at 12 app., Jones v. Wittenberg, No. 3:70CV388, 2017 WL 1422345 (N.D. Ohio Apr. 21, 2017), https://thecrimereport.org/wp-content/uploads/2017/08/Lucas-County-court-filing.pdf.

Arnold Foundation's risk assessment, but the evidence purporting to support this consists entirely of slides taken from two PowerPoint presentations.[224] Multnomah County, Oregon is cited as a successful example of risk assessment leading not only to lower detention rates among juveniles, but also lower racial disparities in detention.[225] However, the authors of the study do not attribute the change to risk assessment per se.[226] A study in Virginia states that training pretrial officers in how to use a risk assessment tool led to increased release recommendations, increased release, and lower misconduct.[227] The study claims that agencies were randomly assigned to treatment and control groups, which suggests that it may be more rigorous than previous research.[228] However, the study was conducted by the same company that designed the risk tool (raising conflict of interest concerns) and did not provide enough detail to verify the reliability of the research design.[229]

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224. Both CRIMINAL JUSTICE POLICY PROGRAM, *supra* note 18, at 21 and JESSICA EAGLIN & DANYELLE SOLOMON, BRENNAN CTR. FOR JUSTICE, REDUCING RACIAL AND ETHNIC DISPARITIES IN JAILS 28 (2015), https://www.brennancenter.org/sites/default/files/publications/Racial%20Disparities%20Report%20062515.pdf state that risk assessment led to a drop in incarceration in Mecklenburg County, but PowerPoint slides are the only references cited in these papers that directly support this claim. *See* CRIMINAL JUSTICE POLICY PROGRAM, *supra* note 18, at 37 n.182; EAGLIN & SOLOMON, *supra*, at 52 n.91.

225. VINCENT SCHIRALDI & JASON ZIEDENBERG, JUSTICE POLICY INST., REDUCING DISPROPORTIONATE MINORITY CONFINEMENT: THE MULTNOMAH COUNTY, OREGON SUCCESS STORY AND ITS IMPLICATIONS 13–14 (2002), http://www.justicepolicy.org/uploads/justicepolicy/documents/multnomah.pdf.

226. *Id.* at 15–16 ("It is difficult to assess what any one detention reform strategy (alternatives to incarceration, objective risk assessments, expedited case processing, sanctions grid for VOPs) or explicit DMC reduction strategy (diversity training, additional public defender resources, staff diversification, data collection and research, new coalitions with other agencies and groups, diversification of the delivery system) made the difference in Multnomah.").

227. MONA J.E. DANNER ET AL., LUMINOSITY, INC., RISK-BASED PRETRIAL RELEASE RECOMMENDATION AND SUPERVISION GUIDELINES 1–2 (2015), https://www.dcjs.virginia.gov/sites/dcjs.virginia.gov/files/publications/corrections/risk-based-pretrial-release-recommendation-and-supervision-guidelines.pdf.

228. There were twenty-nine agencies randomized. *Id.* at 4. Presumably these agencies varied in size and were associated with different regions and regional practices. A typical RCT where randomization was conducted over a small number of groups would show evidence about the extent to which outcomes differed across treatment and control groups before the experimental intervention occurred. If the outcomes differed across treatment and control before the intervention, then post-intervention differences in outcomes cannot be attributed to the intervention.

229. *See* DANNER ET AL., *supra* note 227, at 3–4.

New Jersey has recently implemented dramatic reform to its pretrial system.[230] They shifted from a traditional money bail system to one in which detention is only authorized after a thorough hearing with evidence, discovery, and counsel present.[231] Risk assessment is used to help determine the level of pretrial supervision and to suggest candidates for pretrial custody.[232] New Jersey has seen a dramatic decline in the rates of pretrial detention since bail reform was implemented.[233] The impact on pretrial crime and FTAs is still unknown.[234]

In sum, there is a sore lack of research on the impacts of risk assessment in practice. There is no evidence on how the use of risk assessment affects racial disparities. There is no evidence that the adoption of risk assessment has led to dramatic improvements in either incarceration rates or crime without adversely affecting the other margin. The research on whether it should *theoretically* (due to improvements in predictive accuracy) is far from definitive. Nonetheless, it is a broadly held belief that the adoption of risk assessment tools will lead to clear improvements in the efficiency of criminal justice.[235]

III. THE IMPACTS OF PRETRIAL RISK ASSESSMENT IN KENTUCKY

This Part provides some of the first rigorous empirical evidence on the impacts of pretrial risk assessment in practice. It provides important information about risk assessment's effects

230. Hon. Glenn A. Grant, Acting Administrative Director of the Courts, Remarks Before the Senate Budget and Appropriations Committee 2 (May 4, 2017).

231. *Id.* at 3.

232. *Id.* at 3–4.

233. Joe Hernandez, *N.J.'s Jail Population Dropped 10 Percent in Two Months After It Scrapped Cash Bail*, WHYY (Mar. 13, 2017), https://whyy.org/articles/njs-jail-population-dropped-10-percent-in-two-months-after-it-scrapped-cash-bail.

234. *See id.*

235. *See, e.g.*, PICARD-FRITSCHE ET AL., *supra* note 119, at 22 ("[T]here is a growing professional consensus that the careful and ethical implementation of risk assessment tools can facilitate improved criminal justice outcomes."); Anne Milgram et al., *Pretrial Risk Assessment: Improving Public Safety and Fairness in Pretrial Decision Making*, 27 FED. SENT'G REP. 216, 219 (2015) ("[J]udges' use of [risk assessment] instruments has helped them make pretrial release decisions that have reduced pretrial crime, kept dangerous offenders off our streets, and reduced the number of low-risk defendants detained before trial."); Skeem & Lowenkamp, *supra* note 171, at 680 ("One way to begin unwinding mass incarceration without compromising public safety is to use risk assessment instruments in sentencing and corrections.").

in a state that has been held up as a leader in pretrial reform, as well as insight about a risk assessment tool that has been widely adopted in other jurisdictions. It also serves as an empirical case study through which to explore, as is done in Part IV, the myriad ways that the impacts of risk assessment in practice may be different, and more complicated, than previously thought. Such differences underline the importance of constantly evaluating new methods: a habit that is too rarely present in criminal justice despite the lip service paid to evidence-based practices.

A. OVERVIEW OF PRETRIAL RISK ASSESSMENT IN KENTUCKY

Kentucky is noted as an early adopter of pretrial risk assessment tools and is often cited as an example for other jurisdictions to follow.[236] California's bail reform efforts have been modeled after Kentucky's system.[237] An amicus brief signed by sixty-seven current and former district and state's attorneys, as well as other high-ranking criminal justice officials, described Kentucky's use of pretrial risk assessment as "impressive" and "very effective."[238] The Arnold Foundation's risk tool, the PSA, was developed and piloted in Kentucky.[239] It has since been adopted in forty jurisdictions including three entire states, three of the largest cities, and two of the largest jail systems.[240]

Kentucky has had an innovative pretrial system for many years. It is known as one of only four states that have outlawed the commercial bail industry.[241] It has used some sort of risk assessment instrument since 1976.[242] Whereas most states either lack pretrial services or have locally-organized agencies in only the largest cities, Kentucky's pretrial services operate statewide.[243] They have earned both national and local respect

236. *See supra* note 18 (demonstrating that Kentucky's use of pretrial risk assessments is an example for other jurisdictions).

237. Young, *supra* note 19.

238. *See* Brief of Current and Former District and State's Attorneys, State' Attorneys General, United States Attorneys, Assistant United States Attorneys, and Department of Justice Officials as Amici Curiae supporting Plaintiffs-Appellees at 9, 10 n.8, ODonnell v. Harris Cty., 227 F. Supp. 3d 706 (S.D. Tex. 2016) (No. H-16-1414), *aff'd in part, rev'd in part*, 892 F.3d 147 (5th Cir. 2018).

239. LAURA & JOHN ARNOLD FOUND., *New Data*, *supra* note 221, at 3, 5.

240. *See supra* note 40 and accompanying text.

241. JUSTICE POLICY INST., FOR BETTER OR FOR PROFIT: HOW THE BAIL BONDING INDUSTRY STANDS IN THE WAY OF FAIR AND EFFECTIVE PRETRIAL JUSTICE 40 (2012), http://www.justicepolicy.org/uploads/justicepolicy/documents/_for_better_or_for_profit_.pdf.

242. HEYERLEY, *supra* note 216, at 10.

243. *Id.* at 3.

for their adoption of evidence-based practices, their low FTA and pretrial crime rates, and their rigorous data collection.[244]

In 2011, Kentucky passed a major criminal justice reform bill: House Bill 463.[245] As far as pretrial issues are concerned, the "most significant advancement [of HB 463] is the mandatory use of a 'research-based, validated assessment tool' to measure a defendant's risk of flight or of posing a risk to the public."[246] Before HB 463, use of the pretrial risk assessment tool was optional.[247] Judges who were not interested in the tool were not required to look at it, and many did not use it at all.[248] HB 463 made consideration of the risk assessment a mandatory part of determining bond.[249] It delineated a specific action-directive for low- and moderate-risk defendants: immediate release without cash bail.[250] Defendants were granted a $100-per-day credit toward the bail amount for each day they spend in jail,[251] the bail amount was capped at the maximum fine for crimes that were punishable by fine only,[252] and nonmonetary release was recommended for defendants charged with crimes where the presumptive punishment is probation.[253] However, nowhere in HB 463 was judicial discretion limited. In a Kentucky Supreme Court order that clarified how judges should respond to HB 463, this

244. *See* Jamie Neal, *State Pretrial Services Leader Receives 2012 Public Advocate Award*, KY. CT. JUST. (Oct. 2, 2012) http://courts.ky.gov/pages/newsroom.aspx?viewMode=PressRelease&pressReleaseGUID=%7BD15D83C0-10F7-4E92-9CB1-A775C14F2DCC%7D. The head of Kentucky Pretrial Services received Kentucky's 2012 Public Advocate Award for her work promoting pretrial justice. *Id.*

245. Public Safety and Offender Accountability Act, ch. 2, 2011 Ky. Acts 5.

246. Damon Preston, *Changes in Criminal Law or Criminal Procedure in HB 463*, *in* CRIMINAL LAW REFORM: THE FIRST YEAR OF HB 463, at 5 (2012), https://cdn.ymaws.com/www.kybar.org/resource/resmgr/2012_Convention_Files/ac2012_2.pdf.

247. Telephone Interview with Tara Boh Blair, Chief Operations Officer, Ky. Pretrial Servs. (May 15, 2017).

248. *Id.*

249. KY. REV. STAT. ANN. § 431.066(2) (West 2018) ("In making [the pretrial release and bail] determination, the court shall consider the pretrial risk assessment . . . .").

250. *Id.* § 431.066(3)–(4).

251. *Id.* § 431.066(5)(a).

252. *Id.* § 431.525(2).

253. *Id.* § 218A.135(1).

was made abundantly clear, stating, "Nothing in these guidelines shall be construed to limit the court's discretion as to whether or not to grant pretrial release to a defendant."[254]

When the Kentucky Legislature passed HB 463, Kentucky used a risk assessment algorithm that was developed internally by their pretrial services agency.[255] Like most pretrial risk assessment tools in use,[256] it was a checklist-style instrument that put heavy weight on criminal history and prior FTAs.[257] It also included several non-criminal justice inputs, such as whether the defendant had stable employment, housing, and a reference willing to attend court or co-sign the bond.[258] It was validated (i.e., shown to be predictive of pretrial rearrest and FTA) in a 2010 study conducted by the JFA Institute.[259]

In July of 2013, Kentucky adopted a new risk assessment tool: the Public Safety Assessment (PSA).[260] This tool was developed by the Arnold Foundation using both Kentucky data and a large dataset on pretrial releases in more than 300 jurisdictions.[261] The PSA evaluates risk along three dimensions: risk of FTA, risk of new arrest, and risk of new arrest for a violent

254. ORDER APPROVING JUDICIAL GUIDELINES FOR PRETRIAL RELEASE AND MONITORED RELEASE § 11 (Ky. 2011), http://courts.ky.gov/courts/supreme/Rules_Procedures/201112.pdf. In addition to changes to the pretrial system, HB 463 made a number of post-conviction changes. *See* NAT'L CONFERENCE OF STATE LEGISLATURES, PUBLIC SAFETY AND OFFENDER ACCOUNTABILITY ACT (HB 463): JUSTICE REINVESTMENT SUMMARY 5–16 (2012), http://www.ncsl.org/documents/nalfo/JusticeReinvestmentMikeMullins.pdf. Risk assessment tools were made mandatory in the pre-sentencing report, for determining supervision levels among defendants on probation or parole, and in determining parole suitability. *Id.* at 6. Other changes included mandatory re-entry supervision, a speeding up of the parole process, and reduced penalties for drug possession and minor drug trafficking. *Id.* at 7–8, 12–13.

255. Telephone Interview with Tara Boh Blair, Chief Operations Officer, Ky. Pretrial Servs. (May 15, 2017).

256. For a summary of common pretrial risk assessment tools and their inputs, see Mayson, *supra* note 65, at 507–18.

257. JAMES AUSTIN ET AL., JFA INST., KENTUCKY PRETRIAL RISK ASSESSMENT INSTRUMENT VALIDATION 13 tbl.11 (2010), https://university.pretrial.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=60b06cf8-f956-d6f1-d07f-a426f0465846.

258. *Id.* at 9 tbl.6.

259. *Id.* at 3.

260. *Developing a National Model for Pretrial Risk*, LAURA & JOHN ARNOLD FOUND., at 5 (Nov. 2013), https://www.arnoldfoundation.org/wp-content/uploads/2014/02/LJAF-research-summary_PSA-Court_4_1.pdf.

261. *Id.* at 3.

crime.[262] The defendant's overall risk score is a combination of the risk of new arrest and the risk of FTA;[263] a flag for being at high risk of violent crime was added in 2014.[264] The inputs for the PSA are similar to those used in Kentucky's previous risk tool,[265] although the weights are different and the non-criminal-justice items were eliminated.[266]

Kentucky was the first jurisdiction in which courts piloted the PSA;[267] it is now in use in approximately forty jurisdictions throughout the United States, including the states of Arizona and New Jersey.[268] Throughout 2013 and 2014, the Arnold Foundation continued to do research on their tool and made several modifications.[269] In July of 2014 Kentucky switched to a modified version of the PSA: one that is currently in use in jurisdictions around the country.[270] Age at arrest was added as an input to the new criminal activity score, and the weighting was adjusted slightly.[271]

The risk assessment is conducted by the pretrial services officer right after the defendant is arrested and booked into jail.[272] Using information gathered from the interview as well as the defendant's criminal records, the pretrial officer calculates the defendant's risk score and presents it to the judge during the bail hearing.[273] In Kentucky, the bail hearing is supposed to occur

262. *Id.* at 4. Lauryn Goulding provides compelling arguments for why it is important to predict flight risk and danger separately. Lauryn P. Goulding, *Disentangling Flight Risk from Dangerousness*, 2016 BYU L. REV. 837 (2016).

263. Based on internal documentation provided by the Kentucky Administrative Office of the Courts.

264. FIRST SIX MONTHS, *supra* note 175, at 3.

265. The inputs include: pending charge, prior misdemeanor conviction, prior felony conviction, prior FTAs, prior violent conviction, prior incarceration, violent current offense, violent current offense for someone under twenty-one. *Developing a National Model for Pretrial Risk Assessment*, *supra* note 260, at 4.

266. *Id.*

267. *Id.* at 3.

268. *Pretrial Justice*, LAURA & JOHN FOUND., http://www.arnoldfoundation.org/initiative/criminal-justice/pretrial-justice (last visited Oct. 22, 2018).

269. Based on documentation provided by Kentucky Pretrial Services (on file with author).

270. *Id.*

271. *Id.*

272. *Virtual Tour of Kentucky Pretrial Services*, KY. CT. JUST., http://courts.ky.gov/courtprograms/pretrialservices/Pages/virtualtour.aspx (last visited Oct. 14, 2018) (providing detailed information about pretrial procedure in Kentucky).

273. *Id.*

within 24 hours of booking.[274] In many Kentucky counties, this occurs via a phone call between the pretrial officer and the judge.[275] The pretrial officer informs the judge of the details of the alleged offense as well as the risk level of the defendant.[276] The judge decides a bail amount, supervision status, and any other conditions of release.[277] If the defendant does not post bail within twenty-four hours, the pretrial officer notifies the court at which point the judge can choose to change the bond.[278] If the judge does not alter the bond, or if the defendant still does not post, the defendant usually must wait for the first appearance to have the bond reconsidered.[279]

B. Description of the Data

The data used in this study was provided by Kentucky's Administrative Office of the Courts and covers all defendants who were arrested and booked into jail between July 1, 2009 and July 1, 2016. The data was extracted in May 2017 from records maintained by Kentucky Pretrial Services and Kentucky courts. The original data set contains more than 1.5 million criminal cases. The analysis presented in this Article includes only cases that originate with an arrest for a new criminal offense. Cases where the original arrest was for a probation or parole violation, an FTA, or a violation of conditions of pretrial release are omitted, leaving 1,030,732 criminal cases.[280]

Table 1 presents a selection of statistics describing the sample used for analysis. The first column refers to misdemeanor cases (65% of the sample) and the middle column refers to felony cases. For reference, the rightmost column provides statistics

274. Telephone Interview with Tara Boh Blair, Chief Operations Officer, Ky. Pretrial Services (May 15, 2017).

275. *Virtual Tour of Kentucky Pretrial Services*, *supra* note 272.

276. *Id.*

277. *Id.*

278. *Id.*

279. *Id.*

280. The data used in this study, originally collected from the Kentucky Pretrial Services and Kentucky courts, is on file with the author. While bail decisions for violation and FTA cases are also interesting, there are good reasons why they may be different than bail decisions for an original arrest; including that both groups would complicate the interpretation of results. All of the main results, however, are still found when analyzing the full sample of cases.

from a national sample of felony defendants in large urban counties.[281] While this is the most expansive data set publicly available to describe court processes nationally, it is not the most obvious comparison group since it is largely urban and Kentucky is largely rural.[282] Nonetheless, some differences and similarities are worth noting. First, Kentucky defendants are more likely to be white than those in large urban counties. Although the fraction of felony defendants facing violent charges is much lower in Kentucky, the fraction who remain detained until their case is disposed is similar to the national average in large urban counties. The fraction of felony defendants who are released within a day is slightly lower in Kentucky and the fraction that is granted non-financial release is considerably lower: less than half of the non-financial release rate in urban counties. Misdemeanants have a slightly higher release rate than felony defendants, but still almost a quarter are detained until disposition and a third spend more than one day in jail.

Bail amounts for defendants who are required to pay bond are lower in Kentucky as well, possibly because there are no bail bondsmen to loan money for bond. The fraction of released defendants with an FTA or pretrial rearrest are both lower in Kentucky than the national urban average.

Table 1 - Comparing Kentucky to a National Sample

Characteristic	**Kentucky misdemeanor**	**Kentucky felony**	**National sample felony**
Male	70%	73%	83%
Age	34	33	32
Black	16%	19%	45%
White	80%	77%	30%
Hispanic	3.6%	1.7%	24%
Has Violent Felony Charge	NA	10%	25%

281. REAVES, *supra* note 31.

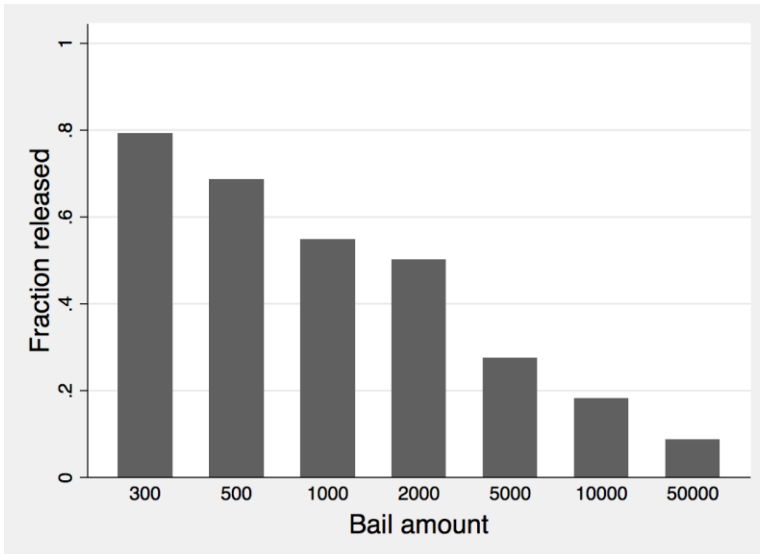
282. *E.g.*, *Urban Percentage of the Population for States, Historical*, IOWA ST. U.: IOWA COMMUNITY INDICATORS PROGRAM, https://www.icip.iastate.edu/tables/population/urban-pct-states (last visited Oct. 14, 2018) (reporting that in the results of the 2010 census, the urban percentage of the population in Kentucky was 58.4% while the same figure for the United States as a whole was 80.7%).

Prior Felony Conviction	33%	46%	43%
Release Prior to Disposition	77%	62%	62%
Release Within a Day	66%	29%	31%
Non-Financial Release	37%	16%	40%
Median Bail for Those Not Given Non-Financial Release	$1000	$5000	$10000
Median Bail for Detainees	$1000	$10000	$25000
Fraction of Releasees with at Least One FTA	14%	10%	17%
Fraction of Releasees Who Were Rearrested Pretrial	10%	13%	16%
Fraction of Defendants with at Least One FTA	10%	6%	NA
Fraction of Defendants Who Were Rearrested Pretrial	8%	8%	NA

As in other jurisdictions, a large fraction of Kentucky defendants who are required to pay cash bond to secure their release fail to post within three days of the bail hearing. Figure 1 shows the fraction of defendants with a given amount of bail who are released within three days. Around 20% of defendants with bail set at $500, and half of those with bail set at $2000, remain in jail for more than three days beyond their booking date.[283]

283. The provision in HB 463 that granted $100 per day in bail credit was routinely ignored. According to the author's own calculations, about a third of all judges never allowed this for any defendants. Only about 3% of defendants with cash bail set in 2015 received bail credit. By Kentucky statute, judges are allowed to refuse bail credit to defendants based on flight risk or danger. KY. REV. STAT. ANN. § 431.066(5)(b)(2) (West 2018).

Figure 1 - Fraction Released at Various Levels of Cash Bail



Note: Each bar indicates the fraction of defendants who are released within three days among those who had monetary bail set at the amount shown.

C. HB 463 Led to an Increased Use of Risk Assessment (And an Overview of Empirical Methods)

This Section has two goals. First, it seeks to demonstrate that Kentucky's 2011 law mandating risk assessment resulted in its increased use. Second, it explains the empirical methodology used throughout the remainder of Part III. These two goals are combined because it can be useful to discuss methods with the aid of an example, as opposed to discussing them abstractly.

The empirical methods used in this paper consist mostly of graphical time-trend analysis: a visual representation of trends and changes to pretrial outcomes. The focus of the analysis is on sharp changes that occurred right around HB 463's enactment and Kentucky's adoption of the PSA. A sharp, discrete change to pretrial practices or outcomes whose timing coincides exactly with the implementation of a new law or a new risk tool can likely be attributed to that law or tool. The causes of longer term trends are harder to identify, and thus are not a primary focus of this article. While formal tests are not reported, all of the changes that this Article describes as occurring before/after HB 463 and before/after the PSA are statistically significant. With more than a million criminal cases, any change that is visible in a graphical time-trend analysis will also be highly statistically significant.

Demonstrating that judges increased their use of the risk assessment instrument when HB 463 made it mandatory requires showing that bail practices changed in accordance with the action-directives associated with each risk classification. In other words, it requires showing that judges became more lenient with defendants classified as low risk and stricter with defendants classified as high risk.

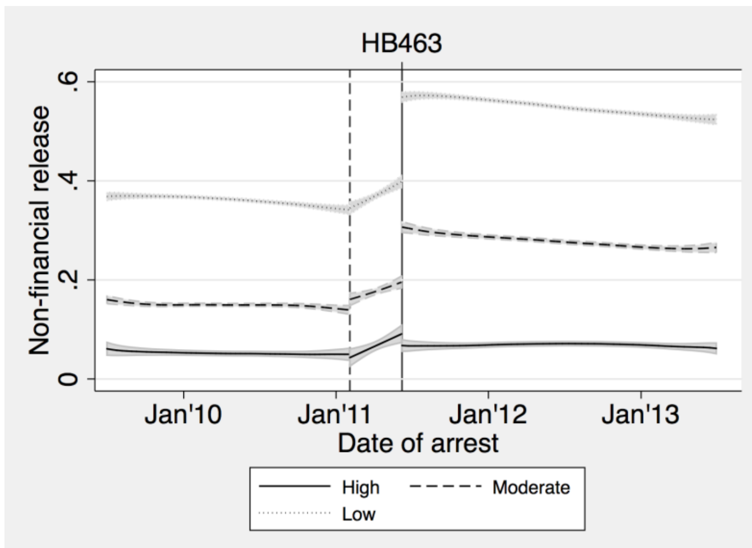
Figure 2 shows a time trend in the fraction of defendants in each of the three risk groups who are granted non-financial release at the first bail hearing.[284] The horizontal axis indicates the booking date and the vertical axis is the fraction of defendants granted a non-financial release at the first bail hearing. The dashed vertical line indicates the date that HB 463 was introduced as legislation and the solid vertical line indicates the date it was implemented. The horizontal lines are estimates of the time trend in non-financial release for defendants in each of the three risk classification groups. The time trends are estimated using local linear smoothing with a bandwidth of 120 days.[285] The local linear smoothing is employed because on any given day the actual number of defendants who are granted non-financial release can be higher or lower than expected due to idiosyncratic factors. This idiosyncratic fluctuation, often referred to as noise,

284. The unit of analysis in this, and in the remainder of this Article, is a case. For conciseness, however, the time trends are described as referring to defendants, not cases. Using more precise language, Figure 2 shows a time trend in the fraction of cases in which defendants received non-financial release.

285. Details about this technique can be found in many places. *See, e.g.*, STATA SOFTWARE, lpoly — Kernel-weighted Local Polynomial Smoothing, at 4–8, http://www.stata.com/manuals13/rlpoly.pdf (last visited Oct. 22, 2018) (the Stata manual for the command "lpoly").

is visually distracting, and so time trend graphs will almost always use some method of smoothing to make the trend easier to see.

Figure 2 - How HB 463 Affected Non-financial Release Rates for Defendants at Different Risk Levels



Note: The top, middle, and bottom line indicate the fraction of low, moderate, and high-risk defendants who are granted non-financial release. The dashed vertical line is the date that HB 463 was introduced as legislation; the solid line indicates the date it was implemented.

Each point on the dotted line represents the fraction of low-risk defendants who are expected to get a non-financial release on a particular date, and so forth for the other risk groups. The shading around each line represents the 95% confidence interval—a measure of uncertainty—for the time trend. There are cuts in the smoothing of the time trend at times when one might expect sharp changes to the trend: in Figure 2 there is a cut at the date when legislation was introduced and another at the date it was implemented. The cuts function by limiting the data that is used to build the trend line to only one side of the cut point. In other words, the trend line for defendants who were booked right before a cut date will be estimated using only data from defendants booked before the cut date, and the same for defendants booked right after a cut date.[286]

Figure 2 shows a dramatic increase in the fraction of low-risk defendants who were granted non-financial release around the time of HB 463. Before the bill was introduced only about 35% of low risk defendants were granted non-financial release, but after its implementation that number rose to 57%: a 22 percentage point increase, or a 63% increase relative to the earlier mean. The dashed line shows a 16 percentage point increase in non-financial releases for moderate-risk defendants and the solid line shows that the fraction of high-risk defendants receiving non-financial release remained essentially the same. This figure shows that HB 463 resulted in a marked change in practices, which corresponded closely with the classifications of the risk assessment.

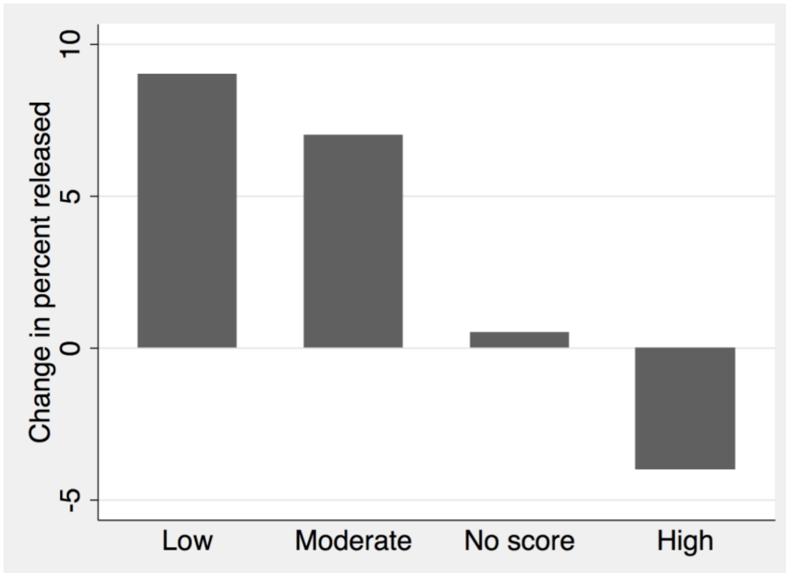
Overall, HB 463 led to a sizeable decrease in bail for defendants who were ranked as low risk, a more moderate decrease in bail for defendants ranked as moderate risk, and an increase in bail for defendants ranked high risk, as shown in

Release rates changed accordingly. Figure 3 shows the changes in the fraction of defendants who are released within three days of the bail hearing before and after HB 463.[287] HB 463 led to a 9 percentage point increase in releases for low-risk defendants, a 7 percentage point increase in releases for moderate-risk defendants, and a 4 percentage point decrease in releases for high-risk defendants. Interestingly, there was no change in the release rate for defendants who did not receive a risk score due to difficulties in verifying key inputs. This further supports the claim that the change in bail setting practices after HB 463 is due to the information provided by the risk assessment.

286. The Appendix provides an alternative method of graphing time trends—binned scatter plots—which demonstrates each of the key empirical claims made in this Article without the use of smoothing or cuts.

287. Defendants who were detained until the case was disposed, but for whom disposition occurred within three days of the bail hearing, are counted as released within three days.

Figure 3 - The Impact that HB 463 Had on the Release Rate of Defendants with Various Risk Classifications



Note: This figure shows the change in release rates between the two months before HB 463 was introduced and the two months after it was implemented. The change in release rates is shown for defendants who were rated low, moderate, or high risk, as well as for defendants who did not receive a risk score. A positive change means that defendants were more likely to be released after HB 463 than they were before.

Table 2 - Impacts of HB 463 for Low-, Moderate-, and High-risk Defendants

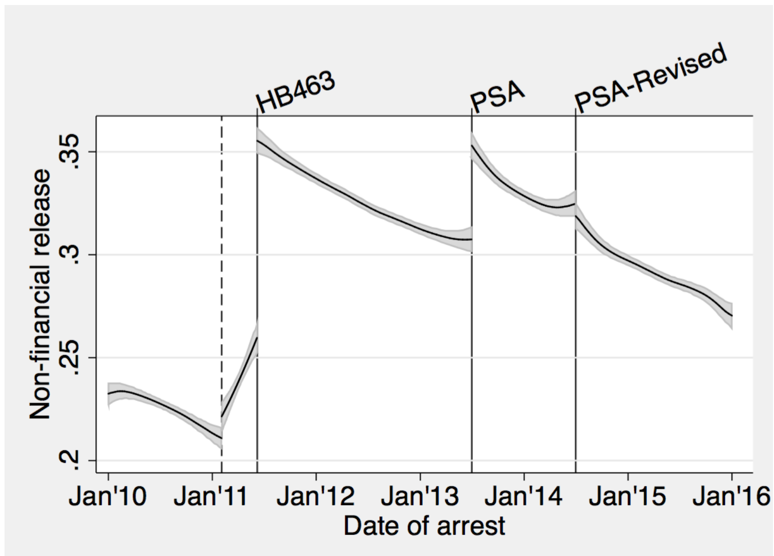
Outcome Measure	Group	Before HB 463	After HB 463	Percentage Point Difference
Non-Financial Bond	Low risk	35%	57%	+22
	Moderate risk	15%	31%	+16
	High risk	5%	7%	+2
Low Cash Bail ($1000 or less)	Low risk	23%	14%	-9
	Moderate risk	29%	22%	-7
	High risk	32%	25%	-7
Moderate-High Cash Bail (greater than $2500)	Low risk	24%	18%	-6
	Moderate risk	35%	31%	-4
	High risk	45%	48%	+3
Release Within 3 Days of Booking	Low risk	73%	81%	+9
	Moderate risk	50%	57%	+7
	High risk	34%	30%	-4

D. Risk Assessment's Impact on Bond Setting and Release

While the previous section focused on differing impacts for defendants with different risk classifications, this section shows the overall effect on all defendants. Specifically, this section analyzes the impact that HB 463 and the adoption of the PSA had on bond setting and release.

Figure 4 shows a time trend in the fraction of all defendants granted non-financial release at the first bail hearing. From left to right, the vertical lines indicate the date when HB 463 was introduced and implemented, and the date that the PSA was adopted and revised to the version that is now broadly used around the country.

Figure 4 - How HB 463 and the PSA Impacted the Likelihood of Non-financial Release



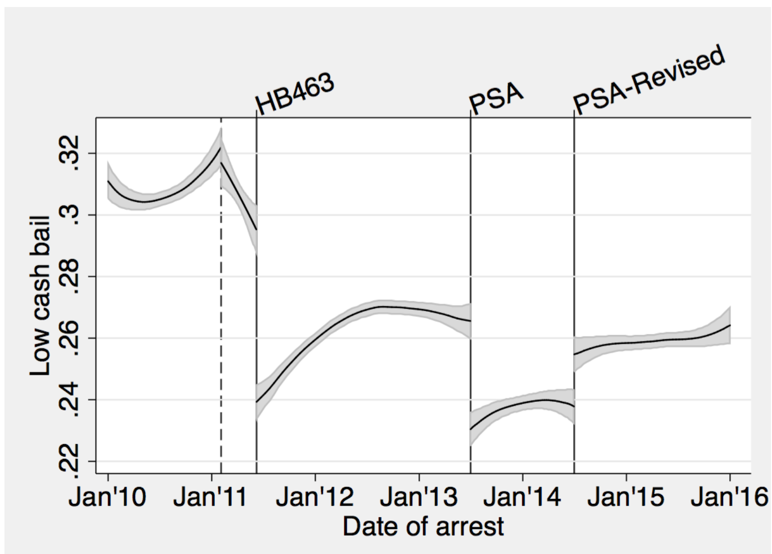
Note: This figure shows the fraction of defendants who are granted non-financial release over time. From left to right, the vertical lines indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

Figure 4 shows a sharp jump up in the fraction of defendants who are granted non-financial release coinciding exactly with HB 463. The increase begins as soon as the bill was introduced (it passed almost unanimously)[288] and accelerates at the time of implementation. In total, there is a 13 percentage point jump in non-financial releases from January to June of 2011. Almost immediately, however, the rate of non-financial releases begins to fall. It declined steadily until July 2013, when the PSA was adopted. There is a smaller spike upwards after the adoption of the PSA; then the non-financial release rate declines again after that, with virtually no change as the PSA is revised. By January of 2016, more than half of the increase in non-financial releases resulting from HB 463 had disappeared.

288. *See* HEYERLY, *supra* note 216, at 4.

Figure 5 shows the fraction of defendants given a low cash bond (requiring a cash payment of $1000 or less) at the first bail hearing. Interestingly, we see almost the exact inverse of the pattern in Figure 4. HB 463 results in a sharp *drop* in the fraction of defendants receiving low cash bail, an *increase* over time as practices move back toward their previous state, a small *jump down* in low cash bail around the adoption of the PSA, and an *increase* after that. This suggests that judges responded to the risk assessment changes analyzed in this Article by substituting non-financial release for low-cash bail. As time went on, however, they returned to their previous bail setting practices.

Figure 5 - How HB 463 and the PSA Impacted the Use of Low Cash Bail



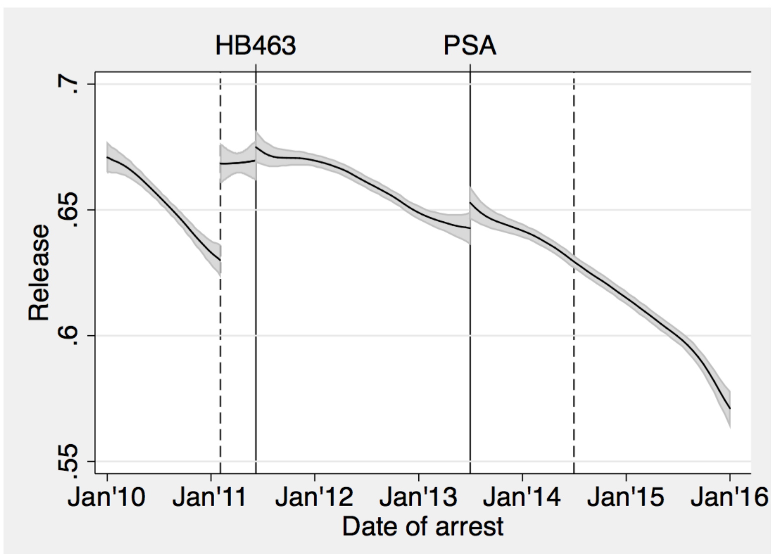
Note: This figure shows the fraction of defendants who are given bail of $1000 or less. From left to right, the vertical lines indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

Figure 6 shows a time trend in the fraction of defendants who are released within three days of booking.[289] For visual simplicity, and because there are very little changes that occur

289. About 5% of defendants have a holder, which decreases the release rate somewhat.

around that time, there is no cut in the time trend estimation at the time the PSA is revised. As can be seen in Figure 6, neither HB 463 nor the PSA has a big effect on the release rate. HB 463 led to only a 4 percentage point increase in the fraction of defendants released within three days of booking, and the adoption of the PSA led to a barely perceptible 1 percentage point increase in releases. It appears that most of the defendants granted a non-financial release as a result of these changes would have gotten out on a low cash bond regardless. Moreover, the small increase in releases was short-lived: by 2015, the release rate was lower than it had been before HB 463.

Figure 6 - How HB 463 and the PSA Impacted the Likelihood of Being Released Within Three Days of Booking

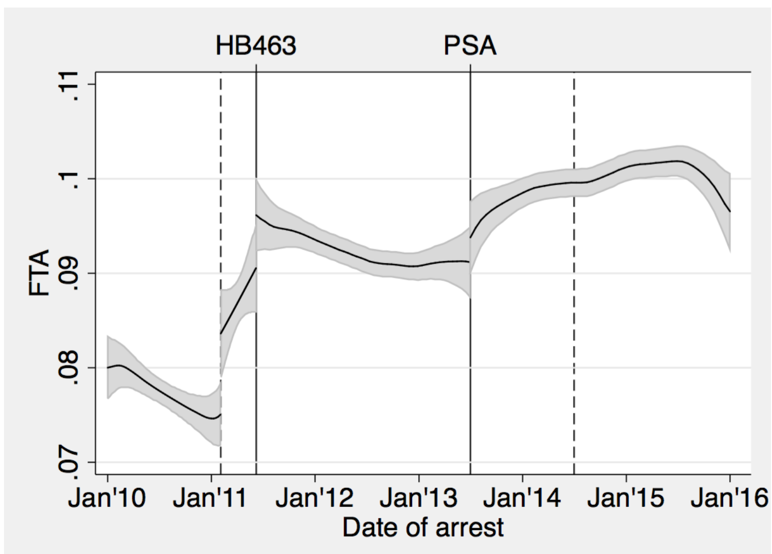


Note: This figure shows the fraction of defendants who are released within three days of booking. From left to right, the vertical lines indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

E. Risk Assessment's Impacts on Pretrial Misconduct

The small increase in releases as a result of HB 463 was accompanied by an increase in the likelihood that defendants would fail to appear in court. Figure 7 shows a sharp jump up in the FTA rate (defined as the fraction of all defendants who fail to appear for at least one court date) from before the legislation was introduced to after the new law was implemented. The size of the increase—about 3 percentage point—was not large in and of itself, but it is large relative to the base level: about a 40% increase over the mean. The introduction of the PSA did not lead to a decline in FTAs. If anything, the FTA rate is slightly higher after the PSA was adopted than before. This does not necessarily reflect on the PSA, however, as there is no sharp change in FTAs that coincides with the date that the PSA was adopted. The drift upward in FTAs during that time period could have been caused by some other factor.

Figure 7 - How HB 463 and the PSA Impacted the Likelihood a Defendant Would have at Least One FTA



Note: This figure shows the fraction of defendants who fail to appear in court at least once. From left to right, the vertical lines indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

Figure 8 shows a time trend in the fraction of all defendants who were arrested for a new offense during the pretrial period.[290] The graph shows an increase in rearrests around the time of HB 463. The increase is less of a stark and indisputable break in

290. The pretrial rearrest rate captures only arrests that are for new crimes, not arrests for violation of court orders or FTAs.

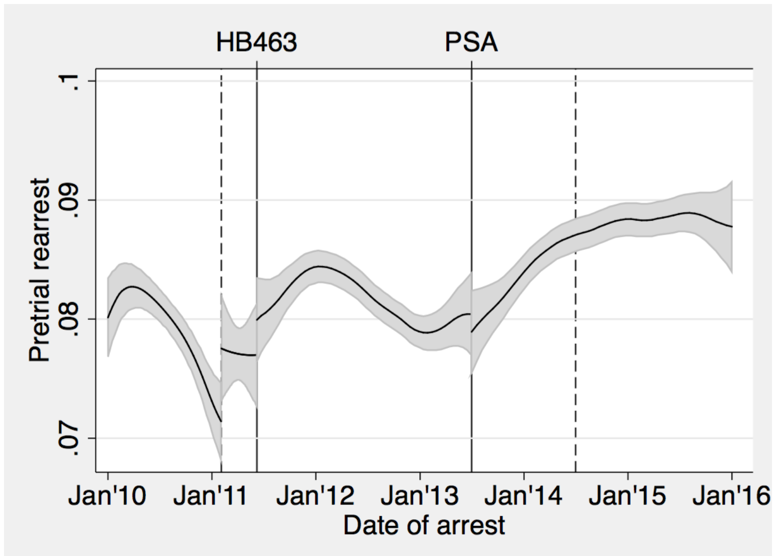
trend than was seen for FTAs in Figure 7. Inferring that HB 463 led to an increase in rearrests requires inferring that the drop in rearrests right before the introduction of the legislation was indicative of a meaningful change in trend that would have continued in the absence of the law. One could also argue that the drop down in rearrests toward the end of 2010 was just an idiosyncratic fluctuation in the rearrest rate, and the rise after the legislation was introduced was simply more idiosyncratic fluctuation. Alternative analysis, shown in the Appendix, suggests that the former interpretation is more likely.[291] Regardless, it is clear that the increased use of risk assessments as a result of HB 463 did not result in a decline in the pretrial rearrest rate.

There is no sharp change in the pretrial rearrest rate around either the adoption or modification of the PSA. The pretrial rearrest rate is slightly higher after the adoption of the PSA, but this appears to be part of a general upward drift in the pretrial rearrest rate and thus not likely to be due to the change in risk assessment tools.[292]

291. A post-HB 463 pretrial rearrest increase can also be seen using an alternative measure of rearrest, and in a sub-sample of non-drug felony defendants.

292. The Arnold Foundation report that claimed that the PSA led to lower rates of pretrial rearrest, FIRST SIX MONTHS, *supra* note 175, used a slightly different sample (all cases, not just cases that began with an arrest for a new offense) and a different measure (the fraction of released defendants with a pretrial arrest, not the fraction of all defendants with a pretrial rearrest). This is not the cause of the disparity between their results and those shown in this Article. Using their methods, this author was able to replicate their findings and show that the post-PSA pretrial rearrest rate rose from 8.5% at the time that their report was published to 11% once all cases had resolved. *See supra* note 218 and accompanying text (providing more discussion about the differences in results).

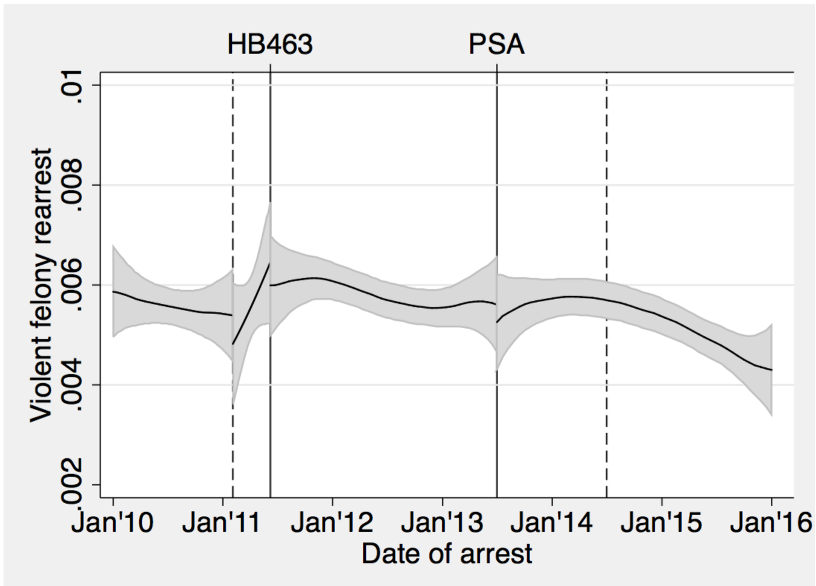
Figure 8 - How HB 463 and the PSA Impacted the Likelihood a Defendant Would be Arrested Pretrial for a New Offense



Note: This figure shows the fraction of defendants who are arrested for a new offense during the pretrial period. From left to right, the vertical lines indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

Figure 9 shows another important pretrial outcome: the fraction of defendants who are rearrested for a violent felony pretrial. There are no visually discernible changes in the violent felony rearrest rate occurring as a result of either HB 463 or the adoption of the PSA. Furthermore, this rate is very low. Less than one percent of all defendants are rearrested for a violent felony (murder, non-negligible manslaughter, forcible rape, robbery, or aggravated assault) during the pretrial period.

Figure 9 – How HB 463 and the PSA Impacted the Likelihood a Defendant Would be Rearrested Pretrial for a Violent Felony Offense



Note: This figure shows the fraction of defendants who are arrested for a violent felony during the pretrial period. From left to right, the vertical lines in each chart indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

The changes that were shown graphically in this Section are summarized in Table 3. The left-most numerical column shows outcomes for all defendants booked during the two months before HB 463 legislation was introduced: December 2010 and January 2011. The next column shows outcomes for all defendants booked in the two months after HB 463 was implemented: July and August of 2011. The final two columns show the two-month averages before and after the adoption of the PSA: May and June of 2013 and July and August of 2013.

Table 3 - Impacts of HB 463 and PSA for All Defendants

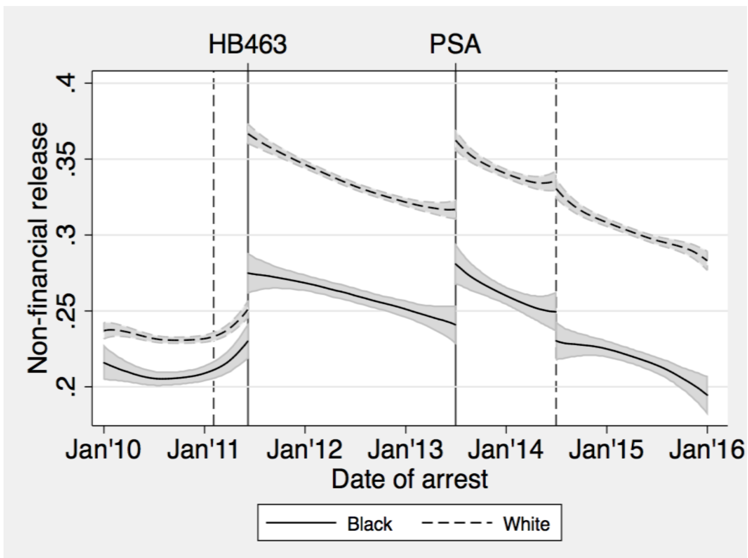
Outcome	Before HB 463	After HB 463	Before PSA 1	After PSA 1
Non-Financial Release Within 3 Days	21%	34%	31%	35%
Low Cash Bail ($1000 or Less)	32%	25%	26%	23%
Release Within 3 Days	63%	67%	64%	65%
FTA	7.6%	9.6%	9%	9.4%
Pretrial Rearrest	7.3%	8%	8%	8%
Violent Rearrest Pretrial	0.52%	0.59%	0.56%	0.52%

The Appendix provides several figures to demonstrate that the results presented in Parts II.D and II.E are robust to alternative specifications. In particular, the Appendix shows that the key results are not caused by changes in the types of defendants who are arrested, are robust to alternative methods of measuring pretrial rearrest and FTA, do not depend on specific choices regarding smoothing and cut points, and are prevalent among a group of defendants who are least likely to be affected by other non-risk-assessment related aspects of HB 463.

F. RACIAL AND REGIONAL DISPARITIES IN BOND AND RELEASE

This Section evaluates whether risk assessment affected racial disparities in the likelihood that a defendant is granted non-financial release or is otherwise released within three days of booking. Figure 10 shows time trends in the fraction of white defendants who are granted non-financial release (the dashed line) and the fraction of black defendants who are granted non-financial release (the solid line). Relative to black defendants, white defendants are more likely to be granted non-financial release throughout the entire time period of the sample (This could be due to racial bias, but it could also be due to differences in the charged offense, criminal history, etc.). There was an increase in non-financial release for both groups as a result of HB 463, however the increase was larger for white defendants than it was for blacks. The racial gap jumped from about 2 percentage point to 10 percentage point after HB 463 was implemented and remained relatively constant through January of 2016.

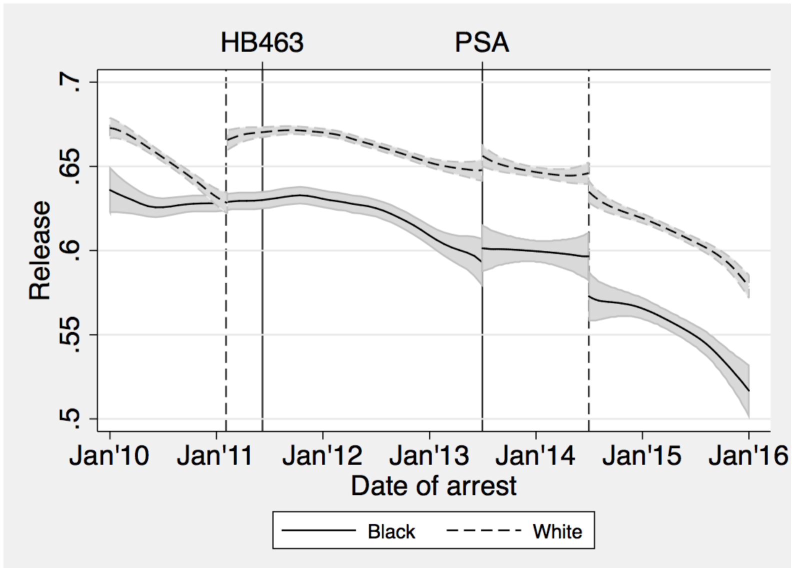
Figure 10 - How HB 463 and the PSA Impacted Racial Disparities in Non-financial Release



Note: The dashed horizontal line shows the fraction of white defendants who are granted non-financial release and the solid line shows the fraction of black defendants who are granted non-financial release. From left to right, the vertical lines indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

Figure 11 shows time trends for both races in the likelihood of being released within three days of booking. We see a similar but more attenuated pattern; the race gap increased after HB 463 and then remained relatively constant at about 5 percentage points. In fact, despite the increase in the likelihood of being granted non-financial release, HB 463 did not lead to a visually discernible increase in the likelihood of being released within 3 days for black defendants.

Figure 11 - How HB 463 and the PSA Impacted Racial Disparities in Pretrial Release

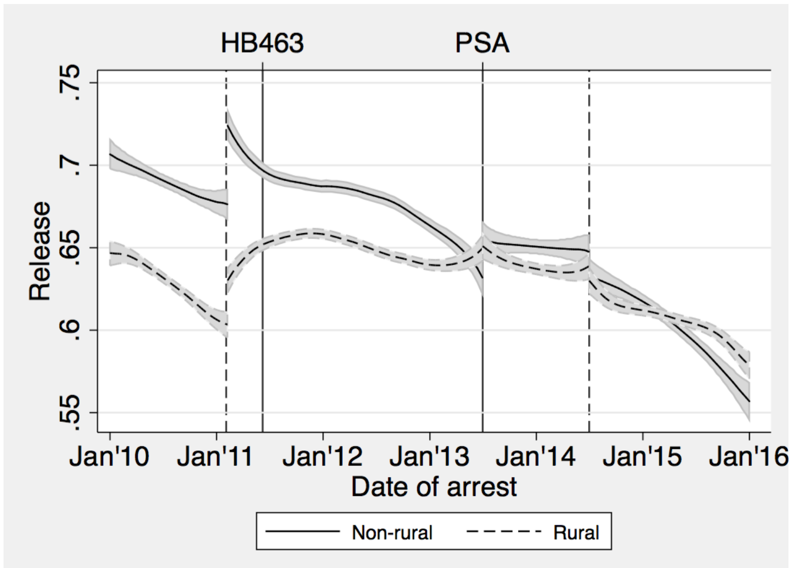


Note: The dashed horizontal line shows the fraction of white defendants who are released within three days and the solid line shows the fraction of black defendants who are released within three days. From left to right, the vertical lines indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

Figure 12 shows that there are regional disparities in the likelihood of being detained pretrial. The dashed line shows a time trend in the fraction of rural defendants who are released within three days of booking and the solid line shows the same for non-rural defendants. Before HB 463, rural defendants were about 8 percentage point more likely to be detained pretrial than those living in cities or suburban areas.[293] However, this gap shrunk and then reversed itself over time. The gap shrunk partly because rural regions responded more to HB 463 than non-rural regions. It also shrunk because the release rate dropped precipitously for non-rural regions over the six years of analysis: from a high of about 70% in January 2010 to a low of 55% in January 2016.

293. There are a variety of potential explanations for this gap: differences in access to bail money, judicial attitudes, the charged offense, criminal history, difficulties with monitoring pretrial releases, etc.

Figure 12 - How HB 463 and the PSA Impacted Rural/Urban Disparities in Pretrial Release



Note: The dashed horizontal line shows the fraction of rural defendants who are released within three days and the solid line shows the fraction of non-rural defendants who are released within three days. From left to right, the vertical lines indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

The differing trends in rural and non-rural regions complicate the analysis of racial disparities, since rural regions have a high percentage of white defendants (85%) while non-rural regions are more mixed (around 68% white and 30% black). Thus, the fact that white defendants appear to have been advantaged by HB 463 more than black defendants could simply be because they live in regions where the judges changed their bond setting habits more as a result of the law.

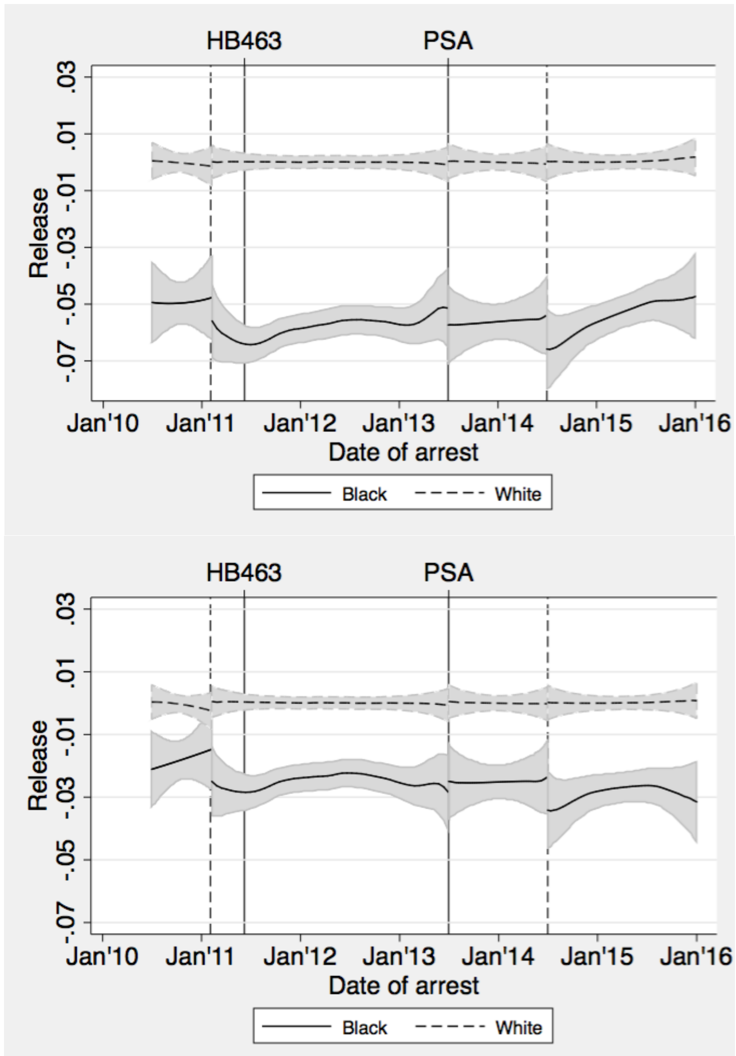
The upper graph of Figure 13 shows racial disparities over time once county effects and regional time trends have been accounted for. This was accomplished by estimating the average release rate for all races in each county by month by year.[294] Fig-

294. Formally, this is constructed by regressing a dummy for being released pretrial on county fixed effects as well as circuit-by-month-by-year fixed effects and then collecting the residuals from that regression. The left graph in Figure

ure 13 plots the difference between the actual and predicted release rate for white and black defendants. The fact that the horizontal time trend for white defendants hovers at around 1 percentage point indicates that white defendants are about 1 percentage point more likely to be released than the county average. Similarly, black defendants are 3–4 percentage point less likely to be released than the county average. As can be seen, once county effects and varying time trends at the circuit level have been accounted for, the racial gap in the likelihood of being released is pretty constant over time at about 5 percentage point While this research design is not well suited for detecting small changes, there is no visible evidence to suggest that risk assessment affected racial disparities once differing regional trends were accounted for.

13 is a local linear time trend of those residuals for black and white defendants.

Figure 13 - How HB 463 and the PSA Impacted Racial Disparities in Pretrial Release After Accounting for County Effects (upper) and County + Charge + Recent Criminal History Effects (lower)



Note: In each figure, the dashed line shows a time trend in releases for white defendants and the solid line shows a time trend in releases for black defendants. The upper figure shows the difference in release rates once county effects and time trends have been accounted for. The lower figure shows the difference in release rates once county effects, time trends, offense, age, gender, and recent criminal history have been accounted for. From left to right, the vertical lines in each chart indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

The lower graph in Figure 13 shows that about half of the racial gap in release rates disappears once gender, age, detailed information about the charge, and recent criminal history is accounted for.[295] This graph shows the difference between the actual release rates and the predicted release rates, using predictions which take into account not only county by month by year effects, but also age, gender, the top charge, the total number of charges, the level of the charges, and whether or not the defendant has a pending case, prior case, or FTA within the year before the booking date.[296] Even after accounting for these variables, black defendants are still about 2–3 percentage point more likely to be detained than white defendants. There are a number of potential explanations for this gap. For one, the data does not include the full criminal history. It's possible that black defendants have more prior arrests/FTAs and thus had higher bail. Racial bias could also lead the judge to set higher bail, although this is less likely in Kentucky since judges are often unaware of the race of the defendant when setting bail. Third, due to correlations between race and income, black defendants may be less able to afford a given amount of bail than white defendants.

In sum, Part III provided evidence that judges did use the risk assessment more when it was made mandatory in HB 463. HB 463 resulted in a 22 percentage point increase in the likelihood of non-financial release for low risk defendants and a 16 percentage point increase in the likelihood of non-financial release for moderate risk defendants. However, some of those who were released on non-financial bond as a result of HB 463 would have otherwise been released on low cash bond. Thus, the net effects on the release rate were attenuated. HB 463 led to a 9 percentage point increase in total releases (both non-financial and on money bond) for low-risk defendants, a 7 percentage point increase in releases for moderate-risk defendants, and a 4 percentage point decrease in releases for high-risk defendants. In total, this resulted in a 4 percentage point increase in the release

295. The graph on the right of Figure 13 shows residuals from a regression of a release dummy on county fixed effects, circuit-by-month-by-year fixed effects, the exact charge for the forty-two most common top charges, the total number of charges, whether the defendant had at least one class A, B, C or D felony, whether the defendant had at least one class A or B misdemeanor, the age at arrest, gender, and whether the defendant had a prior arrest, a prior FTA, or a pending charge within the year before booking.

296. The criminal history is limited to a year before the booking date since the data begins in July of 2009. Thus, estimating more than a year of criminal history data would not be possible for defendants who are booked toward the beginning of the data set.

rate for all defendants, which eroded over time as judges returned to their previous bail setting habits. FTAs increased by 3 percentage point after HB 463 was implemented, and pretrial rearrest increased by about 1 percentage point The adoption of the PSA had negligible effects on the overall release rate, FTA rate, or pretrial rearrest rate. Neither HB 463 nor the PSA had any effect on racial disparities once regional differences were accounted for.

IV. LEARNING FROM KENTUCKY'S EXPERIENCE WITH RISK ASSESSMENT

This Section discusses various implications of the empirical results presented in Part III. It begins by exploring potential reasons why the large gains that many had assumed would accompany the adoption of the risk assessment tool were not realized in Kentucky. It discusses ways that Kentucky's experience with pretrial risk assessment should and should not affect expectations about the impacts of risk assessment in other jurisdictions. Finally, it calls for a new direction in the evidence-based criminal justice movement: a deeper integration of evaluation into the process of adopting new methods.

A. Why No Efficiency Gains?

After HB 463, judges incorporated risk assessment into their bail practices significantly more than they had previously. If the risk classifications of the risk assessment instrument were much more accurate than the judge's intuitive assessment of risk, one might expect a gain in efficiency. This could be seen as a simultaneous decrease in detention rates, FTAs, and pretrial crime—or at least decreasing one without increasing the others. This did not occur. Why not?

First, risk assessment tools may not have provided as large a gain in predictive power as expected. As discussed in Part II.A of this Article, the research arguing that actuarial tools out perform human intuition in predicting crime is far from definitive. While there are reasons to believe that risk assessment tools provide new and useful information, the margin of gain is unclear.

Another possibility is that judicial discretion was used not to correct the risk assessment when it erred, but to override the risk assessment when it was correct. Human decision-making has been shown to be subject to a variety of foibles: false heuristics, over-weighting of small probabilities, over-confidence, risk aversion, etc.[297] While these types of human error are part of the reason to expect that actuarial prediction tools can out-predict human intuition, they may also be reasons why actuarial prediction tools are not that useful in practice. The policy-relevant question is not "Is the actuarial tool better at predicting misconduct than the judge" but rather "Does the judge make better decisions when given access to actuarial predictions?" A recent survey indicates that only a small minority of judges think that a risk assessment tool does a better job at predicting future crime than themselves.[298] Given this skepticism, it is unclear under what circumstances judges make different decisions as a result of the tool than they would have otherwise. If the prediction tool fails to influence decisions in circumstances where the predictive gains are the greatest, the usefulness of the tool will be curtailed.

It is also possible that the use of actuarial risk tools *did* lead to a substantial increase in the predictive capacity of judges, but that this information did not translate into improved outcomes. One of the most dramatic changes in bail setting practice as a result of HB 463 is an increase in non-financial release as opposed to release on low-cash bond. While this likely resulted in a decrease in the number of defendants detained pretrial due to an inability to pay bail, it may have reduced the incentives for released defendants to show up in court. Alternative methods of increasing appearance rates, such as court notifications, were rare: less than 5% of released defendants were assigned by the court to receive phone call reminders of their next appearance (Kentucky has since dramatically expanded their use of court reminders).[299] If the action-directives associated with being classified as low risk included robust support to help defendants overcome barriers to appearance (difficulties with transportation, getting time off work, arranging child care, etc.), the use of the tool may have been more effective.

Generally speaking, risk assessments will only lead to lower rates of misconduct if the action-directives associated with them

297. *See, e.g.*, Amos Tversky & Daniel Kahneman, *Judgement Under Uncertainty: Heuristics and Bias*, 185 SCI. 1124 (1974) (generally discussing a number of different cognitive heuristics and biases that affect the ability to assess probabilities).

298. *See* Chanenson & Hyatt, *supra* note 120, at 10.

299. Jennifer Elek et al., *Use of Court Date Reminder Notices to Improve Court Appearance Rates*, PRETRIAL JUST. CTR. FOR CTS., at 1 (Sept. 2017), https://www.ncsc.org/Microsites/PJCC/Home/Topics/Pretrial-Services.aspx; (follow "Use of Court Date Reminder Notices to Improve Court Appearance Rates" hyperlink).

are effective at mitigating risk. Identifying the appropriate interventions for different risk levels is non-trivial. For instance, will placing high-risk defendants in pretrial detention decrease crime, or will the destabilizing effects of incarceration actually lead to more crime?[300] Or, to take the example discussed in Part II.C, does assignment to a higher security prison decrease the likelihood of within-prison misconduct? Richard Berk and coauthors showed that using actuarial risk assessment to assign prisoners to different security classifications did not lead to lower rates of offending while in prison.[301] It did, however, appear to be effective at sorting prisoners based on offending level: while the total offending rates were the same, the rates were higher in high security prisons and lower in low security prisons.[302] If the use of risk assessment did not lead to lower total offenses, it may simply have been because placement in high security prisons was not effective at preventing offending.

B. LESSONS FOR OTHER JURISDICTIONS

Jurisdictions around the country differ widely in their criminal procedure, culture, and demographics. The experience other jurisdictions have with risk assessment will not, in general, be an exact mirror of Kentucky's. Nonetheless, certain lessons can be drawn from Kentucky's experience that should influence what to expect from pretrial risk assessment in other areas.

First, Kentucky's experience with risk assessment should temper hopes that the adoption of risk assessment will lead to a dramatic decrease in incarceration with no concomitant costs in terms of crime or failures to appear. That is not to say that risk assessment brought no benefit. Just because Kentucky was not able to simultaneously improve along all three margins (detention, crime, and FTAs) doesn't mean that the tool wasn't useful. It simply means that realizing large gains in practice are not as easy as realizing them in a hypothetical policy simulation. While it is certainly possible that other jurisdictions will experience a larger efficiency gain than Kentucky, there is no strong a priori reason to expect this to be the case. The risk tools used in Kentucky are similar or identical to other pretrial risk assessment

300. Paul Heaton, Sandra Mayson & Megan Stevenson, *The Downstream Consequences of Misdemeanor Pretrial Detention*, 69 STAN. L. REV. 711, 715 (2017).

301. *See* Berk et al., *supra* note 208, at 232.

302. *Id.* at 235.

tools currently in use.[303] They were shown to be predictive of future offending and non-appearance.[304] The action-directives associated with the tool—non-financial release for low-risk defendants, release onto supervision for moderate-risk defendants, and supervision or detention for high-risk defendants—are fairly typical of the action-directives used in other jurisdictions.[305] Kentucky's practice of allowing judges the discretion to deviate from these action-directives if they find a crime or flight risk is also typical of pretrial policy.[306]

Kentucky does differ, however, in that it was an early adopter of risk instruments. This meant that the margins of change analyzed in HB 463 were not the difference between having and not having a risk instrument, but the difference between having a risk instrument that was not heavily used and being required to consider it as part of the release decision. Furthermore, the fact that Kentucky was an early adopter means that the change being analyzed happened before risk assessment tools had gained the popularity that they currently have. This cultural shift may affect judges' openness to these tools. For both of these reasons, the margin of change before and after HB 463 is lower than it might be in other jurisdictions.

While the Kentucky experience should *temper* hopes that pretrial risk assessment will result in a dramatic decline in detention rates with no increase in FTAs or pretrial crime, it does not mean those hopes should be abandoned. As discussed in the previous Section, the usefulness of risk assessment in practice depends on a number of factors that are, as of yet, poorly understood. Future studies may show that risk assessment has been more successful in other contexts and may provide insight on how to replicate and expand that success.

As for racial disparities, it is unclear whether the Kentucky experience with risk assessment will be replicated in other jurisdictions. Kentucky is a largely rural,[307] predominantly white state.[308] Racial dynamics in Kentucky are not expected to be rep-

303. *See supra* note 40 and accompanying text.

304. AUSTIN ET AL., *supra* note 257; FIRST SIX MONTHS, *supra* note 175, at 3–4.

305. *See* Koepke & Robinson, *supra* note 86, at 22–23.

306. *Public Safety Assessment: Risk Factors and Formula*, *supra* note 37, at 4.

307. *Urban Percentage of the Population for States*, *supra* note 282.

308. *E.g.*, *QuickFacts: Kentucky*, U.S. CENSUS BUREAU, https://www.census

resentative of racial dynamics in dense urban areas, in the heavily Latino southwest, or in the black rural south. That does not, however, mean that Kentucky's experience provides no useful knowledge. In some regards, Kentucky provides a particularly stringent test of racial bias in risk assessment. Bail hearings in Kentucky usually happen over the phone between the judge and the pretrial officer.[309] Thus, the judge is less likely to be aware of the race of the defendant, which should minimize the incidence of explicit racial bias. Demonstrating that risk assessment does not increase racial disparities relative to the status quo when the status quo is not likely to be heavily biased is a stronger finding than showing that it does not increase racial disparities relative to potentially racist judges. Thus, Kentucky's experience with risk assessment should somewhat assuage concerns about expanded racial disparities, but further research is needed.

Jurisdictions adopt risk assessment for a variety of reasons. In addition to hopes of increased efficiency, jurisdictions may look to risk assessment as a way to centralize and standardize pretrial decision-making. This is likely to be particularly appealing to bail reform advocates who seek to lower pretrial detention rates. In fact, lowering the jail population was one of the goals of HB 463.[310] Kentucky demonstrates some of the challenges with this technocratic approach to bail reform. While judges certainly changed behaviors as a result of HB 463, they deviated from the action-directives associated with the risk assessment more often than not. Kentucky statute contains a presumptive default of non-monetary release for 90% of defendants, yet judges only granted non-financial release in less than a third of these cases—a clear violation of the spirit, if not the letter, of the law.[311] If the hope is to use risk assessment to coax pretrial practices in a certain direction, careful thought should be given to how to achieve this goal. Likely this involves either establishing clear guidelines for when deviation is or is not allowed, making deviation costly for the judge in some way (e.g. requiring a detailed written explanation of the reasons for deviation), or nur-

.gov/quickfacts/ky (last visited Oct. 14, 2018) (reporting that 87.8% of Kentucky's population is white).

309. *Virtual Tour of Kentucky Pretrial Services*, *supra* note 272.

310. *See* Jensen & Tilley, *supra* note 24 and accompanying text.

311. *See supra* Table 3.

turing a culture change among judges. These strategies may differ in jurisdictions where judges are elected, like Kentucky,[312] and in jurisdictions where judges are appointed, like New Jersey.[313]

The limits of enacting criminal justice reform via statute alone are not limited to risk assessment. In Kentucky, the tenuous connection between statute and practice permeates the pretrial process. For example, Kentucky has a statute stating that defendants can earn a $100 credit toward the payment of bail for each day detained pretrial.[314] Yet a vaguely worded loophole (except if "found by the court to present a flight risk or to be a danger to others") can result in blanket override of the statute if a judge so chooses.[315] In fact, one third of the judges never allow jail time credit for any defendant.[316] Even clearly written law from the Kentucky Constitution is routinely ignored. The constitution states that defendants have a right to bail except in capital cases.[317] Yet of the 24,000 defendants who were denied bond during the time period of the analysis, 90% of them were charged with only a misdemeanor or level D felony. Anecdotally, these were mostly defendants who demonstrated a persistent pattern of failing to appear in court,[318] but a reasonable explanation does not negate the violation of constitutional rights.

C. TOWARD A NEW DIRECTION IN EVIDENCE-BASED CRIMINAL JUSTICE

Data, science, and technology have been rapidly changing all aspects of modern life, from how we work, to how we learn, to

312. Judicial elections occurred in Kentucky in November 2010, KY. STATE BD. ELECTIONS, OFFICIAL 2010 GENERAL ELECTION RESULTS (Nov. 2, 2010), https://elect.ky.gov/SiteCollectionDocuments/Election%20Results/2010-2019/2010/off2010gen.pdf, and November 2014, KY. STATE BD. ELECTIONS, OFFICIAL 2014 GENERAL ELECTION RESULTS (Nov. 4, 2014), https://elect.ky.gov/results/2010-2019/Pages/2014PrimaryandGeneralElectionResults.aspx (follow "Official Election Results" hyperlink).

313. *Judicial Selection in the States: New Jersey*, NAT'L CTR. FOR ST. CTS., http://www.judicialselection.us/judicial_selection/index.cfm?state=NJ (last visited Oct. 14, 2018).

314. KY. REV. STAT. ANN. § 431.066(5)(a) (West 2018).

315. *Id.* § 431.066(5)(b)(2).

316. Based on author's own calculations.

317. KY. CONST. § 16 ("All prisoners shall be bailable by sufficient securities, unless for capital offenses when the proof is evident or the presumption great. . . .").

318. Telephone Interview with Tara Boh Blair, Chief Operations Officer, Ky. Pretrial Services (May 15, 2017).

how we spend time with our friends and family. Tech-industry enthusiasts describe this process as "creative disruption": a dramatic change in how people accomplish certain tasks with the advent of a new, more effective method.[319] Many people would agree that the criminal justice system is itself in need of some creative disruption. Billions of dollars are spent each year on policing, prosecuting, incarcerating, and monitoring our communities, yet few are satisfied with the results. Crime rates remain high in many neighborhoods, racial disparities abound, and the system is commonly viewed as opaque, ad-hoc, unfair, outdated, and ineffective.

The ideas and practices associated with evidence-based criminal justice have likely advanced in no small part from a hope that data, science, and technology will bring improvements to a system in need of reform. However, enthusiasm for the potential of new technologies may have led us to put the cart before the horse: widescale adoption of risk assessment before knowing anything about whether it will bring meaningful improvement. Risk assessment tools wear the clothes of an evidence-based practice—they are developed with the use of large data sets and sophistical techniques and endorsed by social scientists running policy simulations—but risk assessments should not be considered evidence-based until they have shown to be effective.

This Article advocates a new direction in evidence-based criminal justice: one in which an iterative process of evaluation and adaptation is central. This involves a shift away from blindly adopting practices that bear the evidence-based moniker, and toward integrating evaluation into the everyday operations of criminal justice. When a new technique is adopted, outcomes should be monitored to see if the desired effects were achieved. If they were not, adjustments can be made accordingly. In this paradigm, a method would be neither championed nor pilloried until its impacts in practice are clearly understood. This paradigm is characterized by informed curiosity: a willingness to try new techniques, but also a willingness to learn and adjust if the new techniques did not work as hoped.

In many ways, Kentucky Pretrial Services embodies that ideal. Over the years they have shown a continued willingness not only to try new methods, but also to evaluate how those

319. *See, e.g.*, CREATIVE DISRUPTION: THE IMPACT OF EMERGING TECHNOLOGIES ON THE CREATIVE ECONOMY, WORLD ECON. FORUM (2018), http://www3.weforum.org/docs/39655_CREATIVE-DISRUPTION.pdf (discussing the impact of emerging technologies on the creative economy).

methods have affected key outcomes, and change practices if need be. This capacity did not materialize out of thin air. For one, it requires a data infrastructure that took many years of hard work to develop and implement. Once developed, however, their data systems allowed them to monitor changes and trends in bail, release, and pretrial misconduct. For example, they have been aware that the release rate has been dropping precipitously, particularly in urban areas. In cooperation with Kentucky Pretrial Services, Kentucky's highest court has recently declared a major revision in the way pretrial risk assessment is used in their state. As of 2017, all defendants who are rated low and moderate risk and who are charged with low level crimes (non-violent and non-sexual misdemeanors as well as certain Class D felonies) are granted immediate non-financial release.[320] No bail hearing is required, thus no judicial discretion is involved in the decision. If the goal is to liberalize release for low level defendants, Kentucky's new method of using risk assessments may prove more effective than how they were used previously. Hopefully future studies will chart the impacts of this change and help advance our knowledge about the different ways risk assessments can be used in practice.

CONCLUSION

This Article began with a quote stating that we are beyond the point that risk assessment can be thought of as a trend, and into a "risk assessment era."[321] That one of the foremost examples of evidence-based criminal justice has advanced as far as it has with so little evidence on its impacts is a little unnerving. While evidence-based criminal justice is commonly cited as an ideal, we are still far from embodying it in practice.

This Article evaluated the impacts of pretrial risk assessment in a state that has been widely heralded as a leader in pretrial reform. It showed that pretrial risk assessment in Kentucky led to neither the dramatic efficiency gains predicted by risk assessment's champions, nor the increase in racial disparities predicted by its critics. While discussion and research about the *expected* outcomes of a change in policy will always be important, real world implementation can differ from what theory predicts in a number of ways.

320. *Authorization for the Non-Financial Uniform Schedule of Bail Administrative Release Program, No. 2016-10*, KY. REV. STAT. ANN. Administrative Release App. A (West through May 1, 2018).

321. Starr, *supra* note 6.

Empirical research evaluating risk assessment will expand, and we will learn more about the impacts of risk assessment in different contexts. Kentucky's experience should temper expectations but not eliminate hopes; risk assessment tools may prove to be a highly beneficial input to criminal justice, but understanding how and under what conditions is likely to take time and careful research.

APPENDIX

Figure 14 confirms that the time trends shown in the main body of the text are not meaningfully influenced by changes in the type of defendants being arrested. The four graphs in Figure 14 show, clockwise from top left, a variant of the time trend in non-financial release, release within three days, pretrial rearrest, and FTAs. Instead of showing the actual fraction of defendants for whom each outcome was present, the figures show residuals from a regression of the outcome on detailed variables describing the offense, basic demographics, and recent criminal history. These residuals are the difference between the actual outcome and the predicted outcome (where the predictions are based on the descriptors listed above). This process helps remove the effect of any change in defendants over time. For example, the fact that the release rate is declining over time might have been explained by a pattern in which the defendants arrested toward the end of the sample have committed more serious crimes than those who were arrested toward the beginning of the sample. If the charges that defendants are facing grow more serious, it would not be surprising that the release rate fell.

The trends shown in Figure 14 look quite similar to the time trends shown in Part II.D and Part II.E of this paper. The trends are centered at zero, since the vertical axis is measuring the difference between the predicted rates and the actual rates. However, the patterns are qualitatively quite similar, as are the magnitudes of change. Thus, the evidence presented in Part II.D and II.E is likely explained by differences in pretrial practices as opposed to a change in the type of people who are arrested.

Figure 15 also shows time trends in non-financial release, release within three days, FTA and pretrial rearrest. However, these trends are not built using linear smoothing like the figures in the main body of the text do. Figure 15 consists of scatter plots, where each dot represents the average outcome for all defendants booked within a two-month span. As such, the figures are visually somewhat noisier. Nonetheless, the patterns remain the same: visually discernible increases in non-financial release, net release, FTA, and pretrial rearrest right after HB 463 is implemented, and little discernible change around the adoption of the PSA. This eases concerns that any specific choices about the method of linear smoothing or the cuts in the time trend that were used in the graphs shown in the main body of the text created misleading visual impressions.

Figure 16 shows time trends in the same four outcome measures that were shown in the previous figures, but the sample is limited to felony defendants who are not facing any drug charges. Since the other pretrial-related changes that were enacted as part of HB 463 are expected to mostly affect drug offenders and misdemeanants, this specification helps ensure that the patterns we are seeing are truly a result of risk assessment. Once again, the results are qualitatively very similar: the same sharp changes are seen around the time of HB 463 and very little change around the adoption of the PSA.

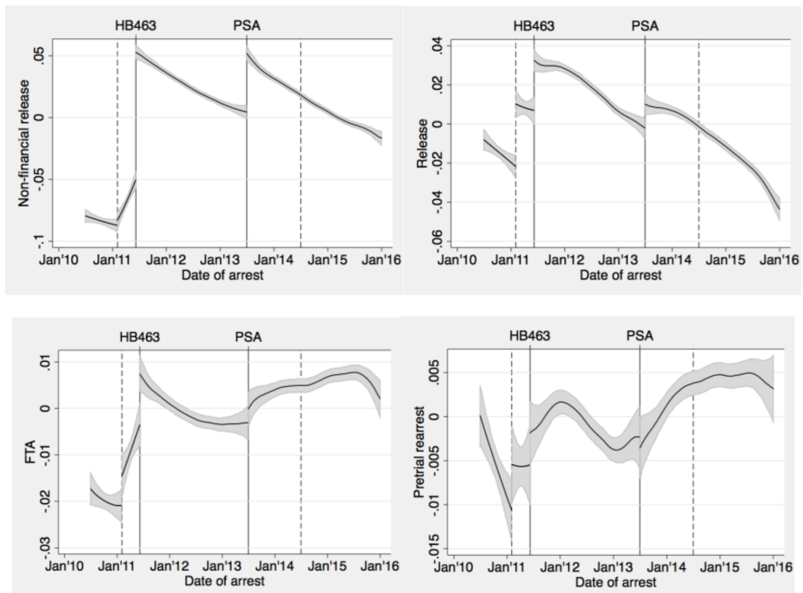
The top two graphs in Figure 17 provide alternative methods of evaluating time trends in FTAs and pretrial rearrest. The measures used in this figure were constructed from the data: a defendant was considered to have an FTA if the data shows that the same person was arrested for non-appearance after the original booking date and before the original case was disposed. Likewise, for pretrial rearrest: a defendant is considered to have a pretrial rearrest if they are arrested on a new charge after the original booking date and before the original case was disposed. These measures are different from those used in the main body of the text. The pretrial misconduct measures used in Part III were inputted by pretrial services officers. Pretrial officers see all FTAs while the data shows only FTAs that resulted in an arrest. These alternative measures provide a robustness check – a different method that shows similar results. Just like the figures shown in the main body of the text, Figure 17 shows an increase in FTAs and pretrial rearrest that occurs immediately after HB 463, and no change after the adoption of the PSA.

Finally, the bottom two graphs in Figure 17 show the fraction of *released* defendants who had an FTA or pretrial rearrest.[322] (Figure 7 and Figure 8 in the main text show the fraction of *all* defendants with an FTA or pretrial rearrest.) This allows us to evaluate the extent to which the increase in misconduct occurred solely because there were more people released. The bottom left graph in in Figure 17 shows that even looking solely at released defendants, the fraction with an FTA increases after HB 463. Thus, the changed conditions of release (non-financial release vs. release on low cash bond) or a change in the type of people who were released is likely responsible for the increase in FTAs once risk assessment became mandatory. However, the

322. The measures used here are the ones that were inputted by the pretrial officers, however the graphs look very similar to the ones constructed by the data.

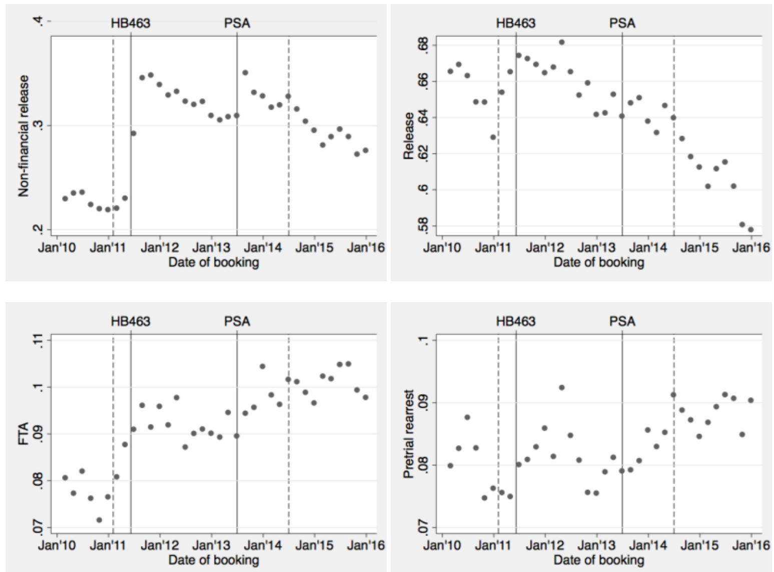
bottom right graph in Figure 17 shows that the fraction of released defendants who have a pretrial rearrest, however, does not exhibit much of an increase after HB 463. Thus, the increase shown in Figure 8 is likely a result of an increase in the number of people released.

Figure 14 - Adjusting for Offense, Demographics, and Criminal History



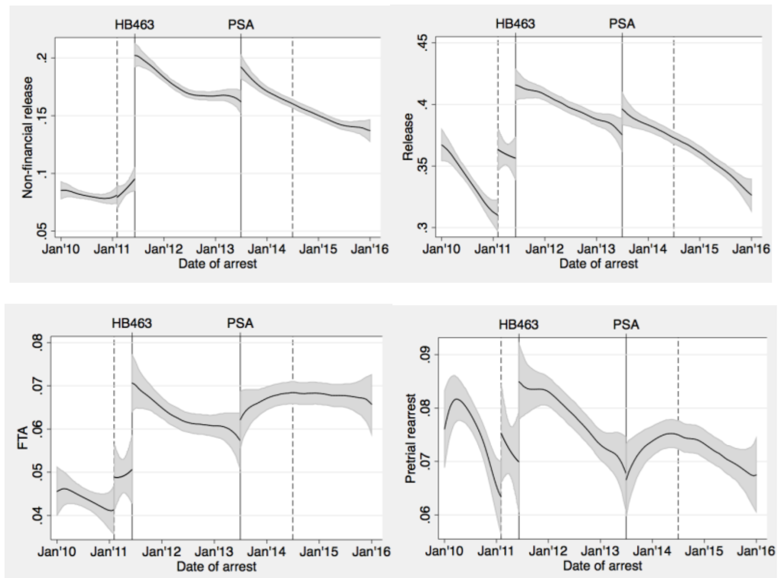
Note: Clockwise from top left, the figures show time trends in the fraction of defendants granted non-financial release, the fraction of defendants released within three days, the fraction who are arrested for a new offense during the pretrial period, and the fraction of defendants who fail to appear to at least one court date. From left to right, the vertical lines in each chart indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified. The horizontal axis is the booking date and the vertical axes are residuals from regressions where the predictor variables consist of the exact charge (for the 42 most common top charges), the total number of charges, whether the defendant had at least one class A, B, C or D felony, whether the defendant had at least one class A or B misdemeanor, the age at arrest, gender, and whether the defendant had a prior arrest, a prior FTA, or a pending charge within the year before booking. The time trends begin in July of 2010 so that all defendants have at least one year of criminal history data.

Figure 15 - Two Month Averages



Note: Clockwise from top left, the figures show two month averages in the fraction of defendants granted non-financial release, the fraction of defendants released within three days, the fraction who are arrested for a new offense during the pretrial period, and the fraction of defendants who fail to appear to at least one court date. From left to right, the vertical lines in each chart indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

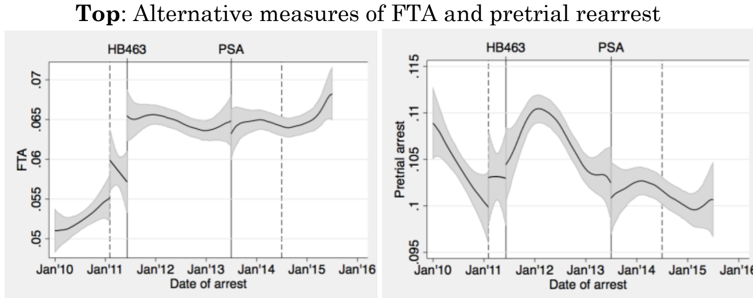
Figure 16 - Non-Drug Felonies



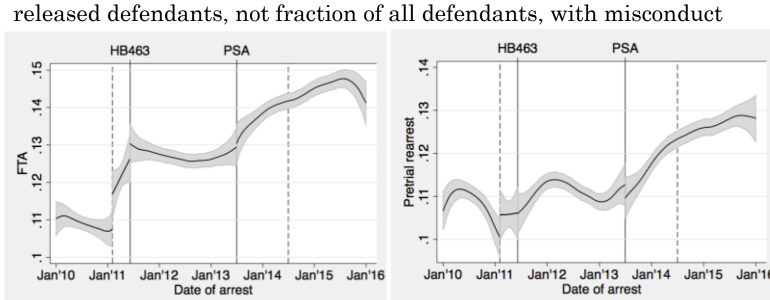
Note: Clockwise from top left, the figures show time trends in the fraction of defendants charged with a non-drug-related felony who were granted non-financial release, released within three days, arrested for a new offense during the pretrial period, and who failed to appear for at least one court date. From left to right, the vertical lines in each chart indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.

Figure 17 - Alternative Specifications

Top: Alternative measures of FTA and pretrial rearrest



Bottom: FTA rate and pretrial rearrest rate defined as fraction of released defendants, not fraction of all defendants, with misconduct



Note: The top left shows a time trend failures-to-appear and the top right shows a time trend in pretrial rearrest. While the FTA and pretrial rearrest measures used in the main body of the text were as reported by the pretrial officers, these measures were constructed from the data. A defendant was considered to have an FTA (pretrial rearrest) if the data shows that they were rearrested for an FTA between the time of the original arrest and the time of disposition. The bottom two figures show the same FTA and pretrial measure used in the main body of the text, but the time trend is the fraction of released defendants with one of these outcomes, not the fraction of all defendants. From left to right, the vertical lines in each chart indicate the date HB 463 was introduced as legislation, the date it was implemented as law, the date the PSA was adopted, and the date it was modified.