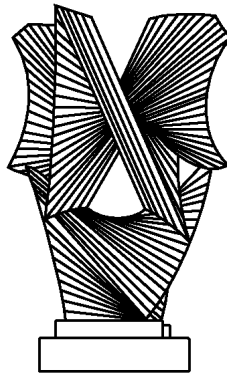


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Harmless Error

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HARMLESS ERROR

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Abstract

This paper presents an economic model of the harmful error rule in criminal appeals. We test the implications of the model against legal doctrines governing reversible and nonreversible error of criminal convictions and on a sample of more than 1000 criminal defendants who appealed their convictions in the U.S. courts of appeals between 1996 and 1998. Among the more important theoretical and empirical findings of the paper are the following. Intentional prosecutor and judge errors are more likely to be found harmful and lead the appellate court to reverse the defendant's conviction than are inadvertent errors. Prosecutor errors are more likely to be forgiven than judge errors, both because judge errors are likely to have greater influence on jurors and because a judge who has failed to correct a prosecutor's error (even an intentional one) has quite likely also failed to correct an offsetting defense error. Errors are less likely to be harmful when defendants face a higher error-free probability of conviction. Appellate courts are more likely to publish an opinion when they are reversing the lower court since the likelihood that the case presents a difficult issue on which precedent would be helpful is greater when there is disagreement among judges.

The harmless-error rule, probably the most cited rule in modern criminal appeals, provides that an error committed at trial, if judged harmless in the sense of unlikely to have altered the outcome of the trial, is not a reversible error. In Part I of this paper, we develop an economic model of the harmless error rule. Part II extends the model to consider various possible appellate decision rules (such as reversing a conviction whenever an error occurs compared to reversing only when the error is harmful), and tests the model against legal doctrines governing reversible and nonreversible error. Part III looks more systematically at actual appellate practice; we present an empirical analysis of the harmless error doctrine based on data drawn from nearly 1000 criminal cases decided in the U.S. courts of appeals between 1996 and 1998. The harmless error doctrine is also applied in civil cases, but we do not consider that application in this paper.

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I. A MODEL OF HARMFUL AND HARMLESS ERROR

A. Introduction

Because we focus on criminal appeals from convictions, we consider errors that either increase the probability of conviction or do not increase it, the latter being the harmless (to the defendant) errors. We do not systematically consider errors that reduce the probability of conviction, because the government cannot appeal an acquittal and obviously the defendant can't complain about an error in his favor; but we do mention the possible significance of this asymmetry for the harmless error rule. We also distinguish later between intentional and inadvertent errors. The former involve the deliberate commission by the prosecutor or a prosecution-minded judge of a legal error in favor of the prosecution—for example, the prosecutor's reminding the jury in closing argument that the defendant's failure to take the stand implies that he is guilty. (A more egregious, because less easily discovered, error would be concealing exculpatory evidence.) Inadvertent errors, in contrast, are like accidents, and thus can sometimes, though not always, be avoided by the prosecutor's spending more time and effort on careful preparation and conduct of his case or by society's increasing the resources devoted to the selection, training, and monitoring of prosecutors and judges.

In not distinguishing in this part of the paper between the different types of error, we implicitly assume that the prosecutor does not respond to the behavior of the appellate court (which might treat deliberate errors more harshly than inadvertent ones), and specifically that he does not make efforts to avoid the commission of errors in order to reduce the likelihood that the defendant's conviction will be reversed. This assumption is not entirely unrealistic, and for two reasons: First, the career goals of a prosecutor may be better served by getting a conviction than by risking an acquittal. Second, most prosecutorial misconduct that occurs in the presence of the trial judge will be detected and corrected on the spot by the judge. This is a more direct check on the prosecutor's conduct than the fear of reversal, and may make that fear play only a small role in his conduct. But in Part II of the paper we relax the assumption that the number of errors invited or committed by the prosecutor is invariant to the contours of the harmless error rule.

In some cases, the judge commits an uninvited error in the prosecutor's favor. We ignore this possibility and treat all errors as being caused by the prosecutor's having slipped one by the trial judge. At the end of the paper, we briefly consider the incentives of judges to uncover and avoid errors.

B. Definitions and Assumptions

Let H be the social harm from error committed by the prosecutor or a prosecution-minded judge when the error raises the probability of conviction and the defendant is convicted at trial. (A complete list of the variables used in our model appears in Table 1.) H is likely to be large if the error leads to the conviction of an innocent person. For this means that the guilty person has gotten away with the crime, which reduces the incapacitation benefit of criminal punishment, may reduce deterrence by re-

ducing the expected cost of crime relative to lawful activities,¹ and may spread fear among the law-abiding population of being wrongly convicted. H also includes reputational losses, reduced earnings, and nonpecuniary losses to person convicted of a crime he didn't commit. The harm is greater for convictions resulting in longer sentences, and so we expect H to be greater the more serious the crime.

Table 1: Definition of Variables	
e	probability of error
h	probability of harmful error given an error occurs
p	probability of conviction at trial without error
q	probability of conviction at trial given harmful error ($q > p$)
a	$a = (1-e)p + e[hq + (1-h)p]$
t	cost of trial and retrial
c(n,e)	cost of appellate review per appeal ($c_n > 0$ and $c_e > 0$)
n	number of issues addressed by appellate court
C	total cost of appeals ($C = ac$)
W	social welfare in state i ($W^0 =$ no appeals, $W^1 =$ appeals allowed, $W^a = W^1 - W^0$)
r^i	reversal rate for different types of convictions ($r^1 =$ no error committed, $r^2 =$ harmful error committed, $r^3 =$ harmless error committed)
r	weighted average reversal weight ($r = (1-e)pr^1 + ehqr^2 + e(1-h)pr^3$)
rt	cost of retrying defendants whose convictions are reversed
B	social benefit from conviction
H	social harm from conviction when error is harmful
U^i	utility of prosecutor from conviction (where i equals ne = no error occurs or e = error occurs)
x, y	prosecutor's cost of trial (x) and cost of preventing error (y)

¹ The effect on deterrence would be small, however, if other potential criminals assumed that the innocent person had actually committed the crime.

Even an error that results in the conviction of a guilty person may impose a social cost, if either the court doesn't know for certain that the person is guilty or if the legal right that the prosecutor infringed is thought to confer a social benefit even when invoked by a guilty person. But in the latter case H will be small and may be more than offset by the benefit of convicting the guilty. We may assume for the sake of simplicity, and without affecting our conclusions significantly, that *all* rights of criminal defendants are intended for the protection of the innocent, making H zero (or close to it) if the appellate court knows the defendant is guilty. But of course the court does not "know"; it can only guess. H can therefore be assumed to be positive to the extent that, by reducing the court's confidence in the strength of the prosecutor's case, it reduces the subjective probability that the defendant is truly guilty.² The costs to the procedural system of errors, mainly the costs to the appellate court of ferreting out errors and the cost of retrying defendants, we consider separately.

Let e be the probability of prosecution error, h the (conditional) probability that the error is harmful, p the probability of conviction at trial in the absence of error or when the error is harmless, and q the probability of conviction when the error is harmful. Given an error, h denotes the probability that $q > p$, since otherwise there is no harm from error. By assumption, therefore, an error that does not increase the probability of conviction is harmless. To simplify, all defendants are assumed to face identical probabilities of error, harm, and conviction.

The appellate court can expend resources on reviewing the defendant's conviction to determine whether an error has occurred and if it has what its impact on the outcome of the case is likely to have been. If it decides not to affirm the conviction, the only remedy available to it is to reverse the trial court and remand the case for retrial. It cannot command prosecutors to behave error-free; nor can it tax, fine, or otherwise sanction them if they commit errors. This is a little exaggerated. Appellate courts can criticize prosecutors and in extreme cases refer them to lawyer disciplinary commissions. And if the error consists of having based conviction on insufficient evidence to establish guilt, the double-jeopardy clause will require that the defendant be acquitted. We ignore these qualifications.

The cost of appellate review to the appellate court (and to the parties, but we postpone consideration of that aspect of cost) will depend on the number of convictions and on the time and effort the court devotes to each appeal. We normalize the number of trials at one and assume that each conviction is appealed, so that the fraction of trials that result in an appeal (a) equals the overall probability of conviction at trial:

$$(1) \quad a = (1 - e)p + e(hq + (1 - h)p).$$

The total cost of appellate review (C) is a times the average cost of an appeal,

² This implies that H will decline as the probability of conviction at trial in the absence of error (or when an error is harmless) increases. H will approach zero as this probability is close to one, because then the defendant is "truly" guilty and any error will still be harmless.

$$(2) \quad C = ac(n, e)$$

where n is the number of issues the court addresses per appeal. We assume that $c(0, e) = 0$, $c_n > 0$, and $c_e \geq 0$.³ For simplicity, we assume that the defendant claims only one error per appeal, so that $n = 1$ if error is reversible per se, $n = 2$ if the error is reversible only if harmful (for then the court must consider both whether there is error and whether it is harmful), and $n = 3$ if the court treats deliberate and accidental errors differently.

Both the cost per appeal and n would be zero if the court automatically affirmed all appeals or reversed all. If all convictions were affirmed, there would be no point in any defendant's appealing; and if all convictions were reversed, there would be a retrial of all defendants convicted in the first place. As we show later, in certain circumstances these extreme positions may be efficient.

The cost to the appellate court per appeal depends not only on n but also on e , the frequency of convictions in which error has in fact occurred. Although defendants can and do claim errors where none has occurred, the appellate court can be expected to spend more time on cases in which error has occurred, both because the claims of error in such cases will deserve more careful consideration and because whenever error is found the court must go on to decide whether it is harmful (if $n = 2$) and deliberate (if $n = 3$).

The costs of appeal will also depend on the time and effort undertaken by the appellate court in reviewing a lower court decision quite apart from the number of issues considered and lower court errors. This will depend, in turn, on the incentives that appellate judges face to discover and sanction prosecutors and lower court judges for committing errors. In addition, the costs of appeal will depend on the incentives of prosecutors and lower court judges to avoid errors. The greater those incentives, the more the appellate court will be able to conserve resources by relying on the reputation of prosecutors and lower court judges not to commit errors. For the most part we take these factors as given, because there is no widely accepted theory of judicial and prosecutorial behavior. Later, however, we consider some extreme examples, such as where it is too costly (relative to the benefits) for appellate judges to distinguish between harmless and harmful error.

C. The Social Welfare Produced by Convictions at Trial

1. If No Criminal Convictions Are Appealed

We define B as the social benefit from a conviction at trial. Consider first a no-appeals rule. (Appeals in federal criminal cases were first allowed late in the nineteenth century.) We can write the expected welfare or net social benefit of such a rule as

$$(3) \quad W^0 = (1 - e)pB + e[h(pB - (q - p)H) + (1 - h)pB] - t$$

³ We denote derivatives by subscripts; so c_n is the incremental cost of deciding an additional issue.

where the first two sets of terms on the right-hand side denote the expected net benefit from a conviction discounted by the probability that the prosecution committed no error and that it committed error, respectively, and t denotes the cost of a trial. (Recall that the number of trials equals the numeraire 1, so t is also the total cost of trial.) If a harmful error occurs, the expected net benefit from a conviction equals pB minus $(q - p)H$. But if the error is harmless, it equals pB . Consider the harmful error case. Imagine 100 defendants go to trial and harmful error increases the number convicted from 80 to 90. Expected welfare consists of the benefit from convicting 80 defendants minus the loss or social harm from convicting the additional 10 that would not have been convicted but for harmful error.

Equation (3) simplifies to

$$(3a) \quad W^0 = pB - eh(q - p)H - t.$$

Social welfare will be positive ($W^0 > 0$) even if appeals are not allowed unless the probability of harmful error (eh) and its impact $(q - p)$ are large and H is large relative to B (as when error results in the conviction of an innocent person), or when t is very large. This suggests that the social justification for not allowing appeals will be weaker the greater the likelihood that innocent persons will be convicted at trial (for then, e , h , $q - p$, and H will be large) and the more severe the penalties imposed on convicted persons. Without any appeals, e , h , and q might be very large, for then prosecutors and trial judges would not be deterred from committing errors by bad publicity or reputational losses among their peers that might result if a conviction were overturned. (In so observing, we relax our earlier assumption that the risk of a reversal does not affect prosecutorial behavior.)

2. If Criminal Convictions Are Appealable and Appealed

Assume now that appeals are allowed. To simplify, we assume that all reversals are retried, that no error is committed in the second trial, that the probability of conviction in that trial remains at p (that is, that neither the prosecutor or defendant gains an advantage by retrial), that no defendant who is convicted on retrial appeals his conviction, and that the cost of the retrial is the same as the cost of the original trial.

The expected social benefit of this regime is given by

$$(4) \quad W^1 = (1 - e)p[(1 - \hat{r})B + r^1pB] + eh[(1 - \hat{r}^2)(pB - (q - p)H) + \hat{q}pB] \\ + e(1 - \hat{r}h)p[(1 - \hat{r}^3)B + r^3pB] - C - (1 + r)t$$

where \hat{r} denotes the probability of reversal for each class (no error, harmful and harmless error) of convictions, C the cost of appeal (see equation (2)), and r the overall probability that a convicted defendant will be retried ($r = (1 - \hat{r} - e)p\hat{r}^1 + eh\hat{r}^2 + e(1 - \hat{r}h)\hat{r}^3$). W^1 differs from W^0 because if the con-

viction is reversed the defendant will be retried at a cost of t and convicted with a probability of p .⁴

3. The Net Gain from Appeals

The net gain (or loss) in welfare from appellate review of criminal convictions (W^a) is the difference between W^1 and W^0 :

$$(5) \quad W^a = -r^1(1-e)p(1-p)B + r^2eh((q-p)H - (1-q)pB) - r^3e(1-h)p(1-p)B - C - rt.$$

Of the five terms in equation (5) only the second can have a positive value; the other four must be either negative or zero. The second term has two components: a potential welfare gain from eliminating the social harm that arises from too many ($=q-p$) convictions when the error is harmful minus a welfare loss from reversing these convictions and ending up after retrial with too few convictions (qp instead of p convictions). The net gain from reversing the harmful error convictions will be positive if $(q-p)H > (1-q)pB$. That is most likely to be the case if a harmful error results in the conviction of an innocent person, because then H and $(q-p)$ will be very large and, as a first approximation, pB will be zero.

At this stage, it is helpful to divide convicted defendants among three categories. Category I consists of error-free convictions with probability $(1-e)p$; Category II of convictions in which there is harmful error with probability ehq ; and Category III of convictions in which there is harmless error with probability $e(1-h)p$.

The first and third terms in (5) represent the expected loss in welfare from reversing a conviction in Categories I and III. That loss occurs both because some fraction of Category I and III defendants who were correctly convicted (because there was no error or the error was harmless) escape conviction on retrial and because it is costly to retry a defendant. Suppose that 100 out of 125 defendants in Category I are convicted and 10 have their convictions overturned because the appellate court finds (incorrectly) that the prosecutor had committed a harmful error. On retrial, 8 of the 10 will be convicted again. Since 100 convictions are the optimal number for Category I (ignoring C), welfare declines as a result of allowing appeals. For there are now only 98 convictions and society has incurred an extra cost of t per retrial of each of 10 defendants.

Welfare losses in Categories I and III will be greater the higher the reversal rate, the higher the cost of retrial, and the greater the benefit (B) from conviction, but the effects of a greater p (the probability of a conviction that is not based on harmful error) and e (the frequency of error) are unclear. A greater p increases (provided r^1 and r^3 are positive) the number of reversals of convictions in which either there is no error or the error is

⁴ We noted earlier that e and h might be greater without appeals because prosecutors and trial judges would have less incentive not to commit errors. Conversely, appellate review that makes reversals more likely when error occurs will reduce the incentive to commit errors. Initially, we take the error rates as given. Later we consider the impact of appeals on the incentives of prosecutors and judges to make errors.

harmless, but fewer defendants whose convictions are overturned on appeal escape conviction on retrial. The latter raises welfare. If we put to one side the cost of retrial, the net effect of an increase in p on W^a is positive if $p < .5$ and negative if $p > .5$.⁵ The net effect of greater error is also unclear. It reduces the expected loss in Category I but raises the expected loss in Category III.

As for Category II, social welfare will increase as the fraction of convictions in that category are reversed, provided $(q - p)H > (1 - q)pB$ and ignoring the cost of a retrial and the cost incurred by the appellate court in deciding whether a harmful error has occurred. The expected gain from reversing a Category II conviction will be greater, the greater e , h , q , and H and the smaller p and B . The appellate court should be most concerned about harmful errors when their relative and absolute impact are large (as measured by $q - p$ and q respectively), for then it is highly likely that $(q - p)H$ will be greater than $(1 - q)pB$ and optimal policy will be to reverse these convictions. The limiting case is where the court believes that harmful error caused the conviction of an otherwise innocent defendant ($p \cong 0$ and $q \cong 1$). But reversal also is likely to be optimal in less extreme cases, such as when the court believes the defendant is guilty but also believes that the error had a significant impact on the defendant's conviction (say $q \cong .9$ and $p \cong .7$). On the other hand, optimal policy will often require affirming the defendant's conviction when the impact of harmful error is slight ($q - p$ is positive but negligible and p is large). Note finally that if no Category II defendants are (though guilty) retried or if retried convicted, the harm avoided by reversing all such convictions could well be less than the benefit of letting their convictions stand even though they were based on harmful errors.⁶

Our formal analysis implies that social welfare is maximized by affirming all convictions in Categories I and III and reversing those convictions in Category II when $(q - p)H > (1 - q)pB$. This conclusion assumes, however, that the gains from distinguishing among the categories are greater than the information costs required to distinguish among them and the costs of retrying defendants in Category II. But given these costs, it is at least clear that the appellate court should devote more resources to reviewing convictions carrying more severe sanctions. Equation (5) shows that the welfare gains from accuracy in affirming convictions in Categories I and III and reversing those in Category II are greater, the greater B and H are. And we have yet to consider the response of prosecutors to the prospect of reversal. Before doing that, however, we develop the basic model a bit further and indicate some applications to actual appellate practice.

⁵ Since the cost of appeal (rt) is directly related to the number of initial convictions (holding the reversal rates constant), $\partial W^a / \partial p < 0$ at $p < .5$ once trial costs are considered.

⁶ Let s denote the probability of retrial and, contrary to the assumption in the model, assume $s < 1$. Then social welfare will increase if Category II convictions are reversed provided $(q - p)H > (1 - qs)pB$. But if s is small enough (few reversals are retried), social welfare can decline if any Category II convictions are reversed. This is more likely, the greater is p and B .

II. EXTENSIONS AND IMPLICATIONS

A. *The Case for Per Se Rules*

Suppose the appellate court, not having seen the trial (especially not having observed the jury), lacks good information for assessing the likelihood that an error committed by the prosecutor affected the outcome (i.e., was harmful). In what circumstance might a rule requiring reversal in all cases in which error occurs (i.e., setting $r^2 = r^3 = 1$) increase welfare compared to reversing only when the appellate courts finds the error harmful (i.e., setting $r^2 = 1$ and $r^3 = 0$)? Equation (4) implies that a rule of per se reversal will increase welfare if

$$(6) \quad a[c(2,e) - c(1,e)] > e(1 - h)p[(1 - p)B + t].$$

In words, the per se rule will yield a higher level of welfare if the incremental cost of distinguishing between harmful and harmless error (the left-hand-side of equation (6)) is greater than the probability of reversing a conviction in which the error was harmless ($= e(1 - h)p$) times the welfare loss from reversal. That loss is the sum of the expected loss from not convicting the defendant on retrial and the cost of the retrial itself.

From (6) it follows that a per se rule would be more likely to maximize welfare the greater the cost of distinguishing between harmful and harmless error, the more likely that an error was in fact harmful (the smaller $(1 - h)$), the smaller the benefits (such as greater deterrence) from convicting a party where error played no role in the original conviction, and the lower the cost of retrial. The effect of a greater error rate is unclear because it increases both sides of (6). (The left-hand-side increases because there are more appeals involving errors and hence more time must be spent deciding whether or not an error is harmless.) The effect of an increase in p is also unclear. A greater p means that more defendants will have their convictions reversed, which raises the right-hand side of (6), but that fewer defendants will be acquitted on retrial, which lowers it. The net effect will be negative or positive depending on whether p is greater or less than .5.

Actual appellate practice is broadly consistent with this analysis.⁷ The most common case in which a per se rule of reversal is applied is where the defendant was deprived of his right of counsel.⁸ Given the complexity of modern criminal procedure, a defendant who is prevented from being assisted by a lawyer may well be convicted even if innocent, in which event B will probably be zero or negative.⁹ Even if the court is uncertain about the defendant's innocence, B will have to be discounted to take account of the

⁷ For a summary, see 3A Charles Alan Wright, *Federal Practice and Procedure* §§ 851–855 (2d ed. 1982 and 1997 Pocket Part).

⁸ This is the most important case left where the per se rule is applied, as the Supreme Court has been busily whittling down the list. See *Neder v. United States*, 119 S. Ct. 1827 (1999). Another case, however, where the per se rule is applied is where the jury is not instructed properly on the reasonable-doubt standard. *Sullivan v. Louisiana*, 508 U.S. 275 (1993). We discuss that in the text below.

⁹ We say probably because it is conceivable that in some circumstances convicting an innocent person would have net deterrent benefits; but we shall ignore the possibility.

possibility. Conviction of the innocent is the extreme example of a harmful error, in the sense of an error where h is close to one (and hence $(1 - h)$ and the right-hand side of (6) close to zero), since in an error-free trial it would be highly unusual (though not impossible, or entirely unknown, even today) for an innocent person to be convicted. At the same time that the right-hand side of (6) will tend to be small in the case of a fundamental error such as depriving the defendant of a lawyer, the left-hand-side of (6) will tend to be large because the appellate court will find it difficult to pin down the actual effect of the error on the outcome. Without a lawyer, the record developed at the trial is unlikely to be sufficiently complete and accurate to enable the defendant's probable guilt or innocence to be reliably estimated.

A superficially very different type of case in which the *per se* rule is applied is where the judge fails to instruct the jury that it has to find the defendant guilty beyond a reasonable doubt; an even more extreme case would be where the defendant was sentenced without a trial. In either case it might be perfectly clear that had the defendant received the full panoply of procedural protections to which he was entitled he would still have been convicted; nevertheless reversal is automatic. In the second case the justification in terms of our model is that without some minimum of procedure in the trial court it will be impossible for the appellate court (which does not hear evidence) to determine whether the defendant really is guilty. The first case is more difficult but may have a similar justification. If the jury is not properly instructed on the prosecutor's heavy burden of proof, the appellate court will not have the added confidence in the defendant's guilt that would come from knowing that a jury had thought his guilt clear beyond a reasonable doubt and not just slightly more probable than not.

At the other extreme, convicted defendants who after having unsuccessfully completed their appeals wish (perhaps many years later) to have their convictions set aside on the basis of trial error must jump through a number of procedural hoops. Making it difficult for these defendants to obtain a retrial (i.e., a near *per se* affirmance policy) makes sense in terms of our model because equation (5)—the equation for determining whether appellate review of convictions will promote welfare—is likely to be negative. In (5) both C (the cost of the appeal) and rt (the cost of the retrial) will be large because the cost of determining whether an error was harmful, and of retrying the defendant, will be greater the farther in the past the original trial was held. And since the defendant previously had his conviction reviewed, the chance of his turning up something new that will demonstrate that the error was harmful (that is, that h is positive or that $q - p$ is large) will be very small. This in turn implies that the only potentially positive term in (5) will be relatively small. The high cost and low expected benefit from reviewing a conviction that occurred many years ago imply that welfare will be maximized by imposing a very heavy burden on the defendant who seeks to have his conviction belatedly reversed.

An exception may be appropriate where subsequently discovered evidence not only shows error, but proves conclusively that the defendant is innocent. DNA evidence, which may not have existed when the defendant was tried and convicted (so he cannot be criticized for not having pre-

sented the evidence earlier), is the best example. Since it can conclusively exonerate a defendant, it does not impose costs of retrial; a defendant who is proved to be innocent, as distinct from one who establishes a nonharmless error in his first trial, will be released without need for a retrial.

The rule used to be that all constitutional as distinct from nonconstitutional errors had to be proved to be harmless beyond a reasonable doubt before they could be excused. The Supreme Court has now rejected that rule for postconviction proceedings,¹⁰ consistent with our earlier analysis. But the survival of the rule in cases of direct appeal is anomalous in terms of our analysis. For there is nothing in the nature of a constitutional error that makes it affect any of the variables in our model. It is true that some of the most serious errors in terms of the model, such as the denial of counsel, happen to be constitutional errors, but other constitutional errors are technical and even trivial (such as violations of the *Miranda* rule), at least from the standpoint of protecting the innocent, and do not impose a significant burden on the appellate court (the left-hand side of (6)) of deciding whether the error was harmless.

The general trend in the courts has been to expand the harmless error rule by reducing the number of errors that are reversible per se (that is, even if harmless)¹¹ and, as just mentioned, by reducing the burden of proof on the prosecution of convincing the appellate court that an error was harmless. We consider briefly and speculatively the reason for this trend. In the 1950s and 1960s, the Supreme Court under Chief Justice Earl Warren expanded the rights of criminal defendants, and this may have been a factor in the large increase in the crime rate that began in the early 1960s. At any rate the crime rate did rise steeply, and much faster than the number of prosecutions. As a result, assuming that it is usually easier to convict a guilty than an innocent person, the percentage of criminal defendants who were prosecuted who were innocent would have fallen, implying a reduction in the probability of convicting an innocent person as a result of a trial error and therefore a tendency to construe harmless error more broadly.

Our analysis implies that it may be optimal to reverse *all* convictions of a particular character even if there is no error at all ($r^1 = r^2 = r^3 = 1$). Suppose that equation (5) is applied to a set of defendants convicted by a judge who accepted bribes from a number of defendants whom he had found not guilty and released; these defendants would not appeal their cases and so would not directly affect the costs and benefits of appellate review. Suppose that to balance his lenient policy toward the latter group and avoid getting a reputation as being soft on criminals (which might cost him reelection), he threw the book at some of the remaining defendants. In terms of equation (5), e , h , and q would be very large, and therefore the fraction of defendants tried and convicted before this judge who belong in Categories I and III might be so small that the benefits from affirming their convictions would be less than the information cost of trying to determine who they are. The best policy might be to throw out

¹⁰ *Brecht v. Abramson*, 507 U.S. 619 (1993).

¹¹ See note 8 above.

all convictions and incur the cost of retrying all defendants before an impartial judge. If, however, the nonbribing defendants were convicted long ago, the cost of retrying them may be so high that it pays to determine which of them were subjected to rulings motivated by the judge's policy of dealing harshly with nonbribing defendants.

Had the prosecutor bribed the judge in these cases, a rule of per se reveals would be applied, just as in the case of unconstitutional denial of counsel, and for similar reasons.

B. If Defendants Face Different Probabilities of Conviction

We now drop the assumption that all defendants face the same probability of conviction. The appellate court should be more vigilant about rooting out harmful error (assuming it is costly to discover) when it believes that the evidence against the defendant was weak and therefore the probability of conviction low than when it believes that the evidence was strong and the probability of conviction therefore high. In equation (5), the higher the "true" or "error-free" probability of conviction for Category II defendants (the only category in which reversals are likely), the smaller will be the benefit from reversing the defendant's conviction. First, $(q - p)$ and, therefore, the expected reduction in social harm from reversal will diminish as p increases (holding q constant). Second, H or the social harm itself is likely to be a negative function of p since H will be greater the more likely that the defendant is truly innocent. Third, the greater is p , the larger the expected loss (equal to $(1 - q)pB$) from convicting less than the optimal number of defendants in category II. Fourth, the loss in benefits of deterrence (B) from a decline in convictions are positively related to p .

Several other considerations are worth mentioning; all point in the direction of greater concern with harmful error when p is low. To begin with, the probability that error is harmful is not independent of the true probability of conviction. Consider a group of convicted defendants. If p is very high, the likelihood that an error actually changed the outcome of the case will tend to be low. Most of these defendants would have been convicted anyway. Conversely, if p is very low, the likelihood that an error changed the outcome will tend to be high as most of these defendants would have escaped conviction but for the harmful error. Indeed, when p is zero or close to it, the only way the defendant could have been convicted is by means of a harmful error. When p is low, moreover, there is a greater chance that the defendant is innocent, so that H will be large and B low or even negative if his conviction is affirmed. Furthermore, we have overlooked the incentives of prosecutors to induce trial errors that increase the likelihood of a conviction. If the prosecutor's case is going well (say p is high) he will have less incentive to gamble on committing an error that raises the probability of conviction but makes reversal more likely. But if his case is going poorly (p is low), he may be willing to risk such an error because he has little to lose. Thus, we expect a negative correlation between the likelihood of a deliberate harmful error and the error-free probability of conviction. For all these reasons, an appellate court that faces significant information costs should be more willing to reverse a convic-

tion when it believes that an error may have occurred and that the prosecution's evidence at trial was weak rather than strong.

C. Alternative Definitions of Harmful Error

Up to this point we have assumed that an error is harmless when it has no (or, to be realistic, only a very slight) positive impact on the probability of conviction. This is not the only possible definition of harmless error but it is the best one from an efficiency standpoint. We show this by examining the alternatives. One (call it Alternative 1) would be to deem an error harmful only if it were a necessary condition of the defendant's being convicted. This would imply that an error was harmless unless $p = 0$ (or close to 0). Even an error that substantially increased the likelihood of convicting the defendant (for example, from $p = .2$ to $q = .9$) would be harmless, because there would be a positive though small probability that the defendant would have been convicted anyway (i.e., $.2$). Alternative 2 would be to deem an error harmless only if there were sufficient evidence to convict the defendant anyway (i.e., $p = 1$). Then there would be virtually no harmless errors, as an error would be harmful unless $p = 1$ (or close to 1). Thus, even if an error had no impact on the likely outcome (say, both p and q equal $.7$ or $.2$), the error would be harmful according to this definition. Alternative 3 would be to deem an error harmless only if the defendant were more likely than not to have been convicted anyway. Then an error would be harmless if $p > .5$ (even if $q > p$) and harmful if $p < .5$ (even if $p = q$).

Alternative 1 would result in nearly all convictions in all three categories being affirmed; Alternative 2 in nearly all convictions in Categories II and III (the categories where error occurred) being reversed; and Alternative 3 in some convictions in both Categories II and III being reversed and some in Category I also reversed if the court side-steps the question of whether an error occurred and just looks at the evidence against the defendant. Yet we know from our earlier discussion that, in general, all convictions in Categories I and III should be affirmed and those convictions in Category II reversed.¹² So the alternative definitions of harmless error are suboptimal.

D. The Average-Jury Rule

Because it is too costly to figure out how whether a particular jury was actually influenced by a trial error (not only because it would require a costly and inconclusive inquiry but also because it would burden and embarrass the jurors), appellate courts ask in effect how an average jury would have been influenced, thus ignoring intellectual, emotional, and other relevant differences among individual juries. This saving comes at a cost, because it makes it more likely that the appellate court will fail to detect a harmful error. The likelihood is increased by the fact that the prosecutor, being present at the trial, has better information than the appellate court about the actual characteristics of the jury. This may give him an incentive to induce a harmful error, knowing that it is unlikely to be corrected on

¹² This assumes that for Category II convictions that $(q - p)H > (1 - q)pB +$ the cost of retrial.

appeal. It may nevertheless be optimal for the appellate court to forgo the costs of assessing the impact of error on the particular jury and stick with an average or reasonable jury rule.

Let $f(z) \leq 1$ equal the probability that the appellate court will detect a harmful error (or alternatively but equivalently, the fraction of cases in Category II in which the court detects a harmful error), where z denotes the time and effort that the court devotes to analyzing the jury's likely reaction to the error. We assume that $f_z > 0$ and $f_{zz} < 0$ —i.e., that the greater z is, the greater will be the probability that the court will detect harmful error, but that z is subject to diminishing returns. Recalling that equation (5) represents the welfare gain from appellate review of criminal convictions, and letting $r^2 = 1$ and $r^1 = r^3 = 0$, we can rewrite the expected welfare gain from detecting harmful error as

$$(7) \quad G = f(z)eh[(q - p)H - (1 - q)pB - qt] - C(z)$$

where $eh[(q - p)H - (1 - q)pB - qt]$ equals the expected welfare gain from reversing all convictions net of the cost of retrial (qt).¹³ At z^* , the value of z that maximizes G , the expected welfare gain from an additional unit of z just offsets its incremental cost. Observe that z^* and the fraction of harmful errors that are detected are greater, the more responsive is f to z ; the greater e , h , and q are; the greater the harm (H) that is avoided by detecting harmful errors; the smaller the benefit (B) from convicting the defendant; and the smaller the cost of retrial. On the other hand, z^* will be smaller, the greater the error-free probability (p) of conviction.

We would expect that the cost of z would turn sharply upward, if the appellate court investigated the impact of an error on the actual jury in the case rather than on a hypothetical average jury. This implies, therefore, that even deliberate harmful errors will sometimes, perhaps often, go undetected.

Although not explicitly recognized as an element of the legal standard, there is probably more individualized consideration of the probability that the error was in fact harmful in cases in which the trier of fact is a judge rather than a jury. The appellate judges know the trial judges, at least by reputation, and so face a lower cost of determining whether the error might have influenced the outcome given the particular judge as distinct from the average judge.

The cost to the appellate court of identifying a harmful error is also influenced by the court's workload and by the availability of staff to assist the judges. These factors tend to be offsetting—the heavier the workload, the more staff assistance the judges have—so we shall ignore them.

¹³ Recall that (5) was maximized when $r^1 = r^3 = 0$ and $r^2 = 1$, provided the cost of appellate review (C) and the cost of retrials (rt) were not too great. Here we modify C by making it depend not only on the number of errors and issues that the court reviews but also on the time and effort it devotes per case to analyzing the likely effects of errors (z). The more time and effort, the greater will be C (i.e., $C_z > 0$).

E. Prosecutorial and Judicial Incentives

The prosecutor's incentive to induce or avoid errors at the trial that make it more likely that the defendant will be convicted depends on the sanctions the appellate court imposes on him if he commits an error. If the appellate court reverses a conviction when error occurs, a prosecutor will have a greater incentive both to refrain from committing intentional or deliberate errors and to invest resources in preventing inadvertent errors from occurring than if the court, invoking the harmless error rule, declines to reverse.

1. Intentional Error

When a prosecutor knowingly invites error in order to increase the likelihood that the defendant will be convicted, e and h are likely to be close to 1, and q to exceed p . A rational prosecutor will not invite error deliberately if the resources consumed by the "invitation" could have been used to increase p more. But the major cost of deliberate error is not a resource cost in the first trial—the error may indeed enable him to reduce his total expenditure of time, effort, witnesses, and so forth on the trial—but the increased chance of reversal on appeal, since an error-free conviction is less likely to be reversed.

Assume the prosecutor's utility function depends on the number of convictions he obtains weighted by the benefit per conviction net of the time, effort, and other resources that he expends. We ignore the cost to the prosecutor of the appeal, on the plausible assumption that virtually all criminal convictions following a trial are appealed. The prosecutor's utility in the absence of error can then be written as

$$(8) \quad U^{ne} = p[(1 - r^1)B + r^1(pB - x)] - x$$

where B is now the prosecutor's benefit from conviction (which may differ from society's benefit) and x is the cost of a trial or retrial to the prosecutor, which generally will be less than the social cost of trial, t .¹⁴ Notice that if the probability of reversal is zero (say, because the prosecutor commits no error), (8) becomes $pB - x$. We assume that $pB - x > 0$ for a prosecutor who does not commit error, as otherwise the defendant will not be prosecuted in the first place.¹⁵

¹⁴ To simplify the presentation, we take x as given. Implicitly we assume that the prosecutor faces a budget constraint such that, other things the same, he prefers to spend fewer resources prosecuting a given defendant, because that economy would free up resources that he could use to increase the number of prosecutions, the time he spends prosecuting other defendants, his leisure, or some combination of these factors.

¹⁵ If $pB - x < 0$, then $U^{ne} < 0$ and therefore a prosecutor who does not commit error would not have a credible threat to go to trial. Several qualifications should be noted, however. (1) If the probability of reversal is not zero even in the error-free case, $pB - x \geq 0$ is not sufficient to motivate prosecution because U^{ne} will be ≥ 0 only if $(pB - x) \geq pr[(1 - p)B + x] > 0$. (2) A rational prosecutor who does not commit error may pursue a case against a defendant even if $pB - x < 0$ and $U^{ne} < 0$, if he can impose larger costs on the defendant. (3) If the prosecutor plans to commit an intentional error, then $pB - x$ need not ≥ 0 . To illustrate, consider equation (10) in the text. The prosecutor will pursue the defendant if $U^e \geq 0$. This holds when $qB - x > qr^2((1 - p)B + x)$. If error substantially

The prosecutor's utility if he commits an intentional error is

$$(9) \quad U^e = hq[(1 - r^2)B + r^2(pB - x)] + (1 - h)p[(1 - r^3)B + r^3(pB - x)] - x - y$$

where y is the prosecutor's cost of committing such an error. That cost may be either positive (e.g., the cost of hiding exculpatory evidence) or negative (e.g., the savings from doing nothing to prevent misconduct by subordinates). To simplify, we assume that these factors cancel out, so that y equals 0, though we shall point out how the results change if $y \neq 0$.

Assuming that both e and h equal 1 in the intentional-error case, (9) becomes

$$(10) \quad U^e = q[(1 - r^2)B + r^2(pB - x)] - x$$

Whether the prosecutor commits an intentional error will depend on whether U^e is greater or less than U^{ne} , which in turn will depend on the appellate court's reaction to the error.

We consider three possible reactions. First, information costs may be so great that the appellate court cannot determine whether an error is harmless or even whether an error has occurred. Since under this assumption a prosecutor who commits an error is not sanctioned, he will choose to commit an intentional error since $U^e > U^{ne}$ as $q > p$. This is assuming that cost of committing such an error is negative or zero; if it positive, he will be less likely to commit such an error the larger this cost is and the smaller the increase in the probability of conviction (i.e., the smaller q relative to p given $q > p$) that the error brings about.

Now suppose that the appellate court can detect error and affirms all convictions in which no error occurred, but that because information costs prevent it from distinguishing harmless from harmful error the reversal rate is the same for both types of error. If the court treats all errors as harmless, then we are back to the all-affirmance case. If it treats all errors as harmful, then committing error will reduce the prosecutor's utility, both because the defendant may escape conviction on retrial and because a retrial is costly to the prosecutor.¹⁶ Neither extreme is realistic, and so suppose there is some positive value of $r^2 = r^3$ between 0 and 1—call it r^* —where the prosecutor will be indifferent between committing and not committing an intentional error.¹⁷ A reversal rate greater than r^* but less

raises the probability of conviction (q is significantly larger than p) and there is little chance of reversal, the prosecutor will prosecute the defendant even if $pB - x < 0$.

¹⁶ Substituting $r^1 = 0$ and $r^2 = r^3 = 1$ into (8) and (9) and combining terms, yields $U^{ne} > U^e$ provided $pB > (pB - x)[hq + (1 - h)p] - y$. And since $[hq + (1 - h)p] < 1$ (or $q < 1$ in the intentional error case where $h = 1$) and the prosecutor's trial costs are positive, $U^{ne} > U^e$ unless the prosecutor saves a great deal in say supervisory costs by committing an intentional error (i.e., y is a large negative number). Assuming y is either positive or zero, then $U^{ne} > U^e$.

¹⁷ Assuming $r^1 = 0$, $y = 0$, $h = 1$ and setting $U^{ne} = U^e$, yields

$$r^* = [(q - p)B - y]/q[B(1 - p) + x]$$

than 1 will deter the prosecutor from committing an intentional error, while a reversal rate lower than r^* will lead to an intentional error.

Finally, if information costs are sufficiently low that the appellate court can readily distinguish between harmful and harmless error and reverses a conviction only if it is harmful, the prosecutor will be deterred from committing deliberate errors. Consider two cases. First, if $h = 1$, $U^{ne} > U^e$ assuming $r^1 = 0$ and $r^2 = 1$. Here the fact that the court can distinguish between harmless and harmful error is irrelevant because all intentional errors are assumed to be harmful. Now suppose that some intentional errors turn out to be harmless ($h < 1$) and the prosecutor is not penalized for them ($r^3 = 0$). Comparing equations (8) and (9) and assuming $r^1 = r^3 = 0$ and $r^2 = 1$ yields $U^{ne} > U^e$ provided that $h[pB(1 - q) + qx] + y$ is positive, which it will be unless there are substantial savings (a large negative y) from committing an intentional error. These savings are likely to be small, however. Simple concealment for example, just not handing over exculpatory evidence to the defendant, will cost little.

Since either a policy of reversing all convictions in which error occurs, or reversing only those in which error is harmful, is likely to deter intentional errors, the former policy will yield a higher level of social welfare by avoiding the costs of distinguishing between harmful and harmless error. This conclusion differs from that of Part I, but there we took as given the fraction of cases in which error occurred. When error is a prosecutor's choice variable that depends on the action of the appellate court, welfare is maximized by reversing all cases in which intentional error occurs, even though not all such errors are harmful ($h < 1$). Since in that regime no errors are committed, all cases are affirmed, and social welfare is maximized.¹⁸ As we are about to see, this conclusion is falsified when we consider inadvertent error; and since it may be as difficult for the appellate court to distinguish between intentional and unintentional errors as to determine the influence of error on the particular jury, a rule of automatic reversal in intentional-error cases may not be optimal. In fact, it may be more difficult to determine whether an error was intentional than whether it was harmless. The court can guess whether the error is the sort that would be likely to sway the average jury, but to determine whether the prosecutor had committed the error deliberately would require a difficult and usually inconclusive inquiry into the prosecutor's state of mind, though we will suggest later a possible proxy for deliberateness that is easier to observe.

There is another reason not to have a rule of automatic reversal of intentional errors, and it has to do with the fact that the prosecutor cannot appeal an acquittal. This means that defense counsel may have a strong incentive to procure an error in his client's favor, knowing that if the error

One can show that r^* will be greater (1) the smaller is x (i.e., the smaller the cost of retrial if the conviction is reversed); (2) the larger is B ; (3) the larger is q (holding p constant); and (4) the smaller is p (holding q constant).

¹⁸ This result is analogous to the proposition in the economic analysis of intentional torts that the optimal solution is to deter the tort from being committed in the first place. See, e.g., William M. Landes and Richard A. Posner, *The Economic Structure of Tort Law*, ch. 6 (1987).

“works” and results in an acquittal there will be no appellate correction. One way of reducing this asymmetry is the doctrine of “invited error,” which excuses the prosecutor who violates a rule as a means of self-help against defense counsel’s violations. Second, since a judge who fails to catch and correct the prosecutor’s flagrant errors may likewise fail to catch defense counsel’s flagrant errors, a rule of automatic reversal if the defendant is convicted would give defense counsel a kind of free pass at violating the rules. We shall not be surprised to find, therefore, in the empirical part of our paper, that not all flagrant errors in the prosecution’s favor do lead to reversal.

2. Unintentional Error

Assume that the prosecutor can reduce the likelihood of unintentional or inadvertent error by expenditures w , so that we have $e = e(w)$ and $e_w (= \partial e / \partial w) < 0$.¹⁹ In contrast to case of intentional error, the appellate court’s reversal policy will not eliminate all unintentional error because the benefits from additional care (i.e., time, effort, and other resources) beyond some level will typically be less than the costs. How much the prosecutor will spend on care will depend, in part, on the appellate court’s policy. When all errors are reversed, the prosecutor will choose w to maximize U where

$$(11) \quad U = (1 - e(w))pB + e(w)[hq(pB - x) + (1 - h)p(pB - x)] - x - w.$$

But when only harmful errors are reversed, he will select w to maximize

$$(12) \quad U = (1 - e(w))pB + e(w)[hq(pB - x) + (1 - h)pB] - x - w.$$

The value of w that maximizes (11) will be greater than the value that maximizes (12) because the prosecutor’s loss from error is greater in (11) than (12). If the defendant is convicted but a harmless error occurs, the prosecutor receives $(pB - x)$ in (11), since he must retry the defendant, but B in (12), since the appellate court will let the conviction stand.²⁰ Hence, if a harmless error occurs, the prosecutor loses more (or gains less) from a conviction in (11) than (12).

An appellate court policy of reversing all errors lowers welfare, in the case of unintentional errors, compared to a policy of reversing only harm-

¹⁹ We ignore the possibility that expenditures on w may divert resources away from prosecuting defendants and therefore reduce p . We also assume diminishing marginal product for error reduction ($e_{ww} > 0$).

²⁰ Maximizing (11) and (12) with respect to w yields the first-order conditions

$$(11a) \quad -e_w[pB - (hq(pB - x) + (1 - h)p(pB - x))] - 1 = 0$$

$$(12a) \quad -e_w[pB - (hq(pB - x) + (1 - h)pB)] - 1 = 0.$$

Since $[hq(pB - x) + (1 - h)p(pB - x)] < [hq(pB - x) + (1 - h)pB]$ and there are diminishing returns to w will be greater in (11a) than in (12a).

ful errors. Remember that both policies result in zero intentional errors but that the former entails lower information costs and so is preferable. Not so in the case of unintentional error. In that case, because it is costly to avoid committing the error, a rule of automatic reversal where error is found will result in some reversals in harmless-error cases, and we know from Part I that reversals in such cases are welfare reducing. This conclusion depends, it is true, on the cost to prosecutors of avoiding inadvertent error. If it is trivial, errors and therefore reversals will be few even under a rule of automatic reversal. But the complexity of modern criminal procedure suggests that a zero level of inadvertent errors could not be attained at reasonable cost.

3. Incentives of Appellate Judges

We have thus far treated the appellate judges as simple social-welfare maximizers, without considering their actual utility functions. This is not an area in which economic analysis has made great progress, because of the efforts that society makes to divorce judicial decisions from the personal economic interests of the judges. However, it is plausible to assume that judges want to keep their caseloads down, to increase the average quality of their product, to have more leisure, and to forestall criticisms that they are not satisfying the public demand for judicial services. The harmless error rule reduces the number of appeals by reducing the number of retrials (and subsequent appeals); it may well also reduce the average cost of an appeal by enabling the court to “duck” difficult issues by finding that, even if the defendant is right about the issue, the error in its resolution by the trial court was harmless.

But it would not be in appellate judges’ self-interest to interpret the harmless error rule too expansively or even always to consider the issue of harmless error ahead of the issue of error even when the former was the easier. The appellate court can limit its caseload by laying down clear rules of law to guide prosecutors, defense counsel, and trial courts; to lay down such a rule, however, it needs an issue, which it loses if it resolve an appeal on the ground that if there was an error (which the court is not deciding) it was harmless. Also, too lax a standard of harmless error would, by reducing the cost to prosecutors of errors, increase the number of errors and hence the number of appeals and the number of issues per appeal (every error being a separate issue).

III. EMPIRICAL ANALYSIS

Our analysis has a number of empirical implications. Most of these concern the structure of the harmless error rule. We have discussed these, and we have found that in general the rule is consistent with the analysis. In addition, however, we have constructed a sample of appellate cases that enables us to test quantitatively several implications of the economic model.

1. Intentional errors will be less likely to be forgiven, as being harmless, than unintentional ones.

2. Prosecutor errors are more likely to be forgiven than judge errors, both because judge errors are likely to have greater influence on jurors and

because an incompetent or inattentive judge who has failed to correct a prosecution error at trial is quite likely also to have failed to correct an offsetting defense error. Hence, the net effect of even flagrant and apparently harmful prosecution errors may be negligible.

3. Errors are less likely to be harmful when defendants face a higher error-free probability of conviction. We test this by looking at cases in which there is more than one defendant. These are primarily conspiracy cases. Since federal conspiracy law is highly favorable to prosecutors (for example, admissions by one conspirator within the scope of the conspiracy are admissible against all), defendants in these cases should face higher error-free conviction probabilities.

4. Appellate courts are more likely to publish an opinion when they are reversing the lower court, since the likelihood that the case presents a difficult issue on which precedent would be helpful is greater when there is disagreement among judges (i.e., the appellate judges disagree with the trial judge).

A. Description of Data and Comparison of Means

Table 2 lists the variables in our analysis. The data come from a sample of 1222 defendants in all 963 federal appellate criminal cases, published or unpublished (including habeas corpus, which is technically civil), decided in 1996, 1997, and 1998, in which the majority opinion mentions “harmless” error: not necessarily finding that an alleged error was harmless, but indicating that whether an alleged error was harmless or harmful was an issue meriting discussion.²¹ Seven percent of our sample involve flagrant (i.e., intentional²²) errors; the rest are inadvertent or unintentional errors. Although the classification is inherently somewhat subjective, both consensus among our research assistants and certain features of the data discussed below indicate that the classification is reasonably accurate and not biased. We also classified the outcome of each defendant’s appeal according to whether the conviction and sentence was affirmed, reversed, remanded, or vacated.²³ For some defendants, a conviction or sentence was affirmed in part and reversed, remanded or vacated in part. We counted these outcomes as “not affirmed” because some part of the lower court’s judgment was thrown out. The variable NACS denotes that the defendant’s conviction or sentence or both were not affirmed in their entirety. NAC denotes that the defendant’s conviction was not affirmed its entirety (i.e., no sentencing error is mentioned).

²¹ All appeals are by convicted defendants; appeals by prosecutors are rare and are not included in our sample. Other details of our procedures in compiling the sample are available from the authors.

²² Since we cannot determine the prosecutor’s state of mind, we use the flagrancy of the error as a proxy for the likelihood of its being intentional.

²³ When the defendant’s appeal only claimed sentencing error (about 13 percent of the sample), we assumed the conviction was affirmed. When the appeal discussed only a conviction error (about 20 percent of the sample did not discuss the sentence), we assumed that (unless the sentence was reversed) the sentence was affirmed.

**Table 2: Summary of Data
Criminal Appeals, U.S. Courts of Appeals 1996-1998
963 Cases Involving 1222 Defendants**

<i>Variable Name</i>	<i>Definition</i>	<i>Means</i>		
		<i>All</i>	<i>Flagrant</i>	<i>Inadvertent</i>
NACS	1 if conviction or sentence not affirmed	.19	.26	.19
NAC	1 if conviction not affirmed	.13	.16	.13
FLAG	1 if flagrant error	.07	--	--
PRETRIAL	1 if pretrial error	.08	.06	.09
TRIAL	1 if trial error	.79	.90	.78
SENT	1 if sentencing error	.13	.04	.14
COURT	1 if court error	.90	.15	.95
PROS	1 if prosecutor error	.10	.85	.05
HARMFUL	1 if error harmful	.14	.23	.13
HARMLESS	1 if error harmless	.45	.48	.44
ARGUABLY	1 if arguably error but clearly harmless	.42	.32	.43
REMAND	1 if remanded to establish nature of error	.01	.00	.01
PUB	1 if opinion published	.57	.68	.56
SUMMARY	1 if per curiam, summary order or order	.41	.30	.41
HABEAS	1 if habeas appeal	.03	.01	.03
DRUG	1 if drug crime	.51	.49	.51
MULTI	1 if case involved 2 or more defendants	.32	.41	.31
Cir 1	1 if 1 st Circuit	.03	.06	.03
Cir 2	1 if 2 nd Circuit	.10	.06	.10
Cir 3	1 if 3 rd Circuit	.02	.02	.02
Cir 4	1 if 4 th Circuit	.13	.04	.13
Cir 5	1 if 5 th Circuit	.09	.17	.09
Cir 6	1 if 6 th Circuit	.09	.09	.09
Cir 7	1 if 7 th Circuit	.07	.01	.08
Cir 8	1 if 8 th Circuit	.08	.04	.08
Cir 9	1 if 9 th Circuit	.23	.30	.22
Cir 10	1 if 10 th Circuit	.07	.06	.07
Cir 11	1 if 11 th Circuit	.04	.09	.04
Cir 12	1 if D.C. Circuit	.05	.06	.05

Note: All variables are dummy variables that take the value 1 for the particular attribute and 0 otherwise

The summary statistics in Table 2 reveal that 19 percent of the defendants had at least some part of their sentence or conviction reversed, remanded or vacated (NACS), whereas the corresponding figure is 13 percent for convictions only (NAC). About 90 percent of the alleged errors occurred before or at trial (8 percent at pretrial and 79 percent at trial) and 13 percent at the sentencing stage.²⁴ Ten percent of the errors were committed by prosecutors (e.g., informing the jury that the accused refusal to take the stand indicates guilt) compared to 90 percent for the judges (e.g., faulty jury instructions or admitting inadmissible evidence). Yet if we subdivide the sample into flagrant (81 defendants) and inadvertent (1141)

²⁴ If an error occurred at more than one stage, we recorded the error as occurring at the earlier stage.

errors, prosecutors committed 85 percent of the former (see the column labeled "*Flagrant*") while judges committed more than 95 percent of the latter (see the column labeled "*Inadvertent*").²⁵

Drug convictions comprise about one-half the sample, appeals with more than one defendant nearly one-third, habeas corpus cases about 3 percent, and published opinions about 57 percent. More than 40 percent of the sample consist of either per curiam opinions or unpublished orders. In 87 percent of the cases, the errors were held to be harmless—in 45 percent the appellate court found errors but held that they were harmless and in another 42 percent the court concluded that even if there was an error (which the court did not decide), it was harmless.

Of the 81 flagrant error cases, 23.5 percent were deemed harmful by the appellate court, compared to 13.5 percent for the 1141 inadvertent-error cases—a statistically significant difference (t statistic = 2.49) that is consistent with our prediction. But when we take the next step and ask whether the appellate court is less likely to affirm the defendant's conviction or sentence (or both) in the case of flagrant errors, the evidence is less decisive. Although non-affirmances are greater for flagrant errors (26 percent compared to 19 percent), the difference is only marginally significant (a t-statistic equal to 1.54).

For the moment, consider prosecution errors only. If, as is likely, prosecutors are more likely to commit deliberate errors in weak than in strong cases, errors in the former type of case are less likely to be harmless (recall that all cases in the sample are appeals from convictions), implying a higher rate of reversal irrespective of whether the appellate court weights a flagrant error more heavily, in deciding whether to reverse, than an inadvertent one. The appellate court might, moreover, treat the flagrancy (and so likely deliberateness) of the error as a signal that the prosecutor knew he had a weak case, and this would make the court more likely to reverse quite apart from any policy of seeking to punish prosecutors. The counter-argument is that a trial court judge who has failed to correct a flagrant prosecution error probably failed to correct a flagrant defense error as well. The net effect of these errors might well cancel out so the appellate court would not infer harmfulness from the deliberateness of the prosecutor's error. The data, however, suggest that the first effect dominates (maybe because our sample cases are all convictions) an inference that prosecution and defense errors cancel out. Of the 126 convicted defendants in our sample in which the prosecutor committed an error, 69 (55 percent) were flagrant and 57 (45 percent) inadvertent. Flagrant errors had a higher reversal rate (22 percent compared to 9 percent) and this difference is statistically significant (t statistic equal to 2.00).

Drug cases are virtually an identical fraction (around 50 percent) of the subsamples of flagrant and inadvertent error cases. A significantly higher fraction of the flagrant error cases are decided in published opinions (68 percent compared to 56 percent for inadvertent errors).²⁶ This is

²⁵ The hypothesis that prosecutors and courts commit the same fraction of flagrant and inadvertent errors is rejected. The t-statistic on the difference in the fraction of intentional or inadvertent errors committed by prosecutors and courts exceeds 30.

²⁶ The t-statistic is 2.24.

as one would expect whether reversal was more likely in the former group because they were harder cases or because the court of appeals weights flagrant errors in deciding harmlessness. A higher fraction of the flagrant error cases involve multiple appellants (41 percent compared to 31 percent though the effect is only marginally significant with a t-statistic equal to 1.82), but, as we discuss later, it is doubtful whether this makes them more difficult for prosecutors to win.

In courts known to be “conservative,” such as the Fourth and Seventh Circuits, the ratio of flagrant to inadvertent errors is significantly lower (t-statistics greater than 2) than in the Ninth Circuit, which is well known to be the most “liberal” of the courts of appeals. Two interpretations are possible. One is that since prosecutors are more likely to win anyway in the conservative circuits, they have less incentive to commit flagrant errors, which even conservative courts might punish. The other is that conservative courts are less likely to find flagrant errors. This pattern incidentally suggests that our classification of cases as either flagrant or inadvertent is accurate or at least unbiased. Likewise the fact noted earlier that a much higher fraction of flagrant errors are what we classify as “prosecution” rather than “court” errors, the former being illustrated by a prosecutor’s using inflammatory language in closing argument and the latter by the trial judge’s giving an erroneous instruction. In both cases the error is likely to have been incited by the prosecutor, but when the court mediates the error, as it were, for example by agreeing to give an erroneous instruction proposed by the prosecutor, the error is much less likely to be flagrant; if it were flagrant, the court would not have been fooled. In contrast, when the prosecutor is committing the error without having first to persuade the judge, the opportunity for flagrant error is greater.

An alternative to “punishing” flagrant errors by reversal, which punishes not only the prosecutor but also, if it is clear that the defendant is guilty, the public would be to decouple harm and flagrancy and punish prosecutors through separate sanctions, for example disbarment. In effect the law does this, since no matter how deliberate and outrageous the error committed or procured by the prosecutor is, the appellate court will affirm if the error was harmless (unless the case falls into the small category of per se reversible errors). This seems the economically correct approach.

B. Probit Analysis

The following system of equations formalizes the relationships that we have examined earlier:

- (13) FLAG = f(PROCS, v, u)
- (14) HARMFUL = f(FLAG, PROCS, v, u)
- (15) PUBLISHED = f(NACS, NAC, FLAG, PROCS, v, u)
- (16) SUMMARY = f(NACS, NAC, FLAG, PROCS, v, u)

The upper-case variables above are defined in Table 2, v is a set of other independent variables (e.g., trial or pretrial or sentencing error, drug convictions, multiple offender appeals, habeas corpus cases, and circuit variables that are also defined in Table 2), and u denotes the residuals. Be-

cause the dependent variable in each equation is dichotomous, we estimate a series of maximum-likelihood probit regressions. Since each independent variable is also categorical, the reported regression coefficients denote the change in the probability that the dependent variable goes from 0 to 1 (e.g., from an inadvertent to a flagrant error in equation (13)) as the independent variable changes from 0 to 1. The reported z statistic (analogous to the t statistic in ordinary regression analysis) is normally distributed and equals the ratio of the probit coefficient to its standard error and is normally distributed. So, for example, the coefficient of .584 on PROS in equation (13) and reported in Table 3 indicates that an error committed by the prosecutor increases the probability of a flagrant error by .584, compared to an error committed by the lower court. Since z is nearly 14, the null hypothesis that PROS has no effect is clearly rejected. The probit analysis enables us to separate out the effects of the different variables.²⁷ We consider each of the probit regressions in turn.

In the Flagrant Error regression in Table 3, two variables (other than the circuit dummy variables) are statistically significant. A flagrant error is much more likely to be due to the prosecutor than to the trial judge (as expected) and less likely to have been committed before trial, possibly because errors are less likely to be observed then. We also find that errors are less likely to be found flagrant in most circuits compared to the 9th circuit (the left out variable) although only in the 6th and 7th circuits are the negative coefficients statistically significant. Overall, the circuit dummy variables are highly significant.²⁸

In Table 4, the Harmful Error regression, a flagrant error increases the probability of the error being deemed harmful by 20 percent, and the sign is statistically significant. Notice also that holding flagrancy constant, an error committed by the prosecutor is significantly *less* likely to be deemed harmful than one committed by the judge, probably because a judge's error is thought to carry more weight with the jury. The jury may expect the prosecutor to go overboard to get a conviction, but the judge to be both impartial and correct.²⁹ And as mentioned above, a trial judge that

²⁷ A couple of technical notes: (1) the Ninth Circuit is the left-out variable, which means that the coefficients on the other circuits represent the change in the probability of the dependent variable as the circuit changes from the Ninth to whatever other circuit is being examined. (2) Although the individual circuit dummies are often statistically insignificant, taken as a whole they are significant, as shown by the log-likelihood ratio test listed at the bottom of the equations that exclude the circuit variables. For example, in the Flagrant Error equation, the test statistic is 22.82, indicating that circuits are significant at the .02 level. In other words, there is a circuit effect on the propensity to find a flagrant error. (3) In the Published Decisions and Summary Orders regressions, some observations are deleted when the circuit dummy variables are included, because of lack of variation in the dependent variable for a deleted circuit.

²⁸ See the log likelihood test for the circuit variables reported at the bottom of Tables 3 to 6.

²⁹ We also estimated a probit regression on the dependent variable NACS, which takes the value 1 if the lower court conviction or sentence or both were not affirmed and 0 otherwise. Since a harmful error will lead the appeals court to reverse the lower court, we expect the coefficient on HARMFUL to be approximately 1 if we have accurately compiled and interpreted the information in the opinions. As expected, the estimated coefficient

fails to catch and correct a flagrant prosecutor error may likewise fail to catch and correct a flagrant defense error. If so, the net effect of these offsetting errors on the probability of conviction will be slight. We tested this hypothesis further by replacing the flagrant error and prosecution error variables with three variables: prosecution flagrant error, court flagrant error and prosecution inadvertent error. The left out variable is court inadvertent error. Although both flagrant error variables have positive coefficients (.29 for court error and .05 for prosecution error), only the court error is statistically significant (a z-statistic of 2.48 whereas the z-statistic on the prosecution flagrant error variable is 1.13). In contrast, the prosecution inadvertent error variable is negative (-.06) though only marginally significant (z-statistic of 1.29) compared to the left-out inadvertent court error variable. Taken as a whole, the coefficients on the three error variables and the left-out variable imply the following ranking of harmfulness. Court flagrant errors are most likely to be found harmful, followed by prosecution flagrant errors and then court inadvertent errors. The appellate court is least likely to find that prosecution inadvertent errors are harmful.

Notice in Table 4 the statistically significant negative effect on a finding of harmful error of there being more than one defendant. A possible reason is that such cases are primarily conspiracy cases, and federal conspiracy law is highly favorable to prosecutors (for example, admissions by one conspirator within the scope of the conspiracy are admissible against all). Since the error-free probability of convicting defendants in conspiracy cases would be high, the appellate court is more likely to find an error harmless in reviewing a conspiracy conviction.

Two other results in Table 4 should be noted. One surprise is that habeas corpus, contrary to our prediction, is not a good proxy for harmfulness. We expected that because habeas corpus cases involve older (often very old) convictions, the defendant will, and in terms of our model he should, have great difficulty showing that his conviction should now be set aside.³⁰ Although positive, the habeas corpus variable is statistically insignificant in both the flagrant error and harmful error regression.³¹ Eight of the 11 circuit dummy variables are negative implying that the 9th circuit (the left-out variable) is more likely to find an error harmful relative to most other circuits. In particular, the 2nd, 4th and 6th circuits dummy variables are all highly significant. Although the coefficient on the 7th circuit variable is negative, it is not significant.

Table 5 (Published Decisions) reveals that appellate courts are much more likely to publish an opinion when they are not affirming the lower court (the increase in probability is .34), since the likelihood that the case

on HARMFUL is .9449637 and the z-statistic is 13.32, indicating that a harmful error increases the probability of not affirming the lower court decision from about 0 to 1.

³⁰ Counting from the date the trial ended or a plea of guilty was entered, and ending with the latest appeal, habeas corpus cases have been in the system slightly more than 6 years on average. (This is based on data for 33 of the 35 habeas corpus cases in our sample.) In comparison, a random sample of 73 non-habeas corpus cases starting from the time the trial ended have been in the system for just under 2 years.

³¹ It is also statistically insignificant in the probit regression on the dependent variable NACS.

presents a difficult issue on which precedent would be helpful is much greater when there is disagreement among judges (i.e., the appellate judges disagree with the trial judge). Most of the circuit variables are both highly significant and positive, signifying that the Ninth Circuit publishes an abnormally small fraction of its criminal decisions. For example, the probability that the 2nd, 6th and 7th circuit publish criminal appeals is about .5 higher than the 9th circuit other things the same. The signs of the other statistically significant variables—prosecutor error, pretrial error, drug cases, and multiple defendants all increase the likelihood of publication—are a little mysterious, particularly pretrial error. Drug cases and multiple defendant cases tend to involve heavier sentences, implying that a heavier investment of judicial resources may be optimal (and judges invest more in preparing published decisions, because in general only published decisions are citable as precedent in future cases). Yet drug cases have a negative sign while multiple defendant cases are more likely to be published. The sign on prosecutor error may reflect a desire by the appellate courts to give publicity to such an errors in order to deter them; judge errors are much more likely to be perceived as inadvertent, and there may also be some tendency for judges to try to minimize public criticism of other judges.

The last regression, Table 6 (Per Curiam and Summary Order Decisions), is related to the previous one because most published decisions carry the name of the authoring judge (if they do not, they are called “per curiam” opinions), and the vast majority of unpublished decisions (often called “orders”) do not, and thus are per curiam too. The results are similar to those in Table 5 but, as expected, in the opposite direction. It is worth noting that appeals involving sentencing errors are more likely than other errors to be decided per curiam (both the TRIAL and PRETRIAL variables have negative coefficients though only the latter is statistically significant); this is probably because the federal sentencing guidelines have rendered the analysis of most such errors quite mechanical. As expected, we find that habeas corpus cases, which tend to be more routine, are more likely to be disposed of by a per curiam decision; the coefficient on the habeas corpus variable is highly significant and raises the probability of a per curiam or summary order from about .40 to .67. Habeas corpus cases are also less likely to result in published opinions (see Table 5), though the coefficient is at best marginally significant.

In Tables 5 and 6 we experimented with substituting for “NACS” (i.e., not affirm the conviction or affirm the conviction but reverse the sentence) two new variables, “not affirm conviction” and “not affirm” sentence. The coefficients of the two variables turned out not to be significantly different from each other (see the test statistics following the regressions in Tables 5 and 6) so that we cannot reject the hypothesis that reversing a sentence is as likely as reversing a conviction to result in a published decision and as unlikely to result in a per curiam decision. This result is not particularly surprising. Most alleged sentencing errors are quickly resolved by reference to the sentencing guidelines; so when the appellate judges disagree with the trial judge about the application of the

guidelines, this suggests the need for a careful appellate effort to craft a precedent that will dispel the issue for the future.

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