THE MARGIN OF ERROR ON DAMAGES CALCULATIONS BASED ON SAMPLE SURVEY DATA IN CLASS ACTION WAGE AND HOUR CASES

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Abstract

The margin of error associated with the sample survey data has been a persistently controversial statistical measurement when measuring class wide damages in a class action wage and hour case. The source of controversy stems from two legal decisions which specifically state that certain margins of error with respect to the sample mean were too high. These cases are *Bell v. Farmers Insurance* and *Duran v. U.S. Bank*. In *Bell*, the court found a margin of error of 32.4 percent was unacceptable and in *Duran* the court found a margin of error of 43.3 percent was unacceptable. However, neither of these legal decisions specified the acceptable range for the margin of error. Moreover, these legal decisions do not address the potential remedies for a margin of error that may be considered too high, such as projecting damages from the lower bound of the one-tailed or two-tailed confidence interval; or reducing the level of confidence. The purpose of these remedies is to provide the trier of fact with a projection of damages that allows them to make an award to the class members in accord with generally accepted statistical science that protects and balances the welfare of defendants and plaintiffs. The damages amount projected from the lower bound of the one-tailed or two-tailed confidence interval protects the welfare of defendants by ensuring they are not overpaying for damages with a degree of procedural reliability specified by the level of confidence. The welfare of the class members is protected by receiving compensation that is potentially below the amount due rather than having their claim dismissed due to a margin of error that may appear high in light of the *Bell* and *Duran* decisions.

I. Introduction

The margin of error is a statistic that can be utilized to assess the predictive limits of survey data. It is defined as the boundaries of random sampling error with respect to the sample mean of the survey data. The margin of error derives from the standard error of the survey data. The standard error is the standard deviation of the sample data adjusted for the sample size. The standard error is then combined with a "Z score" or "t score" to determine the confidence interval around the sample mean. The upper and lower bounds of the confidence interval determine the margin of error.

The margin of error is a controversial statistic in a class action wage and hour case when sample data is being utilized to project class-wide damages. A relatively high margin of error can lead legal authorities to determine that class-wide damages cannot be predicted with sufficient accuracy and therefore no damages are awarded to the class. The legal precedents for making this determination which are often cited are the decisions in *Bell v. Farmers Insurance* (hereafter referred to as *Bell*) and *Duran v. U.S. Bank* (hereafter referred to as *Duran*). *Bell* is a California Court of Appeals decision and *Duran* is a California Supreme Court decision. In both cases, the courts cited margins of error that they found "presented a constitutional dimension" (wording used in *Bell*) and "intolerably high" (wording used in *Duran*). The *Duran* decision stated that *Bell* is the "premier case approving the use of representative testimony in an overtime class action."

The underlying statistical issue of the decisions in *Bell* and *Duran* regarding the margin of error are the concepts of *Type I* and *Type II* errors. Neither decision specifically references these types of errors, but the language clearly shows that these issues are being addressed. The courts are trying to balance awarding damages when a relatively high error rate is present (*Type I*

error) versus failing to act on statistical evidence by being overly conservative (*Type II error*). In both cases, the courts were persuaded that the possibility of a *Type I error* outweighed the possibility of a *Type II error*. However, in both cases the courts cited that the specific facts of the case led to this conclusion, not the margin of error alone. In *Bell*, the decision states "We do not mean to suggest that the margin of error alone may afford a bright-line constitutional distinction." Therefore, simply stating that margins of error in *Bell* or *Duran* were found to be too high is a superficial reading of these decisions. A more careful reading shows that the justices did not make their decisions based on margin of error alone and left open the possibility for remedies for high margins of error associated with *Type I error*.

The purpose of this article is two-fold. First, to present a clear and concise discussion explaining why the sample data was rejected in *Bell* and *Duran*. It has been our experience that these decisions are often misrepresented by interested parties in legal cases. Second, to present statistical remedies that can be applied to sample data such that legal authorities will feel confident that the possibility of committing a *Type I error* (the employer does not overpay) is minimized; while clarifying the danger of this approach with respect to a negative impact on the employees (through the commission of *Type II error).* Prior to articulating our two-fold purpose, background information is presented to clarify why survey data is acceptable for projecting class-wide damages in wage and hour cases.

II. The Usage and Acceptability of Survey Data in Class Action Wage and Hour Cases

Class action wage and hour cases cover a variety of damages that may be claimed by the plaintiffs, such as unpaid overtime, failure to provide meal and rest breaks, or unreimbursed work expenses. If data regarding the damages being claimed is not available from defendant's

employment records, a survey of the class members can be taken to obtain a data sample from which to project damages. According to the decision in *Bell*, the seminal legal case to address this issue is *Anderson v. Mt. Clemens Pottery Co.* (hereafter "*Mt. Clemens*"). The decision in *Mt. Clemens* states employees may provide testimony on the amount of damages when their employer fails to keep proper records and damages may be awarded based on this testimony:

> The solution [to the lack of employer records] is not to penalize the employee by denying him any recovery on the ground that he is unable to prove the precise extent of uncompensated work. Such a result would place a premium on an employer's failure to keep proper records in conformity with his statutory duty; it would allow the employer to keep the benefits of an employee's labors without paying due compensation as contemplated by the Fair Labor Standards Act. In such a situation we hold that an employee has carried out his burden if he proves that he has in fact performed work for which he was improperly compensated and if he produces sufficient evidence to show the amount and extent of that work as a matter of just and reasonable inference. The burden then shifts to the employer to come forward with evidence of the precise amount of work performed or with evidence to negative the reasonableness of the inference to be drawn from the employee's evidence. If the employer fails to produce such evidence, the court may then award damages to the employee, even though the result be only approximate.

According to the *Bell* decision, "Following *Mt. Clemens,* the federal courts have consistently granted back wages to non-testifying employees on the basis of a pattern or practice adduced from the testimony of other employees within their job category."

The Federal Judicial Center's Reference Manual on Scientific Evidence (hereafter "Reference Manual on Scientific Evidence") states that sample surveying is an accepted method in legal proceedings:

> *Sample surveys* are used to describe or enumerate the beliefs, attitudes, or behavior of persons or other social units. Surveys typically are offered in legal proceedings to establish or refute claims about the characteristics of those individuals … As a method of data collection, surveys have several crucial potential advantages over less systematic approaches. When properly designed, executed, and described, surveys (1) economically present the characteristics of a large group of respondents or other units and (2) permit an assessment of the extent to which the measured respondents or other units are likely to adequately represent a relevant group of individuals or other units (Diamond 2011).

Moreover, the Reference Manual on Scientific Evidence states that surveys are an efficient way to inform the trier of fact. Also, the failure to conduct a survey suggests that survey responses would have been unfavorable to the plaintiff:

> Although surveys are not the only means of demonstrating particular facts, presenting the results of a well-done survey through the testimony of an expert is an efficient way to inform the trier of fact about a large and representative group of potential witnesses. In some cases, courts have described surveys as the most direct form of evidence that can be offered. Indeed, several courts have drawn negative inferences from the absence of a survey, taking the position that failure to undertake a survey may strongly suggest that a properly done survey would not support the plaintiff's position (Diamond 2011).

The *Bell* and *Duran* cases did not question the use of survey data for projecting class-wide damages. *Bell* states, "The applicability of inferential statistics have long been recognized

by the courts." The issues regarding sample survey data in *Bell* and *Duran* had to do with the specific problems the justices found in the methodology utilized in those cases. The following sections address specifically why the justices found the margins of error too high in *Bell* and *Duran*.

III. The Margin of Error in *Bell*

The class members in the *Bell* case consisted of claims representatives that worked for Farmers Insurance. They were claiming misclassification as exempt from overtime and were due back pay for overtime hours worked. The total number of class members was 2,402. The data to measure damages was collected from a sample of class members through the deposition testimony of 295 class members. The results of the data sample showed an average of 9.42 hours of unpaid overtime per week with a margin of error of 9.6 percent and an average of 0.37 hours of unpaid double-time with a margin of error of 32.4 percent.

The computation of overtime damages based on the sample mean of 9.42 hours was accepted in the decision. The decision states, "We conclude that the proof of aggregate damages for time-and-a-half overtime by statistical inference reflected a level of accuracy consistent with due process under the Doehr balancing test." The Doehr balancing test refers to the United States Supreme Court decision in *Connecticut v. Doehr*, to determine whether the sampling methodology was permissible. The ruling in *Bell* that a 9.6 percent margin of error was acceptable has led to legal authorities accepting ten percent at the threshold for an acceptable margin of error. A ten percent margin of error is often called the "*Bell* standard."

The computation of double-time damages based on the sample data was rejected and no damages were awarded for double-time. Specifically, the *Bell* decision cites the analysis of

defendants' statistical expert who calculated that "the distribution of employees claiming unpaid double time was highly skewed. Some 83 employees claimed some amount of unpaid double-time compensation, but only 54 employees claimed 0.37 hours or more, and a group of only 16 employees accounted for half of the double-time award." The commentary by the court as to why no damages were being awarded is as follows:

> In our view, the possible inaccuracy of the estimate of unpaid double-time compensation presents an issue of constitutional dimension. We do not mean to suggest that the margin of error alone may afford a bright-line constitutional distinction. The reliability of an estimate subject to a large margin of error might conceivably be bolstered by evidence of a high response rate, probable distribution within the margin of error, absence of measurement error, or other matters. We have been unable to find in the present record, however, anything that addresses the issues of reliability involved in the calculation of double-time damages. The estimate of unpaid double-time pay appears as a kind of afterthought in the trial management plan. The parties' experts did not offer foundational calculations for the determination of double-time or propose an appropriate class size, margin of error, or sampling methodology (Bell 2004).

It is clear from this wording that the 32.4 percent margin of error was a factor in making the determination of not awarding double-time damages but not the only factor. The main issue cited is the skewed data which is an important issue in class action cases. The data for the sampled class members will be used to determine a payment for the non-sampled class members. The court noted statistical sampling can provide an accurate aggregate damages amount but "from the perspective of the administration of justice, we see an important negative consequence of the use of statistical sampling to calculate damages: it necessarily yields an average figure

that will overestimate or underestimate the right to relief of individual employees." The court clarifies it position by stating the issue involves weighing the benefits of letting the class action proceed versus the inability to precisely calculate damages for the non-sampled class members (Gustafson 2012). The data sample showed approximately 28 percent of class members had a claim for damages and five percent of the class members had a claim for more than 50 percent of the damages. Therefore, it can be inferred the court felt this was an untenable situation since 72 percent of the non-sampled class would be receiving a payment for which they were not entitled.

In summary, the portion of the *Bell* decision where sample data was rejected does not rely solely upon the margin of error. Numerous other factors were considered with primary emphasis on the survey responses for double-time hours being highly skewed.

IV. The Margin of Error in *Duran*

The class members in the *Duran* case were loan officers that worked for U.S. Bank. They were claiming misclassification as exempt from overtime and were due back pay for overtime hours worked. The total number of class members was 260. The data to measure damages was collected from a sample of 22 class members -- 20 were randomly selected plus the two named class representatives. The results of the data sample showed an average of 11.86 hours of unpaid overtime with a margin of error of 43.3 percent.

The computation of overtime damages based on the sample data was rejected and the earlier ruling awarding damages was reversed. The conclusion of the decision states, "Here, there can be little question that the trial court's findings on liability and damages would have been different absent its erroneous exclusion of evidence and reliance on faulty statistical methodology."

As in the case of the *Bell* decision, the margin of error was one factor among many cited by the court when making this determination. The "faulty statistical methodology" was not solely the margin of error on the sample data. The section of the decision titled "Intolerably Large Margin of Error Resulted" lists several reasons as to why the sample data was found unreliable. The decision states:

> Contrary to the court's findings, the randomness of the sample group was repeatedly compromised, and the results obtained were marred by selection bias. The response rate for the sample group cannot reasonably be considered high given that one [sample group member] did not appear for trial, four opted out when given the opportunity, and one was removed by the court.

Moreover, the decision states that the problems with the statistical methodology derive from "the trial court invented its own sampling methodology, without input from the parties' experts." Therefore, as in the case of *Bell*, the margin of error was one issue among many that led to the decision to not award damages.

V. The Margin of Error in *Statistical Inference*

Statistics is the science of collecting, organizing and interpreting numerical facts (Moore 2003). The margin of error is an estimate of the precision of one numerical fact – the sample mean. The sample mean is a moving target in survey data because rarely will two sample means be the same when collected from the same population. This can be confounding to legal authorities who want to make legal decisions based on certainty:

> In an ideal world, if the same thing is measured several times, the same result will be obtained each time. In practice, there are differences. Each result is thrown off by chance error, and the error changes from measurement to measurement (Freedman 2007).

The margin of error describes the "chance error" if damages are awarded to class members based upon the sample mean. Legal authorities likely felt obligated to reject awarding damages based on the sample mean in the *Bell* and *Duran* cases because the chance of an errant payment by defendants was too large. A margin of error in the range of 30 to 40 percent means that there is a specified level of probability that the population mean lies within a range that is 30 to 40 percent less than the sample mean and 30 to 40 percent greater than the sample mean.

There is no guidance in statistical science quantifying what constitutes a margin of error that is too high with respect to sample survey data in class action wage and hour cases. An example of a margin of error that is too high is found in a sample mean of survey data of likely voters prior to an election. If there are only two candidates on the ballot and the sample mean shows one candidate will receive 52 percent of the vote and the margin of error is 5 percent; then the margin of error is obviously "too high." The margin of error shows that a likely outcome could be that this candidate may only receive 47 percent of the vote. The survey cannot make a prediction about who is likely to win the election with precision. This type of reasoning does not apply to awarding damages in class action wage and hour cases. Legal authorities are not deciding between the likely winner in an election; they are deciding how much to award one group of class members based on one set of data.

Survey data in a class action wage and hour case will yield a sample mean. The margin of error associated with the sample mean will depend upon the variance of the survey data and

the sample size of the data. The increasing difficulty of prompting individuals to participate in a survey can make it impossible to obtain a margin of error of ten percent or less as allegedly called for by the *Bell* standard. Historically, response rates to surveys are falling and therefore, large samples are becoming increasingly difficult to obtain (Tourangeau 2017). If it is impossible to obtain a sample size which is large enough to conform to the *Bell* standard with respect to the margin of error, legal authorities could use this outcome as a basis to award zero damages. This reasoning would neglect the welfare of the class members and provide a windfall to defendants.

VI. How Windfalls Accrue to Defendants when *Bell* Standard is Implemented

A hypothetical example containing a class of individuals with a claim for unpaid overtime demonstrates how a windfall accrues to defendants when damages are not awarded when a margin of error does not conform to the *Bell* standard. Assume a class size of 500 individuals making a claim for unpaid overtime hours due to misclassification as exempt from overtime. The textbook method described to determine the sample size required to arrive at a ten percent margin of error entails a pilot study of 50 randomly selected class members to determine the likely response rate (Diamond 2011). If the pilot survey results in only ten responses, despite the best efforts of the survey research team to contact participants and persuade them to undertake the survey, then it is likely that a survey of all 500 class members is going to illicit 50 survey responses. It has been our experience that this response rate can be a probable outcome because the contact list provided by defendants often contains a high percentage of outdated phone numbers and addresses. This does not mean a low response rate results in a biased sample (Petersen 2015). The cooperation rate (percentage taking the survey / percentage contacted on

phone) is a better indicator of potential bias (Rea 2014). In this example of 500 class members and 50 survey responses, we assume a high cooperation rate and an unbiased sample. If there is significant variance among the survey respondents to the question of the number of overtime hours worked, then an unbiased representative sample will most likely not generate a margin of error of ten percent or less.

In order to project how much overtime is due the class, the surveyed class members are asked "how many hours did you typically work per day?" and then a follow up question of "how many days did you typically work per week?" Assume all class members stated they worked five days per week and the distribution of the hours per day question was as follows:

- Ten respondents answered eight hours per day
- Twenty respondents answered nine hours per day
- Ten respondents answered ten hours per day
- Ten respondents answered eleven hours per day

Converting these responses to average hours worked per week yields the following distribution for the sample:

- Twenty percent of respondents worked 40 hours per week and therefore no overtime hours
- Forty percent of respondents worked 45 hours per week and therefore five overtime hours
- Twenty percent of respondents worked 50 hours per week and therefore 10 overtime hours
- Twenty percent of respondents worked 55 hours per week and therefore 15 overtime hours

The sample mean for this distribution is seven hours of overtime per week and the margin of error is 19.4 percent based on a 95 percent confidence interval of 5.64 hours to 8.36 hours. This margin of error may give legal authorities cause for concern because making payments to class members based on 7.0 hours of overtime per week may result in defendants possibly overpaying for damages by up to 24 percent – the percentage difference between the lower bound of the confidence interval and the sample mean. Moreover, the margin of error based on the 95 percent confidence level is substantially higher than the *Bell* standard.

If the legal authorities in this hypothetical example rely on the *Bell* standard and do not award any damages because the margin of error is above ten percent, they are granting a windfall gain to defendants. Approximately 80 percent of the class members have unpaid overtime. In other words, legal authorities are allowing the defendant to under compensate 80 percent of their labor force during the class period if they do not award damages. Therefore, defendants will realize a windfall gain because the legal authorities have adhered to the *Bell* standard.

VII. Remedies for a Margin of Error that is Higher than the *Bell* Standard

Legal authorities should not have cause for concern if the lower bound of a two-tailed or one-tailed test utilizing the 95 percent confidence interval is the methodology for projecting payments due the non-sampled class members in the above example. The lower bound of the 95 percent confidence interval for a two-tailed test in this example is 5.64 hours. A two-tailed test divides the five percent probability of error in half and places 2.5 percent on the lower bound and 2.5 percent on the upper bound. Therefore, if damages are awarded to the non-sampled class members based on 5.64 hours of overtime per week, there is a 97.5 percent procedural reliability that defendants will not be overpaying the class as a whole. The lower boundary for the one-

tailed test in this example is 5.87 hours. The one-tailed test places the entire five percent probability of error on the lower bound in this example since the purpose of the test is to ensure defendants do no overpay for damages. Therefore, there is a 95 percent procedural reliability that defendants will not be overpaying for damages if the non-sampled class members are paid 5.87 hours of overtime for each week of work.

If the lower bound of the two-tailed 95 percent confidence interval is utilized to compensate the non-sampled class members, then approximately 20 percent of the class members will be overpaid, 40 percent of the class members will be slightly overpaid and 40 percent will be underpaid. In other words, there will be a redistribution of income among the class members. For example, if "individual A" worked no overtime, they will receive 5.64 hours of overtime pay for each week worked during the class period and realize a windfall. If "individual B" worked fifteen overtime hours per week they would be undercompensated by 9.36 hours per week. However, this redistribution among the class members does not cause defendant to overpay for damages.

The above example begs the question as to which of the following options constitutes justice in a class action. Option 1: deny payments to class members and grant a windfall to defendants because the variance in data points caused a margin of error greater than ten percent. Option 2: use the lower bound of the confidence interval to award damages. The latter option ensures defendant is not overpaying and subsequently redistributes income among the class members. Undoubtably, all class members would prefer some payments for damages as opposed to no payments. Therefore, the welfare of the class members is maximized under Option 2. defendants welfare is unharmed by Option 2 since they are ensured of not overpaying for

damages. Option 1, on the other hand, rewards defendants with a windfall for wrongdoing and harms the welfare of the class members.

In statistical terms, the foregoing discussion is related to *Type I* and *Type II* errors. The *Bell* and *Duran* decisions have placed a preponderance of weight on *Type I* error. While the justices in these cases do not explicitly state a "null hypothesis," they implicitly are weighing a null hypothesis that the statistical mean does not represent the payments due the class members. Therefore, if damages are awarded from the statistical mean, a *Type I* error will result when a high margin of error is present. The justices did not reject the null hypothesis in order to limit a *Type I* error. However, this mindset can lead to a false acceptance of the null hypothesis and a *Type II* error. The *Type I* error is that defendant may be harmed by a high error rate resulting in the overpayment of damages. The *Type II* error is failing to act by being overly conservative. The discussion of using the lower bound of the 95 percent confidence interval avoids both types of errors when certain conditions are met as discussed above. Moreover, if the burden of proof were reversed and defendants were subjected to the standards put forth in *Bell* to show they *do not* owe compensation to the class members, they would face an impossible hurdle. In fact, zero damages could be the most speculative number possible when judged by generally accepted statistical standards. If statistical science shows damages are due the class with 95 percent certainty, then awarding zero damages is speculating.

A second remedy to a margin of error that does not conform to the *Bell* Standard is to reduce the level of confidence in accord with the preference of the trier of fact. For example, if the level of confidence is set at 80 percent instead of 95 percent, the margin of error falls to 12.7 percent since the confidence interval is 6.11 hours to 7.89 hours. Determining the level of confidence is a question of art, not science. There has never been a scientifically based rationale

established for only using a 95 percent confidence level. The 95 percent level of confidence is generally accepted based on convention and tradition rather than science. The Reference Manual on Scientific Evidence states "Traditionally, scientists adopt the 95 percent level of confidence," (Diamond 2011) but no scientific rationale is presented. The art that would be utilized by the trier of fact is determining the confidence required to ensure that defendants are not overpaying for damages. This is a balancing act between protecting the welfare of plaintiffs and defendants.

VIII. Conclusion

The decisions in *Bell* and *Duran* have placed constraints on awarding damages in class action wage and hour cases. If sample survey data does not meet the *Bell* standard of a ten percent margin of error, this can be grounds for legal authorities to reject survey data and not award damages to the class members. This type of reasoning is harmful to the welfare of class members and provides a windfall to defendants assuming the data set contains tolerable bias outside of the margin of error. Therefore, legal authorities should first consider whether the sample survey data points have been gathered within conformity to accepted survey science. If the answer to this question is "yes," then a margin of error higher than ten percent can be remedied. The remedy is to use the lower bound of the 95 percent confidence interval to project damages for the class members or utilize a lower confidence level.

Legal authorities who reject the lower bound of the 95 percent confidence interval as the basis for awarding damages are rejecting well-established statistical science when tolerable bias is present in survey data. The rejection of the lower bound grants a windfall to defendants for wrongdoing. Defendants do not have to pay the compensation they were supposed to pay under

the law and therefore are enriched by underpaying their employees. Legal authorities that award zero damages could be engaging in highly speculative decision making.

The lower bound of the confidence interval will result in some redistribution of income among the class members but this a preferable outcome to zero damages in terms of maximizing class members welfare. Defendants' welfare is unharmed by utilizing the lower bound for determining payments to the class members because the procedural likelihood of overpayment is 2.5 percent when a two-tailed test is used and 5.0 percent when a one-tailed test is used. Therefore, it is highly unlikely defendant will overpay for damages. If the trier of fact desires to avoid a Type II error by focusing more on the welfare of employees, a lower confidence level produces a margin of error more in line with the *Bell* standard.

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