



SCHOOL OF LAW
TEXAS A&M UNIVERSITY

Texas Wesleyan Law Review

Volume 2 | Issue 3

Article 3

3-1-1996

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Recommended Citation

Kevin S. Marshall & Kurt J. Beron, *Statistics and the Law: Proving Lost Profits*, 2 Tex. Wesleyan L. Rev. 467 (1996).

Available at: <https://doi.org/10.37419/TWLR.V2.I3.2>

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STATISTICS AND THE LAW: PROVING LOST PROFITS

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INTRODUCTION

The existence and amount of a firm's lost profits are key elements in most commercial damage cases. Practitioners must be able to demonstrate to the trier of fact the appropriateness and effectiveness of the methodology employed to calculate lost profits.¹ While practitioners generally employ experts to perform a lost profits analysis, it is essential that practitioners understand the conceptual relationship between the legal standard and the methodology employed. In Texas, the legal standard requires the use of a methodology that goes beyond the mere assertion that the plaintiff has sustained a loss. Given that standard of proof, the purpose of this article is to demonstrate that there is one superior methodology for determining lost profits: multivariate regression analysis.

I. THE LEGAL STANDARD

Historically, courts have recognized that a plaintiff is entitled to recover lost profits when it is proven that the loss of profits is caused by a defendant's act or omission and the amount of loss is shown with sufficient certainty.² Generally, anticipated profits are not recoverable when "they are dependent on uncertain and changing conditions,

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1. The trier of fact should demand such a demonstration especially given the inherently speculative nature of such an undertaking.

2. 25 C.J.S. *Damages* § 42 (1966).

such as market fluctuations, or the chances or changes of business, or where there is no evidence from which they may be intelligently estimated.”³

Although Texas law does not require lost profits be susceptible to exact calculation, it does demand such loss be ascertained with a reasonable degree of certainty.⁴ In Texas, it has long been established that before a plaintiff may recover lost profits, “the amount of the loss must be shown by competent evidence with reasonable certainty.”⁵ Thus, there are three related conceptual requirements for recovery of lost profits: 1) competent evidence; 2) reasonable certainty; and 3) causation. Each element must be established prior to recovery. Therefore, it is critical that practitioners fully understand these requirements.

A. *Competent Evidence*

The terms *relevancy*, *competency*, and *materiality* are frequently used as synonyms when in fact their meanings are distinguishable.⁶ Generally, all evidence relevant to a plaintiff’s claim for lost profits is admissible. *Relevant evidence* is evidence having a tendency to make the existence of any fact of consequence to the determination of the action more or less probable than it would be without the evidence.⁷ However, relevant evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice.⁸

While evidence may be relevant, material, and probative on the issue, it may nonetheless be inadmissible because it is not competent.⁹ *Competent evidence* is evidence that is fit and appropriate given the nature of the matter to be proved.¹⁰ Further, evidence is competent evidence if it is of a nature, sort, or type that is acceptable to the court either under the applicable rules of evidence or case law.¹¹ Con-

3. *Id.* at 737.

4. *See, e.g.,* Szczepanik v. First S. Trust Co., 883 S.W.2d 648, 649 (Tex. 1994); Holt Atherton Indus., Inc. v. Heine, 835 S.W.2d 80, 84 (Tex. 1992).

5. Southwest Battery Corp. v. Owen, 115 S.W.2d 1097, 1098 (Tex. 1938) (quoting 13 TEX. JUR. *Damages* § 114 (1938)); *accord* Holland v. Hayden, 901 S.W.2d 763, 766 (Tex. App.—Houston [14th Dist.] 1995, writ denied); General Devices, Inc. v. Bacon, 888 S.W.2d 497, 501 (Tex. App.—Dallas 1994, writ denied); General Supply & Equip. Co. v. Phillips, 490 S.W.2d 913, 921 (Tex. Civ. App.—Tyler 1972, writ ref’d n.r.e.); Texas Instruments, Inc. v. Teletron Energy Mgmt. Inc., 877 S.W.2d 276, 279 (Tex. 1994); *see also* Scott D. Marrs, *Recovering Lost Profit Damages in Texas*, 54 TEX. B.J. 645, 768 (1991) (containing an excellent summary and discussion of Texas law on the legal standard for determining lost profits).

6. 35 TEX. JUR. 3d *Evidence* § 144 (1984).

7. TEX. R. CIV. EVID. 401.

8. TEX. R. CIV. EVID. 403.

9. Hill v. State, 3 S.W. 764, 765 (Tex. Ct. App. 1886, no writ); Moody v. State, 6 S.W. 321, 323 (Tex. Ct. App. 1887, no writ).

10. Horbach v. State, 43 Tex. 242, 249 (1875).

11. *See* Mattox v. News Syndicate Co., 176 F.2d. 897, 901 (2d Cir. 1949).

versely, *incompetent evidence* is inadmissible in court on any issue regardless of its materiality or relevancy.¹²

In Texas, courts have uniformly held that competent lost profit evidence must be predicated upon objective, factual data surrounding the previous operation of the business claiming the loss.¹³ Such data may include, but is not limited to, the previous profits and expenses of the business,¹⁴ fluctuations in market conditions,¹⁵ business risks,¹⁶ operational duration,¹⁷ profitability of comparable businesses,¹⁸ the owner/operator's business experience,¹⁹ and any other relevant economic facts and circumstances impacting profits.²⁰ Therefore, when seeking to recover lost profits, a plaintiff should introduce the business' records and other objective data on market conditions and risks associated with the business. Failure to use such objective, factual data may preclude recovery of lost profits.²¹

12. See *Texas Brewing Co. v. Dickey*, 43 S.W. 577, 578 (Tex. Civ. App.—Ft. Worth 1897, no writ). Incompetent evidence is “[e]vidence which the law does not permit to be presented at all, or in relation to the particular matter, on account of lack of originality or of some defect in the witness, the document, or the nature of the evidence itself.” BLACK’S LAW DICTIONARY 765 (6th ed. 1990).

13. See *Szczepanik v. First S. Trust Co.*, 883 S.W.2d 648, 649 (Tex. 1994); *Holt Atherton Indus., Inc. v. Heine*, 835 S.W.2d 80, 84 (Tex. 1992); *Southwestern Bell Media, Inc. v. Lyles*, 825 S.W.2d 488, 497-99 (Tex. App.—Houston [1st Dist.] 1992, writ denied); *Allied Bank v. C.B.D. & Assoc.*, 728 S.W.2d 49, 54-55 (Tex. App.—Houston [1st Dist.] 1987, writ ref’d n.r.e.); see also *Texas Instruments, Inc. v. Teletron Energy Mgmt., Inc.*, 877 S.W.2d 276, 279 (Tex. 1994); *Southwest Battery Corp. v. Owen*, 115 S.W.2d 1097, 1098-99 (Tex. 1938); *Silberstein v. Laibovitz*, 200 S.W.2d 647, 650 (Tex. Civ. App.—Austin 1947, no writ).

14. *Silberstein*, 200 S.W.2d at 650; see also *Belcher v. Bullion*, 121 S.W.2d 483, 484-85 (Tex. Civ. App.—Austin 1938, no writ) (profits and rents were sufficient evidence to reasonably recover lost profits); *Bagby v. Hodge*, 297 S.W. 882, 883 (Tex. Civ. App.—Austin 1927, no writ) (as a general rule lost profits may be recovered if shown to be natural, probable consequence of act complained); *Allbritton v. Mading’s Drug Stores*, 138 S.W.2d 901, 903 (Tex. Civ. App.—Galveston 1940, no writ).

15. *Southwest Battery Corp.*, 115 S.W.2d at 1098; e.g., *General Supply & Equip. Co.*, 490 S.W.2d 913, 921 (Tex. Civ. App.—Tyler 1972, writ ref’d n.r.e.); *Holt Atherton Indus.*, 835 S.W.2d at 85 (Texas Supreme Court specifically inquired whether market conditions had any affect on the alleged lost profits).

16. *Texas Instruments, Inc.*, 877 S.W.2d at 279.

17. See *Southwest Battery Corp.*, 115 S.W.2d at 1099 (noting the importance of considering the relationship between “the amount of business done by the plaintiff in a corresponding period of time not too remote, and the business during the time for which recovery is sought”); *Atomic Fuel Extraction Corp. v. Estate of Slick*, 386 S.W.2d 180, 189 (Tex. Civ. App.—San Antonio 1964, writ ref’d n.r.e.) (emphasizing the importance of the operational duration of a business in establishing a claim for lost profits).

18. *Pena v. Ludwig*, 766 S.W.2d 289, 301-04 (Tex. App.—Waco 1989, no writ).

19. *Id.*

20. *Southwest Battery Corp.*, 115 S.W.2d at 1099.

21. *Southwestern Bell Media, Inc. v. Lyles*, 825 S.W.2d 488, 497-98 (Tex. App.—Houston [1st Dist.] 1992, writ denied); *Szczepanik v. First S. Trust Co.*, 883 S.W.2d 648, 649 (Tex. 1994); *Holt Atherton Indus., Inc. v. Heine*, 835 S.W.2d 80, 84 (Tex. 1992); *Holland v. Hayden*, 901 S.W.2d 763, 766 (Tex. App.—Houston [14th Dist.] 1995, writ denied); *Frank B. Hall & Co. v. Beach, Inc.*, 733 S.W.2d 251, 258 (Tex.

For example, in *Automark of Texas v. Discount Trophies*,²² the Dallas Court of Appeals reversed and reformed the trial court's judgment awarding lost profits, given "the complete absence from the record of objective facts, figures and data" regarding the plaintiff's profits.²³ The court noted:

[T]he distinguishing feature between the line of Texas cases permitting recovery for lost profits and the line of cases denying recovery is a reliance upon routinely kept business records which have been produced in court—that is, upon an evaluation of a business's decreased profitability based upon objective facts, figures, and data and not upon the subjective opinions of interested parties.²⁴

It merits noting that where lost profits testimony is based on "first-hand knowledge of financial data,"²⁵ Texas law does not strictly require the introduction of supplemental objective data such as financial records. In fact, there is common law authority to the contrary.²⁶ For instance, testimony based upon *first-hand knowledge* of the business records or data in question may have probative value even though it is not supplemented by underlying business records.²⁷ However, most courts have held that *opinion* testimony must be supplemented by underlying business records.²⁸

App.—Corpus Christi 1987, writ ref'd n.r.e.); *Village Square, Ltd. v. Barton*, 660 S.W.2d 556, 560 (Tex. App.—San Antonio 1983, writ ref'd n.r.e.); *Automark v. Discount Trophies*, 681 S.W.2d 828, 829 (Tex. App.—Dallas 1984, no writ) (disapproved by the Texas Supreme Court in *Holt Atherton Indus., Inc. v. Heine*, 835 S.W.2d 80, 84 n.2 (Tex. 1992), to the extent that it holds the supporting records *must* be produced in court); *Texas Instruments, Inc. v. Teletron Energy Mgmt., Inc.*, 877 S.W.2d 276, 279 (Tex. 1994); *General Supply & Equip. Co. v. Phillips*, 490 S.W.2d 913, 920 (Tex. Civ. App.—Tyler 1972, writ ref'd n.r.e.); cf. *Pena*, 766 S.W.2d at 304 (where the court acknowledged the general rule requiring sufficient objective facts, but found no "blanket requirement that a witness' testimony, which is based on first-hand knowledge of financial data, must be supplemented in every instance by the financial records from which actual knowledge is gained.").

22. 681 S.W.2d 828 (Tex. App.—Dallas 1984, no writ).

23. *Id.* at 830.

24. *Id.*

25. *Pena v. Ludwig*, 766 S.W.2d 289, 304 (Tex. App.—Waco 1989, no writ).

26. *See id.*; *see also Frank B. Hall & Co. v. Beach, Inc.*, 733 S.W.2d 251, 258 (Tex. App.—Corpus Christi 1987, writ ref'd n.r.e.).

27. *Pena*, 766 S.W.2d at 304. Plaintiff testified from actual, personal knowledge concerning her company's financial condition and that of her former company without reinforcing it with either business's records. "She outlined a reasonable methodology, using Lone Star's [her former company] profits from a comparable period to calculate Haircrafters' [her company which was the subject of the lawsuit] probable loss for a comparable period." *Id.* The court held that her testimony on lost profits had probative value even though it was not supplemented by underlying business records. *Id.*

28. *Frank B. Hall & Co.*, 733 S.W.2d at 258; *see also Pena*, 766 S.W.2d at 304 (reasoning the owner's testimony was not opinion testimony and did not need supplementing by underlying business records).

B. Reasonable Certainty

While a plaintiff's proof of lost profits must be based on *competent* evidence, the loss must be shown with a *reasonable degree of certainty*.²⁹ Texas courts have long recognized that proving lost profits is "inherently speculative."³⁰ Further, Texas courts draw a distinction between uncertainty as to the amount of lost profits and uncertainty as to the fact of lost profits.³¹ Uncertainty of the *amount* of lost profits will not necessarily defeat recovery for lost profits,³² however, uncertainty as to the *fact* of lost profits is fatal to recovery.³³ It is imperative to keep this distinction in mind.

It is well established that opinion evidence based on speculation or conjecture lacks probative value and is inadmissible. Further, opinion evidence will not support a jury finding even when admitted without objection.³⁴ As a result, certain general rules regarding the recoverability of lost profits have evolved from this judicial perspective. For instance, in Texas, prospective profits are generally not recoverable for new or unestablished businesses because such profits are not "susceptible of being established by proof to that degree of certainty which the law demands."³⁵ Generally, new or unestablished businesses have no profit history from which to reasonably anticipate future profits, and "therefore any proof [regarding the expectation] of future profits would be entirely too speculative and conjectural as to allow a recovery for such profits."³⁶ Moreover, evidence that the plaintiff's business "lost money from the very beginning,"³⁷ "never

29. *Southwest Battery Corp. v. Owen*, 115 S.W.2d 1097, 1098 (Tex. 1938); see *Szczepanik v. First S. Trust Co.*, 883 S.W.2d 648, 649 (Tex. 1994); *Holland v. Hayden*, 901 S.W.2d 763, 766 (Tex. App.—Houston [14th Dist.] 1995, writ denied) (citing *Texas Instruments, Inc. v. Telettron Energy Mgmt., Inc.*, 877 S.W.2d 276 (Tex. 1994)); *Turner v. PV Int'l Corp.*, 765 S.W.2d 455, 465 (Tex. App.—Dallas 1988), *writ denied per curiam*, 778 S.W.2d 865 (Tex. 1989); *General Supply & Equip. Co. v. Phillips*, 490 S.W.2d 913, 921 (Tex. Civ. App.—Tyler 1972, writ ref'd n.r.e.).

30. *Pena*, 766 S.W.2d at 301; see also *Pace Corp. v. Jackson*, 284 S.W.2d 340, 348 (Tex. 1955).

31. *Southwest Battery Corp.*, 115 S.W. 2d at 1099; see also *Pena*, 766 S.W.2d at 301 (noting that while a perfect measure of lost profits is not needed, the amount must be shown with reasonable certainty).

32. *Southwest Battery Corp.*, 115 S.W.2d at 1099; accord *Pace*, 284 S.W.2d at 348; *Pena*, 766 S.W.2d at 301.

33. *Southwest Battery Corp.*, 115 S.W. 2d at 1099; *Holland*, 901 S.W.2d at 766; *Holt Atherton Indus., Inc. v. Heine*, 835 S.W.2d 80, 84 (Tex. 1992); *Szczepanik*, 883 S.W.2d at 649.

34. *Golleher v. Herrera*, 651 S.W.2d 329, 334 (Tex. App.—Amarillo 1983, no writ) (citing *Flores v. Missouri-Kansas-Texas R.R.*, 365 S.W.2d 379, 383 (Tex. Civ. App.—Dallas 1963, writ ref'd n.r.e.) and *Moore v. Grantham*, 599 S.W.2d 287, 290 (Tex. 1980)).

35. *Barbier v. Barry*, 345 S.W.2d 557, 563 (Tex. Civ. App.—Dallas 1961, no writ).

36. *Harper Bldg. Sys. v. Upjohn Co.*, 564 S.W.2d 123, 126 (Tex. Civ. App.—Beaumont 1978, writ ref'd n.r.e.).

37. *Marrs*, *supra* note 5, at 769 (quoting *Keener v. Sizzler Family Steak Houses*, 597 F.2d 453, 458 (5th Cir. 1979)).

turned a profit,' . . . [or] 'never got out of the red ink,'"³⁸ "will preclude recovery for lost profits."³⁹

However, the general reluctance to allow lost profits recovery for new or unestablished businesses has been incorrectly interpreted to mean that new or unestablished businesses may *never* recover lost profits. In fact, courts deny recovery of lost profits for new or unestablished businesses because there is simply no profit history from which to estimate reasonably anticipated future profits. Thus, an owner of a new or unestablished business may prevail where he is seeking recovery of lost profits provided he produces sufficient, competent evidence from which a trier of fact can find a reasonable expectation of profits existed but for the defendant's acts or omissions. For example, lost profits may be recoverable by a new enterprise owner if factual data is otherwise available to furnish a sound basis for computing the probable loss.⁴⁰

In *Texas Instruments, Inc. v. Teletron Energy Management, Inc.*,⁴¹ the Texas Supreme Court held that when presented with proper documentation, a court should not prohibit a business — whether old or new — from recovering lost profits.⁴² The *Teletron* court explained that the finder of fact must not focus on the newness of the business entity, but rather on the newness of the allegedly damaged activity.⁴³ For example, consideration of the experience of the persons involved in the activity, the nature of the business activity itself, and the relevant market conditions should be central to the determination of lost profits, irrespective of the newness of the business entity.⁴⁴

Uncertainty in measuring the *amount* of lost profits will not necessarily defeat recovery.⁴⁵ Texas courts have found it impossible to announce with exact certainty any rule measuring lost profits,⁴⁶ and

38. *Davis v. Small Business Inv. Co.*, 535 S.W.2d 740, 743 (Tex. Civ. App.—Texarkana 1976, writ ref'd n.r.e.) (affirming the trial court's judgment denying lost profits based purely on speculation).

39. *Marrs*, *supra* note 5, at 769.

40. *Universal Commodities, Inc. v. Weed*, 449 S.W.2d 106, 113 (Tex. Civ. App.—Dallas 1969, writ ref'd n.r.e.).

41. 877 S.W.2d 276 (Tex. 1994).

42. *Id.* at 280. The court endorsed its earlier ruling in *Southwest Battery Corp. v. Owen*, 115 S.W.2d 1097, 1099 (Tex. 1938), where a new business may be denied recovery of lost profits, but not simply because it is new. The mere hope for success of a new business, though realistic, is not sufficient for lost profits recovery. Firmer reasons for expectations of profitability may lead to recovery of lost profits. *Id.*

43. 877 S.W.2d at 280.

44. *Id.*

45. *Davis v. Small Business Inv. Co.*, 535 S.W.2d 740, 743 (Tex. Civ. App.—Texarkana 1976, writ ref'd n.r.e.).

46. *Southwest Battery Corp.*, 115 S.W.2d at 1099; *see also* *Pena v. Ludwig*, 766 S.W.2d 289, 301 (Tex. App.—Waco 1989, no writ); *Pace Corp. v. Jackson*, 284 S.W.2d 340, 348 (Tex. 1955).

proof to a mathematical exactness is not required.⁴⁷ In fact, courts have held that questions concerning the methodology used to predict lost profits, or the factual basis for an opinion regarding the amount of lost profits, goes to the weight and not to the admissibility of evidence.⁴⁸ However, if the methodology or the underlying factual basis used to determine the extent of lost profits is overly speculative, its admissibility as opinion evidence may be challenged under Rule 403 of the Texas Rules of Civil Evidence.⁴⁹ Rule 403 states, “Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, or needless presentation of cumulative evidence.”⁵⁰

C. Causation

Proving causation is critical to any plaintiff seeking lost profits damages. “Lost profits may be recoverable if they are the natural and probable consequences of wrongful conduct and their amount is shown by competent evidence with reasonable certainty.”⁵¹ Consequently, lost profits are recoverable *only* if there is sufficient, competent evidence in the record from which “to make a meaningful correlation” between the business’ loss of profitability and the defendant’s act or omission.⁵² The terms *causation* and *correlation* are often misused by courts and practitioners when discussing the effects of a defendant’s acts on a plaintiff’s profits.

This misapplication of these terms often arises because the terms have both legal and scientific meanings. Legally, the loss of profit must have been proximately caused by a defendant’s act or omission to be recoverable.⁵³ When discussing legal causation, we are generally concerned with the concept of *proximate cause*. *Proximate cause* is defined as a “cause which in a natural and continued sequence, pro-

47. *Pena*, 766 S.W.2d at 301; *White v. Southwestern Bell Tel. Co.*, 651 S.W. 2d 260, 262 (Tex. 1983); *Pace*, 284 S.W.2d at 348.

48. *Pena*, 766 S.W.2d at 304.

49. *See Golleher v. Herrera*, 651 S.W.2d 329, 334 (Tex. App.—Amarillo 1983, no writ) (citing *Flores v. Missouri-Kansas-Texas R.R.*, 365 S.W.2d 379, 383 (Tex. Civ. App.—Dallas 1963, writ ref’d n.r.e.)).

50. TEX. R. CIV. EVID. 403.

51. *Pena*, 766 S.W.2d at 301 (citing *Southwest Battery Corp. v. Owen*, 115 S.W.2d 1097, 1098-99 (Tex. 1938)).

52. *Automark v. Discount Trophies*, 681 S.W.2d 828, 830 (Tex. App.—Dallas 1984, no writ); *see, e.g., Southwestern Bell Media, Inc. v. Lyles*, 825 S.W.2d 488, 497 (Tex. App.—Houston [1st Dist.] 1992, writ denied) (explicitly agreeing with *Automark’s* contention that the distinguishing feature between Texas cases allowing or denying lost profits recovery is routinely kept business records).

53. *Scott v. Gardner*, 159 S.W.2d 121, 123 (Tex. Civ. App.—Fort Worth 1942, writ ref’d w.o.m.).

duces an event, and without which the event would not have occurred”⁵⁴

Although use of the term *correlation* is rare in the practice of law, its meaning is especially significant within the realm of the social sciences. *Correlation* generally means that two or more events (or values) are related. “Two variables are said to be *correlated* if knowing the value of one helps us to predict the value of the other.”⁵⁵ For example, in proving a lost profits case, the finder of fact is concerned with whether there is a correlation between the defendant’s act or omission and the plaintiff’s loss of profits. Although establishing a positive correlation between the plaintiff’s loss and the defendant’s acts or omissions does not necessarily prove causation, the relationship does provide a foundation on which to build a lost profits case.⁵⁶

The concept of causation within the realm of the sciences has been the subject of much academic and philosophical debate.⁵⁷ There are essentially three criteria for inferring cause.⁵⁸ To infer cause, the sciences and the law require that: (1) the cause precedes the effect; (2) covariation exists between the cause and the effect; and (3) potentially influencing forces are controlled and ruled out as alternative explanations for the effect.⁵⁹

Therefore, it logically follows that in a lost profits case, the law requires the defendant’s act or omission precede the plaintiff’s loss; the plaintiff to establish a covariation between the defendant’s act or omission and the plaintiff’s loss of profits; and that other economic forces, which may also affect the plaintiff’s profits, such as recent market fluctuations and developments, be controlled to rule out alternative explanations for the plaintiff’s loss. Once a plaintiff demonstrates the general criteria for inferring cause, he can assert the defendant’s acts or omissions proximately caused his loss of profits.

54. *Rudes v. Gottschalk*, 324 S.W.2d 201, 207 (Tex. 1959); 1 COMMITTEE ON PATTERN JURY CHARGES, STATE BAR OF TEXAS, TEXAS PATTERN JURY CHARGES PJC 2.04 (2d ed. 1987).

55. DAVID W. BARNES, STATISTICS AS PROOF, FUNDAMENTALS OF QUANTITATIVE EVIDENCE 265 (1983).

56. *Id.*

57. See THOMAS D. COOK & DONALD T. CAMPBELL, QUASI-EXPERIMENTATION: DESIGN ANALYSIS ISSUES FOR FIELD SETTINGS 1-36 (1979) (explaining the various perspectives of causality held by positivists, essentialists, activists, and evolutionary critical-realists, among others).

58. *Id.* at 31. Legally, *causation* is defined as the act whereby an effect is produced. BLACK’S LAW DICTIONARY 221 (6th ed. 1990). *Proximate cause* is “[t]hat which, in a natural and continuous sequence, unbroken by any efficient intervening cause, produces injury, and without which the result would not have occurred.” *Id.* at 1225.

59. COOK, *supra* note 57, at 31.

II. THE METHODOLOGY—MULTIVARIATE REGRESSION ANALYSIS

The Texas Supreme Court does not sanction any one method for determining lost profits.⁶⁰ The court acknowledges that “[w]hat constitutes reasonably certain evidence of lost profits is a fact intensive determination.”⁶¹ Further, the Texas Supreme Court has held “once a party has chosen a particular method for measuring their lost profits, they must provide a complete calculation.”⁶² *Regression analysis*, sometimes called multivariate or multiple regression analysis, provides this calculation. It is a tool capable of estimating and measuring a correlation between a plaintiff’s profitability and the defendant’s acts and omissions while controlling external factors such as market and regional economic conditions.⁶³

“Regression analysis is a method for examining the relationships among large numbers of variables.”⁶⁴ This methodology allows an individual to summarize the degree to which variations in the values of a number of variables correspond to variations in the value of a single variable.⁶⁵ The practical use of regression analysis has grown markedly over the past twenty-five years due to the development of statistical methodology, computer technology, and the availability of statistical data.⁶⁶ Moreover, using regression analysis for the purpose of proving both the existence and amount of damages is not new to the law.⁶⁷

As confirmed in *Southwest Battery Corp. v. Owen*,⁶⁸ the recovery of lost profits may be impacted by a number of “uncertain and changing” variables.⁶⁹ The strength of regression analysis for measuring lost profits is its ability to assess the impact, if any, of a number of vari-

60. *Southwest Battery Corp. v. Owen*, 115 S.W.2d 1097, 1099 (Tex. 1938).

61. *Holt Atherton Indus., Inc. v. Heine*, 835 S.W.2d 80, 84 (Tex. 1992).

62. *Id.* at 85.

63. BARNES, *supra* note 55, at 315. “[W]ith multivariate or multiple regression techniques we can simultaneously identify the effects of more than one independent variable on a single dependent variable.” *Id.* Defendant’s acts or omissions and external factors are the independent variables while the plaintiff’s lost profit is the dependent variable.

64. BARNES, *supra* note 55, at 293.

65. *Id.*

66. *Vuyanich v. Republic Nat’l Bank*, 505 F. Supp. 224, 267 (N.D. Tex. 1980) (stating that use of multiple regression analysis provides “an important addition to the judicial tool kit necessary for reconstructing from bits and pieces the framework of past events”), *vacated*, 723 F.2d 1195 (5th Cir. 1984) (remanded with directions to reconsider the class determination, not vacated on its merits), *cert. denied*, 469 U.S. 1073 (1984).

67. *Vuyanich*, 505 F. Supp. at 261; *see University Computing Co. v. Management Science Am.*, 810 F.2d 1395 (5th Cir. 1987); *White v. Southwestern Bell Tel. Co.*, 651 S.W.2d 260 (Tex. 1983).

68. 115 S.W.2d 1097 (Tex. 1938).

69. *Id.* at 1098.

ables on a single variable such as lost profits.⁷⁰ When a number of variables influence the existence and amount of lost profits, regression analysis provides a method for assessing the individual influence each variable has on the existence of lost profits. If properly modeled, regression analysis may assist the trier of fact in evaluating large quantities of objective, financial, and institutional data to determine both the existence and amount of lost profits with a known degree of certainty.

Most regression models are set up in the following form: The behavior of the dependent variable is assumed to be a function of a set of independent variables. Regression analysis provides summary statistics that may be helpful in describing the relationship between each of the independent variables and the dependent variable.⁷¹ Regression analysis begins with the specification of the major variables that affect the dependent variable. In a lost profits case, this involves the identification of important independent variables that reflect important and systematic influences on profits (the dependent variable). Since profits are equal to the difference between revenues and costs, the analytical variables should be the variables affecting revenues and costs. For example, a plaintiff's revenues are directly related to sales. If the plaintiff can prove the defendant's conduct caused the plaintiff to lose sales, the plaintiff may be entitled to recover any corresponding loss in profits.⁷²

To properly use regression analysis, this information must be modeled into a mathematical equation.⁷³ Assuming that a linear relationship exists between the variables,⁷⁴ the equation will take the following form:

$$\text{PROFITS} = \text{constant} + b_1(\text{SALES}) + b_2(\text{COSTS}) + b_3(\text{MARKET FACTORS}) + \text{etc.}$$

Each of the capitalized terms are variables that will differ from case to case. PROFITS is the *dependent* variable, that is, the variable predicted by the equation. Each of the other variables influences the plaintiff's profits. The other variables are known as *independent* variables, that is the variables that predict the plaintiff's profits. For ex-

70. BARNES, *supra* note 55, at 293. Any number of variables may be used in place of lost profits depending on the analysis. For example, it may well be more useful in certain situations to focus on sales rather than profits.

71. *Id.* Independent variables are variables that influence the value of the dependent variable. Independent variables are not affected by the dependent variable. They are often referred to as *explanatory variables*, that is, variables that explain changes in values of the dependent variable. Dependent variables are the variables sought to be explained. Their value depends on the values of the independent variables. *Id.*

72. *See, e.g.,* Coleman Motor Co. v. Chrysler Corp., 376 F. Supp. 546 (W.D. Pa. 1974) (illustrating the nature and use of bivariate regression analysis where the plaintiff specified profits to be a function of sales).

73. *See* BARNES, *supra* note 55, at 316.

74. While linearity may be a good approximation in many cases, it is not always appropriate when there are certain types of nonlinear relationships.

ample, PROFITS might be the profits earned in a particular quarter; SALES might be the number of units sold in that quarter; COSTS might be the costs of production and distribution for that quarter; and MARKET FACTORS might be indicators of what competitors are doing. The term *constant*, also called the *intercept*, is an important part of the mechanics of performing regression analysis and in making predictions.⁷⁵ Since its construction and use is entirely by the econometrician, further discussion of the *constant* is beyond the scope of this article.

Beginning with empirical data on the applicable variables, regression analysis results in an equation describing the functional relationship between each independent variable and the dependent variable.⁷⁶ The value of the multipliers ($b_1, b_2, b_3 \dots$, etc.) in the equation, commonly called *regression coefficients* or *slopes*, reflects the relationship between the specific independent variable and the dependent variable (profit).⁷⁷

If properly performed, regression analysis predicts how increasing or decreasing any of the independent variables has affected or will affect profits.⁷⁸ Substituting different values for the independent variables and solving the equation allows the econometrician to predict a value of the plaintiff's profit at different points in time. Comparing the calculated profits from two different values for sales shows the impact of the change in sales on profit. Thus, if an individual can establish that sales are lower by a certain amount due to the actions of the defendant, the econometrician can show its impact on profits. Moreover, this technique allows the econometrician to state his conclusion with statistical confidence in terms of the probability of error.⁷⁹

This approach might well have satisfied the Texas Supreme Court in *Holt Atherton Industries, Inc. v. Heine*.⁸⁰ In *Holt Atherton*, the trial court found lost profits existed for the plaintiff's company when the company could not operate at full capacity because one of its two bulldozers was in the repair shop for an extended period of time.⁸¹ However, the Texas Supreme Court reversed the trial court, holding the trier of fact had no basis for determining whether the plaintiff's damages were established with reasonable certainty or were based on pure speculation because the evidence offered was legally insufficient to prove lost profits.⁸² Specifically, the court determined evidence was lacking to show that (a) the bulldozer would have been actually em-

75. BARNES, *supra* note 55, at 297.

76. *Id.* at 319.

77. *Id.* at 320.

78. *Id.* at 322.

79. *Id.* at 322-25.

80. 835 S.W. 2d 80 (Tex. 1992).

81. *Id.* at 82, 85.

82. *Id.* at 85-86.

ployed had it not been in the shop; and (b) the time period sought for lost profits matched the time the bulldozer was in the shop.⁸³

In *Holt Atherton*, regression analysis could have estimated the demand for bulldozer services based on monthly inquiries and requisitions from customers. Including the demand for bulldozer services as a variable would have produced an estimation of the potential revenue over the time period in question. Coupling this variable with operational costs would have provided a complete estimation of lost profits within a reasonable degree of certainty that may have survived the Texas Supreme Court's scrutiny.

III. ILLUSTRATION

The following illustration demonstrates the need to employ regression analysis in a lost profits case. In this example, the plaintiff seeks to recover lost profits allegedly caused by the defendant's failure to correctly publish the plaintiff's advertisement. The plaintiff's address and telephone number were printed incorrectly and remained in print and in circulation for a one-year period. Obviously, the defendant's incorrect publication of the plaintiff's address or telephone number could prove detrimental to the plaintiff's profits. However, changes in market conditions could also affect the plaintiff's sales and thus impact his profits. To establish a case for lost profits, the plaintiff must be able to isolate and measure with a reasonable degree of certainty the effect the misprinting of the advertisement had on his profits. Regression analysis allows the plaintiff to explain the effect of the defendant's actions, while accounting for other factors that may have impacted the plaintiff's profits.

Factors that may be relevant include the size and composition of the plaintiff's management staff; the type and number of employees; the plaintiff's salary and employment expenses; the amount of the plaintiff's advertising appearing at any given time; the plaintiff's operating expenses during a given time, the economic market conditions in which the plaintiff does business, the degree of competition in the plaintiff's market; and general business trends of the plaintiff's industry. Since all these factors may impact the plaintiff's profit, it is critical to isolate their effects because the plaintiff is only entitled to recover for the loss of profits that resulted from factors attributable to the defendant. The analyst, in this case, should collect relevant data over a representative number of quarters and specify the following model:

$$\text{PROFITS PER QUARTER} = \text{constant} + b_1(\text{SALES PER QUARTER}) + b_2(\text{CORRECT ADVERTISEMENTS IN THE PREVIOUS QUARTER}) + b_3(\text{INCORRECT ADVERTISEMENTS IN THE PREVIOUS QUARTER}) + b_4(\text{\# OF EMPLOYEES PER}$$

83. *Id.* at 85.

QUARTER) + b_5 (MARKET CONDITIONS DURING THAT QUARTER) + etc.

In this particular case, it is not the current advertising that is important, but rather the period of incorrect advertising. Once the model has been properly specified, regression analysis allows the analyst to isolate and measure the impact of the defendant's publication errors in the plaintiff's advertisements.

CONCLUSION

Given the multidimensional legal standard for proving a case of lost profits in Texas, the practitioner is advised to use a multidimensional methodology for proving and measuring profit loss. The common practice of looking at the plaintiff's accounting books to determine the existence and extent of lost profits ignores a myriad of other factors that influence profits over time. For instance, the actions of competitors and economic circumstances surrounding buyers in the market place may have a tremendous effect on profits. An expert who predicts future levels of a plaintiff's profits by merely comparing profits before and after a defendant's conduct unrealistically assumes all factors that influence profits are constant. This uni-dimensional methodology is suspect because of its speculative nature. Moreover, in the event the data obtained using this methodology is admitted, it may fail on cross-examination.

Multivariate regression techniques are superior to most other methodologies for demonstrating lost profits. Factors impacting business profits are multivariate and are not equal in their respective effects on a particular business. Accordingly, the methodology employed should be capable of analyzing and isolating the multivariate effects on a particular plaintiff's profits so that the trier of fact may isolate and ascertain the effect of a defendant's conduct alone. Further, multivariate regression's ability to analyze large quantities of objective, factual data satisfies the *competency* requirement of the law. Properly modeled, it also estimates the degree of certainty in its quantified prediction of a plaintiff's lost profits. Therefore, it addresses concerns that lost profits be proved with a *reasonable degree of certainty*. Finally, it provides scientific evidence linking a defendant's conduct and a plaintiff's loss, thereby satisfying the law's requirement of proving *causation*. Understanding the utility of this technique is a necessary prerequisite for competent and strategic investigation, preparation, and discovery. The utilization of this technique is recommended not only because it accommodates the requirements of the law, but because it is extremely persuasive.

