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The Valuation of Earning Capacity Definition, Measurement and Evidence

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In most courts of law, economic damages due to loss of wages or salary caused by injury or death is measured by an earning capacity standard rather than a standard of actual or expected earnings. Nevertheless, neither the courts, vocational experts, nor forensic economists have developed an explicit definition of earning capacity. As a result, there is considerable confusion as to how earning capacity should be measured. Our review of the forensic economics literature indicates that there has been relatively little written on this subject by economists.[1] The goal of this paper is to move the forensic economics profession, the vocational experts, and the courts closer to a practical and generally accepted approach to the measurement of earning capacity.

Economics is an analytic discipline. As such, its methods attempt to identify fundamental concepts, divide them into their constituent parts, and then to ascertain the rules that governs their interaction. One of the most fundamental concepts that economics can contribute to the discussion of earning capacity is the idea that earnings are determined in labor markets as a product of both supply and demand. The supply side encompasses consideration of what the person is able to do and willing to do for a given wage rate. What the person is able to do is a function of the person's capacities. What they are willing to do for a given wage rate is a function of their preferences, which are difficult to measure directly. The exercise of individual preference is at the root of many of the difficulties of measuring earning capacity through observation of past earnings. The demand side concerns the probabilities of a person actually finding a position at given wage rates, and is directly relevant to the question of whether an economic projection of future earnings has a reliable foundation, or is based merely on possibilities and speculation.

I. Definitions: Actual Earnings, Expected Earnings and Earning Capacity

While our focus is upon earning capacity, three related concepts must be separated: actual earnings, expected earnings, and earning capacity. Actual earnings are what a person *actually earns*, expected earnings are what a person is *expected* to earn, while earning capacity is what that person is *able to* earn. Each of these earnings concepts is a stream or series of values over an entire worklife and not just a single value. At various times, each of these con-

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[1] An article by Brookshire and Carruthers, in "Principles of Establishing the Earnings Base," *Litigation Economics Digest,* 1(1) 1995, which reports results of a survey of the methods of forensic economists, and refers to an earlier version of the present paper, is one example of such discussion.

cepts has been used as a standard of loss in personal injury cases. Thus, in the following sections, we consider their relationship in greater depth.

A. Actual Earnings

Loss of actual earnings is a standard that has been applied when such loss could be measured with reasonable, although not absolute, certainty. While loss of actual earnings seems the simplest standard to apply in personal injury cases, it is not necessarily simple to predict. The stream of actual earnings, which we shall call "actual earnings," is a series of outcomes of a complex stochastic process involving the interaction of a person's abilities and preferences with the needs of employers. In other words, actual earnings in various years are the observations of a random variable. Of course, actual earnings can only be observed in the past. Without a crystal ball, *future* actual earnings, which are determined by chance and choice, as well as skill and ability, cannot be observed. Just as it may be impossible to predict the outcome of a single trial of a random process, we cannot predict future actual earnings of an individual with certainty. Some courts have held that loss of actual earnings is the standard that applies to past losses, while earning capacity is the standard that applies to future earnings. However, even where loss of actual earnings is the standard applied to past earnings, the court will hear arguments as to whether the injured person *could* have earned more since the injury, and merely chose not to do so, perhaps to enhance the value of the lawsuit. In other words, the injured person had post-injury capacity that was not exercised. Such attempts to divide actual past losses into the part caused by choice and the part caused by the injury suggests that the true standard was loss of earning capacity, even in the past.

B. Expected Earnings

In the case of a simple random process, we may be able to define precisely, and to measure with relative certainty, the expectation, or expected value of the outcome. Although the process that produces actual earnings is not simple, this idea provides the definition of expected earnings. *Expected earnings is the series of earnings figures, which are the expected values of actual earnings in the corresponding time periods.* Since expected earnings has such a natural mathematical definition, it might appear that expected earnings is the most easily defined and measured standard of loss. However, even in the past, an observation of the actual earnings for a given period is not the same as the expected value of the process that produced the outcome. Thus, expected earnings are not directly observable, even in the past. Furthermore, the probability distributions that govern actual earnings are generally not known, so the expected values cannot be calculated as one might do for a simple random process.

What is done most often in practice is to rely on observations of past actual earnings, sometimes even averaging their constant dollar equivalents, and calling this expected earnings.[2] This intuitive process relies upon the mathematical principle that the sample average is, under certain conditions, an unbiased estimator of the mean of the underlying distribution. The most impor-

[2]It may be pointed out that such averages are often used as evidence of *both* expected earnings and earning capacity. This will be discussed more completely in Section II of this paper.

tant condition in this context is that the stochastic process must be stationary. However, we know that the distribution of outcomes is not likely to be stationary. The three factors that govern this distribution, the person's abilities, the opportunities available for those abilities, and the person's exercise of his or her preferences over that set of opportunities, will each change over time, sometimes abruptly. Perhaps most difficult to measure and predict among these three are the person's preferences.

A person's preferences are constantly subject to change, and, thus, observations of past actual earnings, based on past preferences, may be a highly inaccurate indication of future actual earnings or expected future earnings. This is particularly true in situations where a person had made a non-binding choice to pursue a low earnings path, such as that of a full-time homemaker, or a physician entering the Peace Corps. Although such a choice can have a dramatic effect of expected future earnings, it is always subject to change. For example, a divorce may result in a homemaker choosing, or even being forced, to reenter the labor force. Knowing or estimating the probabilities of such changes of preference would be necessary to forecasting future expected earnings. Certainly, this is not easy. By removing the uncertainty introduced by the exercise of individual preferences, earning capacity may actually be easier to measure than expected earnings.[3]

C. Earning Capacity

Earning capacity is the expected earnings of a worker who chooses to maximize the expectation of actual earnings. We note that earning capacity has much in common with expected earnings. For example, the probability of various earnings outcomes is still central to the measurement of earning capacity, just as it is for expected earnings. The major difference is that earning capacity is not usually affected by voluntary, non-binding, choices made by the worker. The ability remains, at least in the short run, whether the individual chooses to use that ability or not. Thus, to analyze the earning capacity of an attorney who has chosen to stay home with pre-school children rather than enter or remain in the labor market, we need not investigate the process by which such a decision is made, nor attempt to estimate the year-by-year probability of returning to the market. A focus upon expected earnings would lead directly to such questions.

Less precise definitions of earning capacity have led to widespread misunderstanding and occasional abuse. For example, most forensic economists have seen at least a few extreme cases where some nebulous concept of capacity has been used to rationalize highly implausible earnings assumptions. Generally, the judicial process will reject such valuations. This has led some forensic economic observers to the conclusion that the courts *say* that we should be evaluating earning capacity, but, when it's time to make the decision, the courts will usually endorse expected earnings as the standard.

This conclusion is based on two misconceptions. The first misconception is that earning capacity is defined as maximum possible earnings. Such a definition, which invites speculation, would have little or no empirical content or

[3]Another attribute of using earning capacity as the standard of loss is the avoidance of certain inequitable results. For example, if the full-time homemaker were to be divorced or her husband were to be incapacitated at a later date, her preferences would have changed dramatically, but it will be too late to go back to the court to ask that her compensation be based on what her expected earnings would be under these conditions, now that she needs this income.

practical relevance outside the courtroom. The second misconception is that when the court chooses a *measure* of loss that appears to be equal to expected earnings, then expected earnings is the standard of loss. We believe that such court decisions do not reflect an endorsement of expected earnings as the standard, but instead reflect the requirement that estimates of earning capacity be based on reliable evidence. Often, the most reliable evidence will be past earnings, which is also the most common basis for estimating expected earnings. In other words, the legal standard of loss in personal injury cases is usually earning capacity, but the evidentiary requirements of the legal process often lead to a estimation of earning capacity that is identical to an estimation of expected earnings.

II. The Legal Environment

A. The Standard of Loss

The role of legal precedent has been to prescribe and define the standard of loss of earnings and to place limits on the evidence that may be presented in support of damage arguments. As stated in the introduction, the most commonly accepted and prescribed standard of loss in personal injury cases is that of the loss of earning capacity. A significant volume of scholarship, entitled *Damages in Tort Actions* (hereafter labeled DTA), covers the case law that pertains to earning capacity. (Minzer, et al., 1991)[4] Considerable amplification of the following discussion will be found in Chapter 10, entitled "Loss of Time and Earning Capacity."

B. Definition

The law generally defines Earning Capacity to be "the ability to earn money" and "Impairment of earning capacity means the diminution or loss of the ability to earn money." (Minzer, et al., 1991, p. 31) As expressed by the Louisiana Court of Appeals,

> The loss of the ability to work is in itself a compensable element of damages. Earning capacity is not measured by actual loss; even an unemployed, or sporadically employed, plaintiff is entitled to recover for the deprivation of what he could have earned (*Landry v. Melancon*, 558 So. 2d 1143 La. Ct. App. 1989).[5]

C. Evidence for Impairment of Earning Capacity

The law must contend with the conflicting need for general rules that reduce uncertainty and the goal of achieving fairness in each case. On the one hand, the law attempts to develop general guidelines in order to reduce uncertainty and to insure that its decisions are not arbitrary. On the other hand, the law wants to "do justice" in each case. The tension between a need for general principles and the goal of justice in specific cases has resulted in a broader standard of potential loss, but a more restrictive requirement for the proof of such losses. Earning capacity may seem to be a somewhat flexible concept that

[4]Each chapter is numbered separately. All references in this paper will be to Chapter 10.
[5]This citation is one among many from DTA, pp. 31-39, where the breadth of jurisdictions confirms the general acceptance of earning capacity as the standard of loss.

could encompass almost anything that a person could conceivably do. In fact, the law may allow the trier of fact to consider some claims that may seem, *prima facie*, excessive; but only if such possibilities can be demonstrated with reasonable certainty.

> Damages for permanent impairment of future earning capacity may not be based on speculation, probabilities, or uncertainty, but must be shown by competent evidence that such damages are reasonably certain as the proximate result of the pleaded injury. (*Fitzpatrick v. United States*, 1991, p. 1038)

> Impairment of earning capacity or loss of earnings is recoverable only when reasonably certain to occur in the future. (*Courtney v. Allied Filter Engineering, Inc.*, 1989, p. 959)

The evidentiary requirement prevents the earning capacity standard from decaying into outright speculation. Thus, many of the cases examined by the authors explored questions of whether a given hypothetical vocational capacity was relevant in determining earning capacity. In other words, does this type of information constitute "evidence" of earning capacity or is it merely irrelevant or speculative?

For example, the law may permit a jury to consider whether an injured college student might have become a physician, but for the injury. However, it may be necessary that the student have shown outstanding grades in relevant subject areas, and perhaps an excellent score on the Medical School Admission Test. The law is less likely to allow a jury to consider data on the income of physicians if the injured student were only in high school. Such information is likely to be considered irrelevant speculation.

D. Evidence of the Amount of Impairment

The plaintiff must first prove that a loss exists for which the defendant is liable, and second this loss must be measured. The latter relates to proof of the amount of damages. However, as will be evident in our discussion, these two questions often overlap. While the courts have required the plaintiff to show the existence of impairment of earning capacity with reasonable certainty, courts have generally recognized the impossibility of removing all uncertainty from estimates of the *amount* of future damages, and absolute precision in damage estimates has not generally been required:

> Because lost earning capacity cannot be calculated with mathematical certainty, the trier of fact is afforded much discretion in the determination of such damages. However, the trier of fact must have a reasonable basis for such an award. (*Walker v. Bankston*, 1990, p. 697)

Thus, despite the relatively relaxed standard for proof of the *amount* of damage, reliable evidence is necessary. There is some latitude in what that evidence may be. Even though not a governing factor, some courts have held that past earnings must be introduced if such a history exists. They have held that failure to present evidence of past earnings renders an award of damages too speculative.[6] Other courts do not agree. As stated in *DTA*, "numerous courts have held that the plaintiff need not produce evidence as to his earnings

[6]See Practice Commentary in *DTA*, p. 49 and *DTA*, p. 68

prior to injury." The reason is that to rely too heavily upon history is to focus upon actual earnings rather than capacity. However, some courts have held that the plaintiff must "introduce evidence of either his actual earnings or his earning capacity prior to his injury."[7]

For the average injured worker, past history remains the most important source of factual information for pre-injury earning capacity. Although past earnings do not necessarily dictate earning capacity, and there may not be a legal requirement to do so, such information is likely to be presented to the trier of fact by one party or the other. This earnings data is likely to have an impact on the eventual compensation award. This is true because past behavior is, after all, strong evidence of what a person was capable of doing in the past, and absent identifiable changes, strong evidence of what they would be capable of doing in the future. Actual earnings data is often the starting point for measuring capacity. If there is no information to the contrary, it is usually assumed that actual earnings demonstrate earning capacity. The individual who has never worked may not be a lover of leisure with a high reservation wage, but someone who is simply incapable of holding a job.

Although the most common method of showing earning capacity impairment is to compare actual pre-injury earnings with post-injury earnings, the courts have recognized the determining role that choice plays in actual earnings, yet may have relatively little impact on earning capacity. As the Louisiana Supreme Court stated, "damages may be assessed for the deprivation of what the injured plaintiff could have earned despite the fact that he may never have seen fit to take advantage of that capacity." (*Hobgood v. Aucoin*, 1991) Thus, choosing a pre-injury path of low expected earnings may not reduce the plaintiff's potential recovery after the injury.[8]

In situations where past history appears not to be a clear indicator of capacity, vocational experts and forensic economists must look beyond the raw numbers of past earnings. Issues of mere choice and actual vocational capacity must be separated. Education, training, employer records, pre-existing health and psychological condition and age are all supply side factors that may need to be taken into account in performing an assessment. The demand side issues of the economic state of the industry and potential employers may also be important. For example, it will be advisable to consider if an industry is subject to periods of reduced demand for labor. In some cases, this could be seasonal, such as occurs in the construction industry in some parts of the country.[9]

Although a person's personal preferences are often not considered part of earning capacity, this may not always be the case. For example, interest in a higher level job at the time of the injury may or may not be considered relevant. According to *DTA*, some courts have held that such evidence is relevant and the trier of fact may consider such information, particularly where there is corroborating evidence of job offers or a career track leading to the higher level position. Other courts have held such information to be speculative and not admissible.[10]

Clearly, the more remote the evidence and the lower the probability that the vocational or earning capacity could be achieved, the more likely it is that expert opinions based on such job possibilities will be excluded by the judge.

[7]See DTA, p. 68, and footnote 29: *Crown Plumbing, Inc. v. Petrozak*, 751 S.W.2d 936 (Tex. Ct. App. 1988).
[8]Rehearing denied.
[9]*DTA*, p. 90.
[10]DTA, pp. 97-100.

For example, we know that insufficient training or experience is a barrier to obtaining both vocational and earning capacity. The court and trier of fact must decide if a given barrier renders a potential vocational capacity irrelevant or speculative. While one week of on-the-job training is clearly a minor barrier, how much of a barrier is another year of college? Assume a person is claiming overtime work as part of earning capacity. Under what circumstances is adequate proof available? One can start with the obvious and then gradually change the assumptions. If a person had worked overtime for many years, had expressed interest in such work, the company had indicated overtime would be available for the indefinite future, and the union guaranteed that the person could work overtime if so desired, then additional hours would certainly be part of earning capacity. On the other hand, if the person had never worked overtime in the past, how relevant is that overtime opportunity? If the individual had been capable of and would have been offered overtime work prior to the injury, then one could argue that overtime work was an *option* that was available prior to the injury. But, given that overtime may require both mental and physical stamina, it may be argued that a documented offer of overtime only proves the demand side of the equation, not the supply.

The courts, in fact, are divided on the issue of overtime. On one hand, some have recognized that this option has been denied and have therefore allowed such calculations. However, others have indicated that this would be too speculative. Further, the fact that a person had never previously engaged in such activity may imply that the person does not wish to work overtime, but could mean that the person is not *capable* of such work. That is, past behavior is strong evidence of future earning capacity. *In Trailways, Inc. v. Mendoza*, a Texas jury was reversed because there was no evidence that the plaintiff *would* have worked overtime, only that he *could* have done so.[11]

A related issue is that of worklife. Standard worklife tables are usually applied in estimating the plaintiff's pre-injury earning capacity. Most courts have held that unless there is sufficient evidence proving otherwise, it is acceptable to use general worklife tables when estimating pre-injury earning capacity. However, if a person has significant health problems, for example, this fact might also be considered. On the other hand, standard worklife tables might understate the earning capacity of a person who had worked full-time for 25 years prior to an injury. In *Marcel v. Placid Oil* (1994), the 5th Circuit demonstrated that deviations from general worklife tables might need strong support in order to be allowed in court.

III. The Process of Evaluating Earning Capacity

Vocational experts often play a crucial role in the evaluation of earning capacity impairment, particularly in situations where the injured person may still be employable. Generally, it is the job of the forensic vocational expert to determine what jobs are feasible for the injured person to perform, and what earnings might accrue to such jobs. The vocational expert, who may be a rehabilitation counselor, gathers and evaluates information of several types. Usually, the vocational expert will begin with the supply side, that is, determining what the person is able and willing to do and gathering information on the person's functional capacity.

[11] DTA, p. 133-134, note 1. *Trailways, Inc. v. Mendoza*, 745 S.W.2d 63 (Tex. Ct. App. 1988).

A. The Supply Side: Functional Capacity

In order to perform a particular job, a person must possess various degrees of certain functional abilities. These include the person's physical abilities, such as lifting, standing, walking, fine motor skills, stooping and climbing; cognitive abilities, such as intelligence and reasoning; and psychological factors, such as motivation, interest, and temperament. We will refer to this as the person's functional capacity.

Much of a person's functional capacity is normally assessed through medical evaluations that may include impairment ratings.[12] Included within such evaluations would be testing performed by physical or occupational therapists, or perhaps, by vocational experts. The questions to be answered are similar to "Can the person climb a ladder, stand for hours at a time, and occasionally carry up to 50 pounds?" Such testing and evaluation is common after an injury, as part of the normal medical evaluation, treatment and rehabilitation process. It is less common for such evaluations to be available prior to an injury. Since earning capacity, as a lifetime stream of earnings, is a long-term concept, an evaluation should take into account variation in functional capacity over time. For example, it is common for some physical capacities to decline over time. Physicians may predict that an injured person will find their disability to improve with time, but may predict that a given injury will interact with normal aging in ways that exacerbate long term disability.

B. The Supply Side: Vocational Capacity

Having the physical and mental capacity to perform a particular job is necessary but not sufficient to consider that job part of one's earning capacity. Skills, knowledge and experience are also a necessary element in determining what jobs a person can actually perform. Of special importance to the vocational expert is the person's education and training, as this information not only tells the expert what knowledge and skills the client is likely to have, but also the client's ability to absorb additional training in the future. Given the long-run nature of the earning capacity concept, one would expect to include in one's vocational capacity any job that could be learned in a day or two, or perhaps in a few weeks. Similar situations would exist when the injured person was near the end of a training program, such as a medical student with only a few months to go before graduation. However, at some point, this can become a more difficult question. Having a high intelligence quotient may not be enough to prove that a high school student has the ability to become a physician. Such issues will only be resolved by judgment, whether it is that of the expert or the court.

In addition to looking at the person's education and training, the vocational expert will also review the client's job history in order to determine what skills the person has demonstrated in the past. Some of these skills, applied in a previous occupation, may be transferable to a post-injury occupation. Again, such evaluations are common post-injury, but rarely available for a person who has not had an injury. The questions to be answered are similar to "Can this

[12] The layman sometimes incorrectly thinks that a percentage whole-body impairment rating determined by a physician can be used to estimate a percentage loss of earning capacity. However, it is clear that the same physical injury can have drastically different earnings implications for different workers, depending upon the demands of their particular vocation What is totally disabling to one may be a minor annoyance to another.

person competently perform the tasks of a professional bricklayer?" From the analysis of post-injury transferable skills, a list of feasible post-injury jobs is developed. If a list of pre-injury jobs has also been developed, the vocational expert may compare these two lists. If the two lists are comprehensive, this comparison may be called a "labor market access" study.

C. The Supply Side: Worker Preferences

Up to this point, the vocational analysis we have described applies unambiguously to all of the standards of loss: actual earnings, expected earnings and earning capacity. But vocational evaluation often goes further. Vocational rehabilitation counselors often measure personality and job interest through interviews and testing. In administering personality or job interest tests to their clients, the vocational counselor is attempting to find congruence between the client's interests and the job descriptions that fall within the person's abilities. These tests may rule out certain job categories as being impractical for the client, but other categories may merely be undesirable or less preferred than alternatives. Although there is no sharp distinction here, to the extent that the vocational analysis starts to take preferences into account, that evaluation may become less relevant to earning capacity, but more relevant to expected earnings, because the individual's preferences are the essence of the difference between expected earnings and earning capacity.

Each person has vocational capacities that he or she chooses not to use, based on his or her own preferences. One example of a simple preference system or map is that of an "earnings maximizer;" in other words, "higher wages are better." No matter what the other job attributes may be, the worker would always pick the higher paying job. A multitalented surgeon may choose to practice surgery rather than sculpture, based on the higher earnings. This is not surprising because we almost always assume that "higher wages are better." For such a person, according to our definition, there would be no difference between expected earnings and earning capacity. However, for some individuals this would not be correct. Although it is more surprising when the qualified surgeon chooses to be an artist, similar choices are made every day. A person's actual earnings and, indeed, their expected earnings, are altered as a result of the person making certain choices from the opportunities afforded them.[13] Workers usually have more than one alternative from which to choose. Such choices may increase or decrease a person's actual earnings, but not earning capacity.[14] Since actual past earnings will often be the basis for estimating earning capacity, it is important for us to understand worker choice.

An important concept in the economist's tool kit for understanding worker choice is opportunity cost. Everett Dillman[15] cites several examples to demonstrate this concept. Assume that a college graduate decides to become a carpenter and earn $24,000 per year rather than $35,000 per year. Actual earnings, and perhaps expected earnings, is $24,000 while earning capacity is

[13]The demand side of the market, including potential employers, determines what opportunities are available to persons with given vocational capacities, and will be discussed later.

[14]Although such choices will affect actual earnings and expected earnings, they may not have a direct effect on what a person is able to do, and, thus, may not have an immediate effect on earning capacity. However, a person's choices, by affecting their experience and training may eventually have an enormous effect upon earning capacity.

[15]Dillman, Everett, "Economic Insights," September 1990. (A newsletter produced by International Business Planners in El Paso, Texas). We have increased the magnitudes to reflect more current earnings levels.

$35,000. The carpenter has voluntarily sacrificed an additional $11,000 per year, indicating that the non-monetary benefits of being a carpenter are at least that amount. (This assumes that the lower earnings level is not the result of some unreported disability that rules out the apparent $35,000 capacity.) Estimating loss at $35,000 rather than $24,000 not only is closer to the concept of earning capacity, but also recognizes that a higher salary is a possible option that could have been exercised at some time in the future. Although the individual had the ability to earn a higher income and presumably some firms would have been willing to hire him for such positions, the person's preferences at that time led to the choice of a lower paying job. If a spouse should become injured or unemployed, the worker might very well choose to revert to the higher-paying vocation, now that the opportunity cost of pursuing carpentry, in terms of quality of life ("utility"), has increased.[16] Clearly, even an option that is currently not chosen may be highly valuable. Dillman's article points out that it is often difficult to determine which alternative job should be chosen in order to calculate opportunity cost, and that providing too much leeway in this regard could give rise to abuse.

However, it is difficult to know when actual earnings are inconsistent with apparent capacity as a result of choice, and when such observations are the result of unobserved functional or vocational capacity problems. When a person who apparently has all of the attributes necessary for a given wage rate nevertheless earns much less, it is difficult to choose from two likely explanations arising from supply side considerations. The first explanation is that perhaps not all of the important supply variables have been observed. In other words, there may be unobserved factors, such as health or psychological issues that limit the person's ability to earn at the higher level. For example, a person may have a personality that produces conflict with superiors or co-workers. The second explanation is that the person may not have *chosen* to take the highest paying job. A person may choose to stay home with young children rather than pursue a career. The critical factor is whether the inconsistency of actual earnings with apparent earning capacity is the result of voluntary or involuntary factors. If the reduced earnings are voluntary, then the difference reflects preferences rather than capacity. If the difference stems from involuntary problems, then the person's capacity must reflect these factors. In some circumstances, social, family, peer or other pressure may make it difficult to distinguish between voluntary and involuntary causes. Experts may not be able to resolve the issue in such situations.

Sometimes, the twin issues of choice and earning capacity are hidden in statistical tables. Consider the question of worklife. Frasca and Winger (1989) proposed estimating worklife utilizing the average age of labor force separation[17] rather than the worklife expectancy tables published by the Bureau of Labor Statistics (February, 1986). According to these authors, worklife expectancy table values, based on observations of labor force participation rates are reduced by voluntary separations from the work force, and such voluntary separations do not reduce earning capacity.

[16]This assumes that the option not previously chosen would not be lost through lack of use. It will be difficult to reenter some occupations if a long time has elapsed since the person exercised that option. If a law school graduate did not practice law for 10 years after graduation, acquiring employment as a lawyer may be very difficult.

[17]Both the median age of final separation and worklife estimates have been re-estimated by Hunt, Pickersgill and Rutemiller (1997). See *Journal of Forensic Economics,* 10(2), pp. 197-205.

> These separations would include, for example, workers returning to the educational system, workers returning to non-market household production, and workers taking a temporary sabbatical. During each of these voluntary periods of inactivity, earning capacity is not diminished, but both market earnings and worklife activity are. (Frasca and Winger, 1989, p. 103.)

Of course, some periods of nonparticipation in the labor force, prior to final withdrawal will be involuntary, due to illness or other incapacity.

Corcione and Thornton (1991) developed a similar idea with specific reference to women. Their thesis was that periods of voluntary withdrawal from the labor force are not evidence of reduced earning capacity. They recommend that tables of potential labor force participation be substituted for worklife tables, and that for women this would significantly increase the estimated years of potential earnings. This approach was an improvement over that proposed by Frasca and Winger since the authors specifically made a distinction between those withdrawals that were voluntary and those that were involuntary. Ireland and Winkler (1994) suggest that statistical data for women who are childless and were never married might correct for some of the downward bias caused by voluntary labor force separations in the general female population.

Unfortunately, it will often be difficult to distinguish between capacity factors and mere choice. For example, personal preference is certainly important when determining those jobs where employment is likely. Thus, the person's actual preferences would be important factors in the determination of expected earnings. A lack of interest in a particular job should not obviate the fact that certain options have been eliminated for an individual due to the tort. However, from the demand side, we should note that interest and enthusiasm are attributes that some employers value highly, and may even be necessary for success in some occupations. A lack of interest may preclude a position that a person wants for strictly financial reasons. If there is a demand for a particular worker attribute, then whether the worker has that attribute is a factor in determining that worker's vocational capacity.[18] In general, whether a particular choice is voluntarily chosen or rejected, and hence part of earning capacity, or is unattainable and thus not a part of earning capacity, is often difficult to determine.

Thus, the vocational expert will often not know when a job should be totally removed from a person's vocational capacity due to a total lack of interest or temperament, as opposed to when the job is merely not among the top choices. Similarly, it should be noted that temperaments and preferences change. A person who despised indoor sedentary work prior to an injury may adjust quite well if that is the only type of job that is feasible post-injury.

D. The Demand Side

The mere listing of feasible jobs gives little indication of the probability that the particular injured person can acquire each job, if that job is desired. When a vocational expert creates lists of jobs that can be performed by the injured person, but ignores the feasibility of the person actually finding such employment, the expert is analyzing only the supply side vocational capacity and not earning capacity. The demand side focuses upon how many jobs employers would offer for a given level of vocational capacity at various wage levels. Or, in a given case, the demand side considers the likelihood of a particular person,

[18]Thus, there is a possible interaction between supply and demand considerations.

with a particular vocational capacity, actually obtaining a job at a specified wage rate. Thus, the questions are typically of the form: "How much work is this person likely to get as a professional bricklayer at $15.50 per hour?"

The demand for labor is derived from the demand for the firm's products. Economic theory tells us that the employer will offer employment as long as the marginal revenue product of the worker exceeds the wage rate. Thus, higher personal productivity generally implies a higher wage rate or a higher probability of being employed at any given rate. Higher product prices as a result of increased demand generally imply the same. As a derived demand, the demand for labor may fluctuate with the business cycle in general or the vagaries of a particular industry. This means that changes in demand for the industry's product can change the wage rate for the worker, or perhaps even eliminate the position altogether. In such a case, a longer-term view would be appropriate, taking account of both good times and bad.[19]

The demand side is sometimes neglected in the forensic process. This may be due to the implicit use of definitions of earning capacity that address only the *ability* of the person to *perform* a given job. This ignores the possibility that the person actually can get such a job, and, thus, it is the *vocational* capacity rather than the *earning* capacity that has been examined. This kind of analysis has resulted in the listing of extremely unlikely pre-injury or post-injury vocations, implying that these are part of the person's pre-injury or post-injury earning capacity.[20] The approach to earning capacity proposed in this paper would give little or no weight to such positions.

For example, in a situation where an individual's actual earnings seem to be below his capacity, we may be overlooking the demand side of capacity. If a person is not employed in what would seem to be highest paying occupation for which he or she has the vocational capacity, perhaps there is just too little demand for the given occupation.

Fortunately, it is common for vocational experts to do a labor market survey to determine what wage rates and jobs are available to similar workers in a particular area. Sometimes, the evaluation will include information on the availability of such jobs to the given person. For example, the vocational counseling process may include contacting prospective employers to determine if they would be willing to hire a person with the given abilities and disabilities. This part of the process is focused upon the demand side of the individual's labor market. This is most often done as a post-injury evaluation, but occasionally a pre-injury assessment is done as well.

E. The Synthesis of Supply and Demand

The vocational expert may go on to distill the list of feasible and available jobs with corresponding wage rates to a single estimate of annual earning capacity or a range of such figures. Since the economist is normally expected to take such figures as the starting point for the determination of the present values of pre-injury and post-injury earning capacity, it is critical that this distillation process be done in a way that is reliable. Tim Field (1993) suggests

[19]Courts have endorsed an examination of the ability of the person to actually find work for which he is qualified. For example, depressed economic conditions can reduce earning capacity. See *Damages in Tort Actions*, Volume 10, p. 90.

[20]Depending on whether this type of error is performed on pre-injury or post-injury analysis, the result will be biased for either the plaintiff or defense. For every plaintiff-oriented way of biasing the pre-injury or post-injury analysis, there is a defense-oriented way of biasing the analysis.

eight methods of translating a list of jobs into a wage base. These include: utilizing a minimum wage, the wage at the time of injury, the average weekly wage in all occupations in the state, five "representative" jobs from the job list that corresponds to the individual's relevant factors (interests, temperament, physical stamina, education, etc.), a close examination of the person's actual job history, the average of all the jobs from the person's job list, the average of the top 20 jobs from the job list, and the wage of five actual jobs that were (or are) available in the immediate labor market.

Clearly, there are situations where some are more feasible or reliable than others, and these situations are discussed in the vocational literature. But in many cases it would be possible to use several of these approaches. For example, a person with an established wage history might have an earning capacity equal to his actual wages, the average of all potential jobs on the relevant jobs list (a list perhaps in the thousands), the top 20 jobs, or a representative list of five jobs. Care must be taken, however, that an abbreviated list of jobs fairly summarizes the entire list, particularly if some sort of average is to be calculated. The difference in estimated loss could be enormous depending upon which approach is used. The question is, which should be used in a particular case? Unfortunately, the vocational literature provides little guidance. Field does offer some help. One guideline is what he simply calls "common sense." You clearly do not use the minimum wage for someone who has been a welder for 17 years. But most cases are not so obvious. Another guideline is what he terms "comfortableness." The professional must develop techniques in which he or she feels comfortable in both explaining and defending. Again, this does not provide any specific help. Finally, he suggests that one could be "eclectic." By this he means that the expert should provide a variety of approaches and hence offer the trier of fact a range of possible outcomes. That certainly is more honest than presenting one number and pretending that the calculation is based upon greater precision than is actually the case. But it should be noted that if the range is extremely wide, this technique could simply be passing the burden of estimation onto other individuals who have even less insight in this particular area.[21] One of the purposes of this paper is to reopen this discussion with the benefit of the somewhat different perspective of economics. In the next section, we suggest guidelines for the evaluation of earning capacity.

IV. Guidelines For Estimating Earning Capacity

A. Overview

Although the court system clearly intends to compensate losses of earning capacity, rather than actual earnings, the courts have not always given us clear guidance. As an example, interest and temperament may not be very important in the determination of capacity, other than some professional positions. Future training may or may not be relevant. Past earnings are often taken as indicative of earning capacity, but the courts have been clear in telling us that past earning history is not the final word. What seems clear is that for an expert to predict a marked deviation from actual past earnings history requires reliable evidence. In some ways, our guidelines are merely a more organized way of looking at available evidence.

[21]In *Joy v. Bell Helicopter Textron*, 999 F.2d 549 (D.C. Cir. 1993), the appeals court found that the trial court erred in admitting the economist's testimony because some of the alternative scenarios were deemed speculative, even though one of the alternatives was clearly not speculative.

Our intention is not to end discussion of the hard issues in measuring earning capacity, but rather to begin it. We expect there to be substantial changes as these suggestions are used and developed. One source of such changes is legal. Although economics is a science, forensic economics must follow the law. Case law is not a science, but is rather an inductive process in which general principles are drawn from decisions in particular circumstances. Those general principles will eventually be reformulated or amended if justice is no longer being served.[22] Thus, the proper application of economic science to legal issues must also be an inductive process. No guidelines can provide mathematical precision to this difficult task. As the courts prescribe or proscribe the considerations that are part of an assessment of earning capacity, our guidelines must change as well.

The guidelines must address the two basic steps in the evaluation of earning capacity, prior to its reduction to present value:

1. *Identification of the set of jobs (and associated earnings streams), for which the person has, or had, the vocational capacity to perform.* For post-injury evaluations, a functional assessment will usually be necessary. There will often be thousands of jobs within a person's pre-injury vocational capacity, and perhaps a very large number after an injury.
2. *Evaluating that set of jobs.* Somehow, the large amount of information must be condensed to something that is usable. Unfortunately, much information is lost in the process. For example, when an entire distribution of possible outcomes is condensed into one statistic, such as the average or the median, the numerous possibilities and their relative likelihood of occurrence are lost.

B. The Guidelines

1. Definition

Earning capacity is the expected earnings of a worker who chooses to maximize the expectation of actual earnings. The focus is the entire stream of potential earnings over the person's worklife. The likelihood of the person achieving each job or occupational possibility is an integral part of that person's earning capacity. Note that the value of earning capacity may be, but will not necessarily be, the value of one particular option within that capacity. Although this definition suggests mathematical precision, that precision can seldom be achieved because the exact probability of achieving a given job usually cannot be known. If these probabilities were known, there might be no need for most of the other guidelines. Thus, many of the later guidelines are suggested ways that evidence of such probabilities might be evaluated. Since the expert will not be able to give an evaluation of earning capacity with absolute certainty, it is common for several alternatives to be presented to the trier of fact. Some of the guidelines suggest ways that such alternatives might be viewed.

2. Consistency

The same guidelines that apply to the evaluation of pre-injury earning capacity should also apply to the evaluation of post-injury earning capacity. This means that there is no intrinsic difference in the measuring techniques. Of course, there is normally more historical earnings information available on

[22]See Cardozo (1921). The entire book is insightful, but this idea is expressed in the Introduction. See especially pages 22 and 23.

pre-injury capacity than post-injury. This asymmetry in the data will often cause the estimation techniques to differ. The essential point is that if the information differences did not exist, neither would the measurement techniques. It is common for each party in litigation to subtly change the definition of loss to suit their interests. For example, a plaintiff will often want to analyze pre-injury capacity and compare this to post-injury actual earnings. The defendant will often want to reverse this approach. Thus, post-injury earning capacity should factor in what the person could potentially accomplish even with the injury, recognizing that additional training may be more difficult and the individual may face job barriers due to the disability.

3. Functional Capacity

A job for which a person does not have the functional capacity should not be considered when measuring the person's earning capacity. In other words, the existence of jobs for which the person does not have the mental or physical capacity cannot increase or decrease the person's capacity.

4. Vocational Capacity

A job for which a person does not have the vocational capacity has no effect on that person's earning capacity, unless the person can easily acquire that vocational capacity. Jobs for which vocational capacity can be easily acquired may affect earning capacity. Obviously, the adverb "easily" must be interpreted by courts. The courts have not yet done so, but this is clearly within their responsibilities. The "ease" may include considerations of time as well as rigor. For example, a vocational capacity that requires only two weeks of training would be more relevant than one that requires 4 years. Choice and interest may have more importance in this area. Vocational experts often test for job interest and similar characteristics when attempting to design a retraining program. Successful retraining depends upon such issues.

5. History

The person's past pre-injury actual earnings is assumed to be a strong indicator of earning capacity. Unless the person is a minor, student, trainee, noncareer military person, housewife, or other person in circumstances where it is clear that the earnings history is not indicative of capacity, one *begins* with historical earnings.[23] Since actual earnings are, to some extent, a matter of choice, then such choices as working fewer hours than a normal work week or earning wages far below one's potential should theoretically not affect earning capacity. Nevertheless, an apparent choice of reduced wages may actually be disguising a disability that has not been identified. Furthermore, a choice that removes a person from an occupation may eventually result in a reduced capacity, as knowledge or skills grow stale. Although this guideline might be extended to post-injury actual earnings, the comparatively short time period, as well as post-injury physical recuperation and rehabilitation, may render such evidence less useful.

[23]This may seem to imply that workers maximize their compensation. Labor theory indicates that this is not correct, as there may be unmeasured compensating differentials that lead a worker to choose a position that does not have the highest total compensation. Furthermore, each worker will have his own preferences that guide the labor versus leisure trade-off. Since Guideline 5 is merely the starting point, its use need not contradict sound economic theory.

6. Higher earnings are preferred

Higher-paying jobs within the person's vocational capacity should be the first consideration in the valuation of earning capacity. In other words, the existence of low-paying jobs would be irrelevant to earning capacity unless the probability of obtaining higher-paying jobs is too low.

7. Probability

Each job within the person's vocational capacities has some probability of realization, given the choice to pursue that option. (This is the demand side of the earning capacity equation.) Jobs, taken with a given earnings level, for which the probability of realization for the given individual is low, should have little impact on the value of the earning capacity of the individual. This guideline would eliminate evaluations based on choosing only a few of the highest paying jobs, with no regard to their probability, as well as, when combined with guideline 6, eliminating the practice of focusing only upon lower paying jobs.

In the past, it was likely that the operational definition of "low probability" would have been left to the trier of fact, perhaps with the help of expert opinion. However, recent opinions have increased the responsibility of judges to act as "gatekeepers" in preventing the presentation of expert opinion that is not based on reliable foundation. One way to ensure reliability is to require that the set of jobs to be considered in one's earning capacity evaluation must be "more likely than not." In other words, the set of jobs considered relevant must have an aggregate probability of acquisition, given the choice to do so, of more than 50%. This would mean that one could consider only the highest paying set of jobs whose aggregate probability was more than 50%. Note that the probability of any particular job may be low, although the job may belong to a group of jobs whose aggregate probability may be substantial. Therefore, the categorization process is important. See Appendix for an illustration of how this Guideline might be applied.

8. Minimum capacity

Every unimpaired person is capable of earning at least minimum wage, 40 hours per week, 52 weeks per year. Guideline 5 notwithstanding, unless significant impairments can be identified, then a full-time minimum wage job should provide a floor to the estimation of earning capacity. Significant impairments may be legal, physical, psychological or behavioral, but in order for one or more of such impairments to have an effect on estimated earning capacity, there should be evidence that they exist in such a degree that they would reduce earnings. Thus, this guideline might be considered a "null hypothesis" to be rejected only by consideration of evidence.

9. Age-Earnings Cycle

Each person would presumably follow an age-earnings cycle similar to those of like individuals. In other words, it is a refutable presumption that a person's earnings will rise or fall in concert with persons of similar characteristics, such as age, education, and gender. There will be cases where a person has not followed such a pattern, and that may be evidence that the person will continue to deviate from the norm for the remainder of his worklife. Note that an injured person may no longer be similar to the average person, and thus may have a considerably different age-earnings cycle. This guideline again

presents a "null hypothesis," only to be rejected when there is evidentiary support for such a rejection.

10. Worklife

A person presumably would have a normal worklife expectancy. This worklife expectancy should reflect capacity, and thus be relatively insulated from the effects of voluntary unemployment or underemployment.[24] This guideline is, again, a "null hypothesis." Thus, we would normally assume that, in the absence of contrary information, the person would work as long, and as much, as similar individuals. Note that an injured person may no longer be similar to the average person, and thus may have a considerably different worklife expectancy.

III. Summary

Earning capacity is the most common standard for loss in personal injury cases, but the concept has not previously been clearly distinguished from the related concepts of actual earnings and expected earnings. We have seen that earning capacity is distinguished from actual earnings, and thus expected earnings, by the fact that some people have preference functions that differ from "higher wages are better." Therefore, their past actual earnings and expected future earnings may not equal their earning capacity. The judicial process, however, requires that an impairment of earning capacity be supported by reliable evidence. Often, there will be no reliable evidence that the person possessed an earning capacity in excess of their actual earnings, and that, if they were "earnings maximizers," their actual earnings would be higher. The court must base its decisions on evidence, and thus it is common for there to be no difference between the earnings capacity that can be proven and expected earnings.

While the concept of earning capacity is central to the evaluation of losses in personal injury and wrongful death cases, and it has been the subject of much discussion in both the vocational and legal literature, it has not been examined fully by economists. This may be because earning capacity has not been clearly separated from the concept of vocational capacity. Normally, the vocational expert would determine the vocational capacity (perhaps we should say "capacities") by identifying specific jobs or classes of jobs that the person would be able to perform. As we have discussed, the determination of that list of jobs requires consideration of many complex questions involving medical and psychological issues. The list of jobs describing a person's vocational capacity characterizes the supply options available to the person. The list itself may contain thousands of jobs, with different likelihoods and patterns of earnings. The economist may not have very much to say about the production of that list, but the reduction of that list to a number, or a range of numbers, is in the

[24]The existing worklife tables, including mean future working years and median years to final separation, are based on labor force participation status. This underlying data does not distinguish between voluntary and involuntary nonparticipation. Thus, these tables are not an ideal instrument for measuring earning capacity. Note also that the presence of unemployed participants has no effect on worklife as measured by these tables, although their lack of employment is often considered to be involuntary and might be an indication of reduced capacity. Note that the LPE approaches are based on labor force participation data, and, therefore have some of the same problems. The unemployment factor in such models does move them more toward earning capacity, if we believe that most unemployment is involuntary, and therefore is a indication of reduced capacity.

purview of economics. It is here that the economist and the courts will continue to add significantly to the discussion.

The purpose of evaluating earning capacity rather than actual earnings is to reduce both the problems of choice and some of the uncertainty of predicting actual outcomes. You may choose to earn less than your capacity. It may be easier to predict what you will be able to do than predict what you actually will do. However, the reliance upon earning capacity does not eliminate all of the uncertainty. The probabilistic nature of earning capacity is clear to the courts. Even when earning capacity and not actual earnings is discussed, the courts have been reluctant to accept "speculative" values that arise from jobs that the person is highly unlikely to hold because of market conditions rather than choice. Thus, the courts recognize that ability to perform the duties of a job is not the same as the ability to get paid to do the job. The demand side of the market is also important.

The evaluation of a list of jobs, each with its associated probability and earnings level, is equivalent to the evaluation of a random variable. Whether the evaluation is by taking some weighted average, the maximum, the minimum, or the median, most of the information from the distribution is removed. Thus, it is critical that care is taken to avoid misleading the ultimate consumer of the summarized data, that is, the trier of fact. What is not said can be more important than what is said. The best way to avoid misleading the consumer of statistical data is to disclose fully the process by which the data were produced.

We have begun the process of articulating guidelines that would reduce the possibility of producing misleading evaluations of earning capacity, consistent with the legal constraints. Some of the guidelines are obvious. That is good, because we need to start from a common basis. We know that others are controversial, particularly as they are stated in this early form. Some of the guidelines will require the clarification of issues by the courts, particularly where fuzzy concepts such as "reasonable probability" or "easily" are involved. We know that there is much left to do.

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Appendix

Example of a Conceptual Application of Guideline 7: Probability

In order to explain more clearly how Guideline 7 could be used to specify a list of jobs that would be "proper," let us consider one possible formulation. This "conceptual" application is an illustration of what we mean by Guideline 7, when used in conjunction with Guideline 6, "Higher Wages Are Better." We do not intend to imply that the data necessary to the example would actually exist.

Assume that an individual is capable of obtaining certain jobs J_i, that pay annual income Y_i, with a probability of attainment P_i. The probability of attainment is the likelihood that the person would obtain the job at the given rate of pay if they made a good faith attempt to apply. This corresponds to the "probability of realization" described in Guideline 7. It does not imply that the person actually desires or is likely to seek this particular job. The value of P_i is a function of both supply factors, such as whether the person has the skills to perform the required job duties, and demand factors, such as whether there are job openings available and the wage at which they would be offered. It is assumed that the probability P_i of being offered a particular job at the given wage is not dependent on whether the person actually obtains an offer for any other job.

As an example, assume that Mr. Smith is capable of performing 15 jobs that range in income from $46,000 to $60,000 as indicated in the first and third columns of Table 1 on page 32. The probability of attainment for each job is given in the second column. In the example, lower paying jobs are more likely and the likelihood of obtaining the highest paying jobs is very low.

There are alternative ways of restricting the pool of jobs that can be considered when estimating earning capacity. One way would require that the pool be the set of highest paying jobs (Guideline 6) such that the probability of getting at least one job (column 4) from the set is greater than 50%. The probability of getting at least one job is one minus the probability of getting no job (column 5), or

$$1 - (1-P_1)(1-P_2)....(1-P_n).$$

In the above list, the minimum number of jobs that satisfies this condition is 14, as only after including the highest 14 does the cumulative probability in column 4 rise above 50%. In column 6, each job is assigned a weight equal to its relative probability, which is the job's Probability of Attainment from column two, divided by the total of the first 14, 0.7090. Multiplying each job's weight by its income level, and adding, we arrive

at weighted average earnings of $50,250. Note that the high-paying, low probability jobs contribute relatively little to the total weighted average earnings.

Attempts to "improve" upon the suggested technique can quickly lead to problems. For example, if one were to insist that the probability of getting some job from the list be increased to 100%, then, unless there were at least one job with 100% probability of attainment, adding millions of jobs would not meet such a criterion.

Table 1

Job	Probability of Attainment	Income	Cumulative Probability of Obtaining at Least One Job	Cumulative Probability of Obtaining No Job	Weight for Job	Calculation of Weighted Average Income
1	0.0010	$60,000	0 00100	0.99900	0.00141	$85
2	0.0030	59,000	0.00400	0.99600	0.00423	250
3	0.0050	58,000	0.00898	0.99102	0.00705	409
4	0.0100	57,000	0.01889	0.98111	0.01410	804
5	0.0200	56,000	0.03851	0.96149	0 02821	1,580
6	0.0300	55,000	0.06735	0.93265	0.04231	2,327
7	0.0400	54,000	0.10466	0.89534	0.05642	3,047
8	0.0500	53,000	0.14943	0.85057	0.07052	3,738
9	0.0600	52,000	0.20046	0.79954	0.08463	4,401
10	0.0700	51,000	0.25643	0.74357	0.09873	5,035
11	0.0800	50,000	0.31591	0.68409	0.11283	5,642
12	0.0900	49,000	0.37748	0.62252	0.12694	6,220
13	0.1000	48,000	0.43973	0.56027	0.14104	6,770
14	0.1500	47,000	0.52377	0.47623	0.21157	9,944
15	0.2000	46,000	0.61902	0.38098		
Total of First 14	0.7090				1.0000	$50,250