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Tailoring

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Abstract

Courts in personal injury, wrongful death and employment law cases encourage economic damage experts directly and indirectly to fit their economic damage appraisals closely to the facts of the specific case, which is perhaps the broadest meaning of the term "tailoring." The purpose of this paper is to explore a number of questions about tailoring. Why are some kinds of tailoring generally accepted, frequently encountered, and appropriate, while other kinds of tailoring are encountered less often and controversial? We briefly consider some of the myriad characteristics and circumstances that could be a potential basis for tailoring. We also consider issues raised by tailoring to qualitative factors for which no numerical measure of impact is available. Finally, from our discussion of tailoring for particular variables and particular kinds of cases, we develop some generalizations about tailoring.

Introduction

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Experts testifying about economic damages in personal injury, wrongful death and employment law cases are encouraged directly and indirectly by the courts to fit their economic damage appraisals closely to the facts of the specific case, which is perhaps the broadest meaning of the term "tailoring." A more specific definition of "tailoring" is this: taking advantage of special information about a plaintiff to distinguish his or her circumstances from the average in a larger group, when calculating damages.[1] Courts from time to time encourage tailoring directly by excluding expert testimony (or some portion thereof) that is insufficiently tailored to the plaintiff's circumstances.[2] There is also indirect encouragement for experts to tailor through instructions courts give to juries to consider all the relevant facts and circumstances specific to a plaintiff in determining the amount of damage awards, and through the type of evidence cited in court decisions upholding jury awards.[3]

Two of the most common factors used in tailoring are age and earnings history. It is clear that life expectancy, prospective work life and other variables depend on age, and

tailoring for age occurs largely without controversy.[4] In addition, for a worker with a lengthy work history, forensic economic experts rely heavily if not exclusively on the worker's own earnings history to develop a projection of the worker's future earnings, but for the adverse event, with substantially less or no reliance on data showing the average earnings of other workers.

The purpose of this paper is to explore a number of questions about tailoring. Why are some kinds of tailoring generally accepted, frequently encountered, and appropriate, while other kinds of tailoring are encountered less often and controversial? What conditions must be satisfied for tailoring to be possible and appropriate? Hopefully this paper will promote a wider discussion of tailoring and the kinds of tailoring that are and are not appropriate.

The following sections of the paper are organized as follows. In Section II we briefly consider some of the myriad characteristics and circumstances that could be a potential basis for tailoring. Next, we consider tailoring for a few of these variables: race, sex, location, disability, the special tailoring that may be useful in constructing loss projections for children, and tailoring to qualitative factors for which no numerical measure of impact is available. Finally, in Section III, from our discussion of tailoring for particular variables and particular kinds of cases, we develop some generalizations about tailoring, which might be called (somewhat pretentiously) "principles of tailoring."

Possible Tailoring Attributes

It will help to make the discussion more concrete to list some of the attributes for which there may be an argument for tailoring. This list is largely but not entirely based on the information that most forensic economic experts collect in the process of preparing a damage appraisal. These variables typically include the following: age; race; sex; earnings history (where available); educational attainment and training; location; military service (if any); marital status and family characteristics; pre-injury health status, and lifestyle factors (e.g., whether and to what extent the plaintiff uses tobacco, alcohol, or illegal drugs), plaintiff's "body mass index," family health history, perhaps sexual orientation; criminal record (if any); intelligence; evidence of industriousness and motivation; physical appearance; cleanliness and tidiness.[5]

Should We Tailor for Race?

Black genes. We do not address the issue of whether genetic differences are so significant as to warrant tailoring for race. There is no clear scientific consensus that such differences give rise to economically significant outcomes. Moreover, if there were such a consensus, there has been sufficiently widespread racial mixing over many generations that the consensus might hold no practical implications for forensic work: Myrdal (1996) tells us that when he wrote in 1944, only 22% of American blacks were of unmixed African ancestry; presumably the fraction is now lower, so statistical results for "blacks" do not tell us much about racially pure blacks. Bric *et al* (2010) concludes that

"Among African Americans, analysis of genomic admixture ... indicates that the median proportion of European ancestry is 18.5% (25th–75th percentiles: 11.6–27.7%), with very large variation among individuals." Gates (2013) summarizes several studies with similar conclusions.

Black Cultures. If a forensic economic expert is trying to decide whether or not to tailor statistical evidence to race given that the genetic justification is weak or nonexistent, one question to ask is whether or not there is a distinctive culture that separates the experience of black Americans from others. Thomas Sowell, who has devoted much of his career to studying the differences among ethnic groups in the U. S., says that there is not one black culture, but three (Sowell 1978).

The three black cultures are: native blacks who are descendants of slaves freed after the Civil War; descendants of the free persons of color, free before the end of the Civil War; and West Indians, black residents of the British West Indies (also descendants of slaves) who migrated to the U. S., together with their descendants. Free persons of color never constituted more than 14% of the black population before 1860 (after which the category was dropped from the census of population) but they have been extraordinarily successful economically, and have continued to maintain social separation from the former slave population, according to the scattered evidence available.[6] Immigrants from the British West Indies and their descendants are a tiny fraction of the black population, not more than about 1% nationally but concentrated in New York and the surrounding area; they too have been extraordinarily successful economically, and socially separate from the larger black population. In 1970 all of the black Federal judges in New York, and all high-ranking black officers in the police department, were of West Indian background; and for many years before that all black borough presidents were also West Indian (Sowell 1981). In the 1970 census their incomes were almost as high as whites, and second generation West Indians incomes were higher than those of the Anglo-Saxon minority.[7]

Even within the mainstream black population there are significant regional differences in both income and in measured intelligence. In the 2013 America Community Survey, black households in New York State had incomes more than 60% higher than those in Mississippi (US Census Bureau, 2013); Blacks in the north have measured IQs 10 points higher than those in the south, and blacks who move from south to north while still in school experience an increase in measured IQ (Sowell 1978).[8] Such regional differences, together with the cultural differences referred to above, could lead to challenges of the use of national statistics based on race to tailor damage estimates for a black plaintiff.

Should We Tailor for Sex?

The sexes differ with respect to their roles in childbirth, in strength and in endurance. These differences offer biological reasons for differences in earnings. There are also related cultural differences because the mother customarily assumes more responsibility for childcare than does the father. So it is not surprising that the historical record shows that earnings and work life correlate with sex, and based on our experience we believe that many if not most forensic economic experts frequently tailor for sex, occasionally

with controversy. This tailoring may be for both earnings and for work life expectancy. Tailoring earnings for sex may cause controversy because projecting women's earnings based on what other women have earned in the past may incorporate into damage estimates for women the effects of past discrimination. That discrimination is now illegal, but ongoing. Some forensic economic experts use prospective male earnings for females, particularly in the case of injury or death before embarking on a career, or for a single career woman. Using the male age earnings profile for such women also corrects for the fact that age-earnings profiles for women are flatter because of the more sporadic participation of women in the labor market and the greater number of entrances and exits for women compared to men. The result is that, for women, being another year older means, say, another 0.6 years of work experience, whereas for a man, another year of age typically means close to 1.0 more years of work experience.[9]

Regarding work life expectancy tailoring, voluntary retirement is based in part on opportunities confronting the individual, and therefore work life expectancy is based in part on those opportunities. Perhaps more than any other, the paper by Corcione and Thornton (1991) has brought to our attention situations in which using female work life expectancies has shortcomings, especially if the goal is to estimate a female's earning capacity rather than her expected earnings. One of their suggested remedies for situations where female work life expectancy is likely to understate female earning capacity is to use the corresponding male work life expectancy instead. More recently, Krueger and Slesnick (2014) have shown that adding non-market working years to the years of paid labor force participation measured by work life expectancy tables nearly equalizes the total lifetime working years of men and women.

Occasional court cases have ruled tailoring for sex and/or race impermissible in the calculation of economic damages.[10] In *Reilly v. United States* (1987), the court rejected the use of female work life expectancy tables for Heather Reilly, a female age 22. The tables (presumably Table A-6 of BLS Bulletin 2254, but the details are a little off) showed a work life expectancy of 28 years, which the court rejected in favor of the projection by the plaintiff's expert who assumed continuous labor force participation from age 22 to age 70. The judge said he could not accept the reduction in Heather's work life expectancy by 40% because data from 1978-80 could not have probative value in projecting employment patterns for the 21st century. In another case, *Wheeler Tarpeh-Doe v. United States* (1991), Nyenpan Tarpeh-Doe was the bi-racial son of a Liberian father and a white mother. The plaintiff's expert used the earnings from census data for American male college graduates of all races. The defense economist argued that the proper earnings to use were those of all black males rather than for males of all races. The court chose not to categorize Nyenpan as either black or white and further chose to ignore gender as well, instructing the defense economist to estimate the child's earnings using the earnings of all college graduates in the United States for all races and both sexes combined. This resulted in a lower damage estimate than was testified to by either side's expert! Finally, it should be recalled that for 9/11 cases seeking compensation from the Victim's Compensation Fund (VCF)[11], the decision was made by Special Master Kenneth Feinberg to use male work life expectancy tables in computing economic damages for both males and females. It remains to be seen whether this

choice by the VCF will influence courts to require experts and juries to use male work life tables in computing the lost earnings of females.

Should we tailor for location?

Based on life expectancy at birth, Hawaii is the most long-lived state in the U. S., outliving the national average by 3.4 years; the District of Columbia is least long-lived, with life expectancy 3.7 years below the national average (Wei *et al.*, 2012, p. 4). The spread comes mostly from the differences in the non-white populations, where the mixes of Asian, Polynesian and black differ markedly. Should we tailor life expectancies to the state of residence? What if the plaintiff is a recent migrant or is planning to leave the state? Location is an easily changed variable, but that is not the biggest problem in tailoring for it. The biggest problem is that unless we know *why* life expectancies differ among states, we have no way to decide whether recent migrants will benefit equally with lifelong residents, or if departure will change life expectancy. It seems likely that much of the wide variations among life expectancies across states for a given race is linked to differences in incomes, but if income explains life expectancy we still do not know if family income in childhood or today's income is more important (and to complicate the question, Minnesota, now 8th in per capita personal income, has been ranked second in life expectancy, after Hawaii, at birth dating back to 1950, when its per capita income was no more than average for the country as a whole). Incomes also vary widely across states: per capita personal income varies from 74% of the national average in Mississippi to 135% in Connecticut (U.S. Bureau of Economic Analysis 2015); and wage rates for specific occupations also vary widely. Regional differences have a big impact on racial differences in income, too: while both Puerto Rican and Mexican Americans out-earn blacks nationally, blacks outside the South out-earn both Hispanic groups. State-by-state differences in incomes and earnings are tied to differences in ethnic mix, education levels, unionization, occupational mix, and even age.[12] To tailor economic variables to the state of residence would seem rash without a good understanding of which of the varying characteristics among the states explain the economic differences.

Of course, there may be special circumstances where tailoring for location is appropriate. For example, the earning capacity of a self-employed truck driver showing zero net profits might be appropriately measured by the average earnings of employed truck drivers with the same kind and amount of truck-driving experience. Local or regional wages for such drivers might be better than national wages if there is reason to believe that the driver would be likely to maintain his residence at the same location indefinitely.

Should we tailor for disability?

If we are evaluating economic damages resulting from a disability, of course we should tailor for it – if we have appropriate evidence regarding the nature of the disability and its effect on the plaintiff's ongoing ability to work or perform household or personal services. A problem arises, though, if we rely on government statistics to measure the effect of the disability. Krueger and Skoog (2015) have shown that self-reported

disabilities in the Current Population Survey (CPS) and Survey on Income and Program Participation (SIPP) tend to disappear in a follow-up survey a year later.

There are reasons to question the overall results from either of these surveys, because, first, the respondents to the survey may be identifying disabilities for other members of the household rather than for themselves, and the respondent may change from one survey to the next; and second, if some of the questions about disabilities are not answered, the Census Bureau imputes answers based on household characteristics. Because of these issues, Krueger and Skoog used the Public Use Microdata Samples for each survey to focus on those respondents who are reporting on their own disability, excluding any for which answers have been imputed. They found that in the CPS 39.6% of those suffering from one of six disabilities (hearing, vision, cognitive difficulties, lack of mobility, inability to carry out activities of daily living or instrumental activities of daily living) report that they do not have the problem a year later; in the SIPP sample, the comparable fraction was 35.1%.[13] This could mean that in one of the surveys the respondent lied or responded inappropriately, but it could also mean that many of the disabilities as identified by the census respondents are temporary rather than permanent; that is to say, the questions are not reliable in identifying long-term disability. Krueger and Skoog offer an analysis of transitions into and out of disability based on results taken from the CPS microdata, finding that prospective years of disability for those beginning with the disability differ by only two years or less from the years of disability for those beginning without it. They conclude that there is no statistical justification for claiming that disability will lead to significant reduction in work life expectancy (see Krueger and Skoog, Section VII).

The Krueger – Skoog analysis reinforces criticisms made of the results extracted from disability statistics that assume that those who suffer a disability will suffer from it for life, while in the "but-for" situation in which there is no disability, the same person would have been non-disabled throughout life (e.g., Gamboa, A. and D. Gibson, 2006, 2010, and 2015).

Tailoring for Children

One of the major challenges in forensic economics concerns how to estimate the future earnings of an injured child.[14] Because no earnings history exists, projecting the future earnings of a child is by its nature a statistical exercise. The range of values that can be plausibly projected for future earnings is much wider than for an adult with an established occupation and record of earnings. The future earnings of a child depend on a number of variables, including the health of the child, the child's innate ability and the investments that are made to develop the child's human capital. Educational attainment is one of the key components for building human capital and earning capacity. The typical approach taken by forensic economic experts for projecting a child's earnings is to first make an assumption, or a set of alternative assumptions, about the education level the child will attain. The simplest approach to choosing an educational attainment level is to assume that "the apple falls near the tree," that is, that the child will attain the same or a very similar level of educational attainment as the parents. For example, if

both parents are high school drop outs, one of the estimates of the child's future earnings may be based on the assumption that the child will be a high school drop out too. The forensic economic expert may use one or more additional educational attainment scenarios for the child (e.g., high school graduate and associate degree or bachelor's degree) and present a report showing lifetime earnings projected for each scenario.

In economics there is a rather considerable literature (Mincer (1974), Willis and Rosen (1979) indicating the importance of the variation in educational attainment for explaining the distribution of earnings. There is also a literature linking future achievement or lack thereof to family background and characteristics (e.g., see Willis (1987). One of the interesting developments in the forensic economic literature beginning in the 1990s was the publication of papers using data sets containing information about parents and children to provide empirical estimates of the proposition that "the apple falls near the tree." As noted by Hardy (1992):

> "A standard approach which is taken in many situations where there is no educational or employment record for a particular individual is to examine the educational and employment histories for parents and siblings. Since most individuals are strongly influenced by family, an assumption that the child will follow in the footsteps of a family member is reasonable. The credibility of such an assumption could be challenged very easily in the courtroom, however, because there are numerous examples of children who are doing better or worse than other members of their family. In addition, when examining an individual family, there may be significant variability in abilities and earnings potential among individual members, making it difficult to establish a basis for estimation." (pp. 73-74)

Hardy uses data from the General Social Survey to relate the educational attainment of parents and children, and draws conclusions from the data such as, "If parents are both college graduates, 70% of their children were also college graduates and 30% had less than a college education."[15] Information of this sort is then used with estimates of lifetime earnings for college graduates and high school graduates to develop a weighted average for lifetime earnings, with the educational attainment probabilities as weights. Such weights incorporate information about the family of the child and are superior to simply using as weights the proportion of persons in the population with a particular level of educational attainment as their highest degree, or, even more crudely, just assuming that the probabilities of each alternative level of educational attainment is the same. Either of these cruder types of estimation might be chosen by a judge or jury if more accurate probabilities conditioned on the characteristics of parents were not available.

The papers by Spizman and Kane (1992), Gill and Foley (1996), Jepsen and Jepsen (2001), Kane and Spizman (2001) and, most recently, Kane, Spizman and Donelson (2013) take a leap forward from the simple cross-tabs in Hardy. These latter papers estimate educational attainment probabilities using an econometric model (an ordered probit model) to derive estimates of the probability of completing alternative levels of education. The data in the first paper is from the National Longitudinal Study of the High School Class of 1972 and the last four papers use data from the National

Longitudinal Survey of Youth. These studies all find a strong and statistically significant relationship between the educational attainment of parents and children. Separate estimates of educational attainment probabilities are provided for males and females, allowing for tailoring by sex. There are also variables for place of residence at age 14, race (white, black and Hispanic), broad occupational categories for the parents (professional, sales & clerical, blue collar), family structure (living with both parents at age 14, and presence of siblings), the religion in which the child is being raised, and whether there were newspapers, magazines and a library card in the family when the child was age 14. The Jepsen and Jepsen paper adds variables for household income and private school attendance to their model. The most recent Kane, Spizman and Donelson (2013) paper eliminates the newspapers, magazines and library card variables and, instead, uses a variable that measures the ratio of family income to the poverty line for a family of that same size.

Using the educational attainment probabilities from these models provides a sophisticated way to collapse a wide range of lifetime earnings estimates (for high school dropout, high school graduate, some college but no degree, associate degree, bachelor's degree, master's degree, Ph.D. degree and professional degree) into a single expected value. This expected value is calculated by using the probabilities of attaining each of these levels of education as weights. The weights can be related back to the specific characteristics of the child and those of his or her family. The basic advantages of this approach are that (i) it shows the full range of educational and lifetime earnings alternatives, (ii) it displays the educational attainment probabilities tailored from the characteristics of the child and the child's family, and (iii) it allows the range to be collapsed into what might be argued is the best single value for summarizing all the results.

There are, however, some drawbacks. First, the model is not easy to explain, and the jury and judge will be required to simply take the probabilities on faith. Second, the models in each paper have several variants, depending on the number of variables used in the estimating equation. For example, both the Jepsen and Jepsen and the Kane and Spizman papers estimate one variant of the model for each gender using only race, location and parent's education. Then a second and a third version of the model is estimated adding more variables. Some of the variables in the full version of the model may not be known for the particular child in a given case. In that event, one could either (i) use one of the stripped-down versions for which all the variables for the plaintiff child were known, or (ii) compute the expected value of the unknown variable from data in the sample. Third, the two models dated 2001 differ in the choice and definition of some variables and in what units of observation are included in the data used for estimation. The result is that there are some fairly large differences in the estimated probabilities in the different papers. While not yet observed by either of the authors of this paper, the existence of different probabilities in the different models makes it tempting for unscrupulous practitioners to choose the model that gives the most preferred numerical value for estimated damages, depending on who has hired the practitioner. Fourth, there is the problem that some of the variables are measured when the child is age 14. This requires some assumptions about stability to be made for a child younger than age 14 (e.g. that an 8-year-old child will still be living with both parents at age 14). Fifth,

there is an issue of how the forensic economist is to handle the lack of an exact match between the educational attainment categories in these papers and the educational attainment categories in the earnings-by-education data from the U.S. Bureau of the Census. For example, data are provided by the Census for educational attainment level "8 years or less" and "9 to 12 years but no high school diploma." These categories both contain high school drop outs and they would have to be combined (or perhaps only the 9-12 category used) for use with the estimated probability of being a high school drop out. These problems may dissuade some forensic economic experts from using one of these models to estimate the probabilities of educational attainment.

Other issues in projecting the lifetime earnings of a minor child aside from choosing the level of educational attainment are whether to tailor for race and sex. The comments made above about race provide arguments in support of the view that tailoring earnings and working life for race should be avoided. Not tailoring for race would be implemented by using data for all races combined. That leaves the question of whether to tailor the female work life expectancy and female earnings for sex. For purposes of estimating the duration of working life for female plaintiffs, there is a case to be made for using the male work life expectancy in place of the female work life expectancy. If the standard is earning capacity, as opposed to expected earnings, then the male expectancy avoids penalizing the female for "voluntary" time spent out of the labor force for family reasons. If the standard is expected earnings, one might think that the female expectancy should be used. However, if one "takes the child as she is found," she is most typically "found" single, and it could be argued that she should be treated as if she will remain single and be a "career" woman. Consider the contrary assumption. Suppose it assumed that she will not remain single but rather marry and have children. In that event she will have time out of the labor force for family reasons, justifying the use of the female work life expectancy. This will reduce the estimate of her lifetime earnings without any offsetting estimate being provided of the value of her provision of services as a wife and mother. Adding the value of the services she provides to a hypothetical husband and hypothetical children would not be permitted by the court, even though the estimate of her lifetime earnings is reduced precisely because of these family responsibilities. Hence, using the male work life expectancy is a way of valuing "her full expected earnings," a portion which may be diverted to family pursuits. As noted earlier, Krueger and Slesnick estimate that total time worked by males and females is approximately the same when both years of labor market work and non-market work are taken into account.

Whether earnings of children should be tailored for sex depends in large part on whether convergence is expected to continue in the male-female earnings gap. Convergence between male and female earnings has occurred (e.g., see Blau and Kahn, 2007)**,** but its future rate is not predictable and more research on this issue is needed.

Should We Tailor for Qualitative Variables?

A problem with introducing qualitative variables is illustrated by a discussion in a textbook familiar to many forensic economic experts (Anderson, 2002). Anderson discusses the problem of assessing the life expectancy of an eight-year-old female who

suffers from cerebral palsy due to complications experienced at birth. Some of the characteristics of her status can be quantified based on her mobility and ability to feed herself, resulting in numerical estimates of the impact of these factors on her life expectancy. But Dr. Anderson goes on to discuss other pertinent factors for which numerical impacts on life expectancy cannot be quantified:

> "a) History of illness: Is Mary a sickly child, with frequent episodes of illness? In particular are there frequent episodes of chest infection? (Pneumonia is the commonest cause of premature death of children with cerebral palsy)
>
> b) Quality of care: does the family ... show a good understanding of Mary's needs? Is there easy access to good quality medical care...?
>
> c) Socio-economic status: Studies in many countries have shown that on average those families who are better-educated, have a higher income, etc., have lower death rates than average and thus a better life expectancy."

(He goes on to conclude that Mary's circumstances for care are quite favorable for an above-average life expectancy but that) "Mary catches cold easily and last winter she needed antibiotics to control a mild chest infection. Taken together the tendency to chest infection could well cancel out the socio-economic advantages, so that Mary's life expectancy is likely to be close to the average figure..." (pp. 85 – 86).[16]

While Dr. Anderson is an experienced and highly-qualified expert, he is in this example forming a numerical judgment based on no data. And so do many of us, cancelling out factors that would increase damages against others that would decrease them; one of the authors of this paper (Foster) has been guilty of doing so.

Tailoring Principles

Having reviewed some issues involved in tailoring for a variety of factors, we return to the matter or stating some generalizations about tailoring.

The First Principle of Tailoring: Improving Damage Projection Accuracy.

The primary reason that forensic economists tailor is to improve the accuracy of the damage projections they make. Most would be willing to tailor for any variable, without regard to "political correctness," if (a) such tailoring is permitted by the court and (b) sufficient foundation and evidence exists that such tailoring improves the accuracy of projected damages. Hence, a key question in any decision about whether to tailor for a particular characteristic or attribute is whether such tailoring will make a damage projection more accurate. For many attributes, there is uncertainty about whether tailoring will improve accuracy, given the current state of research and knowledge. In many instances there may be knowledge about the direction of the effect of some attribute (e.g., both the plaintiff's parents lived to be 105 years old), but the quantitative magnitude of the attribute is unknown (e.g., we don't know how much to bump up the plaintiff's own life expectancy above the average to tailor for the extraordinary longevity

of the plaintiff's parents). Experts striving to provide damage appraisals in a fair and objective manner and not slanted to benefit the side for which they work will want to guard against "selective" tailoring. Selective tailoring by a plaintiff expert occurs when the expert diligently combs the literature for a way to tailor for an attribute that raises the appraisal of damages but "runs out of time" before exploring with the same thoroughness to find a way to tailor for a characteristic of the plaintiff that will reduce the size of the damage appraisal. When working for the defense, selective tailoring would mean tailoring for only attributes and facts inconvenient to the plaintiff side without also looking for reasons to tailor for the attributes that would boost the size of the damage projection (e.g., Sally Smith's life expectancy is adjusted downward because she smokes more than 25 cigarettes a day, but the fact that her parents are both still alive at age 100 is ignored). Just as there are Type 1 and Type 2 errors in statistics, tailoring might not be done where it is possible and needed to improve a damage estimate, or it might be done when a better damage projection would be made without it, or when there is insufficient data and/or empirical evidence to support tailoring for that particular attribute. The failure to tailor life and work life expectancies for age provides a clear (if rarely observed) example of a Type 1 tailoring error. If a person is injured or killed in an accident at age 50, then using the average age[17] of the population of approximately 35 would overstate both the number of years of life and work life expectancy by amounts easily quantifiable using life and work life tables. Hence, a computation of the quantitative impact on the damage estimate of this failure to tailor for age is straightforward. Another example is provided by the computation of the earnings base for a plaintiff. Suppose this earnings base is computed using the average wage earned by workers in a particular occupation (e.g., plumbers) instead of using the pre-incident wage history for the plaintiff, a 50-year-old plumber. The difference in the earnings base computed using the average wage of plumbers compared to an earnings base computed using the plaintiff's own unique earnings history is again easy to determine, and the degree of error caused by the failure to tailor is easy to compute in dollar terms. Unfortunately, there are no life and work life tables for plaintiffs with particular combinations of positive and negative attributes (e.g., a plaintiff that smokes and in a family with extraordinary longevity) that make tailoring easy to do and with its effect on damages easily quantified. However, through the use of new and maturing data sets and new techniques, the state of knowledge is advancing. Hence, the possibilities for tailoring are growing and the forensic economic expert must vigilantly watch for the emergence of genuinely useful tailoring opportunities that will allow the accuracy projected economic damages to be improved.

Statistical vs. Theoretical Arguments.

Suppose W_x is a variable of interest, such as prospective work life for a male plaintiff of age x. If she knows nothing more about the individual beyond his age, the forensic economic expert might decide to use the expected value of future work life — the work life expectancy, or WLE_x. But if she also knows that he was active – that is to say, a member of the labor force – at age x, she would surely instead use the work life expectancy for active males, WLE^a_x. The additional information that the man was active gives a better estimate: the variance around the mean for active males will be lower (and work life expectancy will, incidentally, be higher). Now suppose that the individual is

known to be black, in addition to being active in the labor force. The work life expectancy for an active black male at age *x* will be lower than that for all races combined, but the variance around the mean will also be lower. In general, the conditional variance cannot be greater than the unconditional variance; more information is in that sense always better than less.[18] So how can there be controversy?

There can be controversy because of the cultural diversity among blacks discussed above, but also because race might be correlated with labor force experience only because race is in turn correlated with true explanatory variables that can be justified in an economic model, *e.g.* health or education. If we have access to work life expectancy tables classified by education, and by race, but not by both together, one might argue that it is better to use education rather than race because the reason for using education arises from economic theory. For a college graduate, *e.g.*, one might choose education rather than race to forecast work life even if the variance around the mean is lower for blacks with all levels of education than for college graduates of all races, simply because economic theory supports the inclusion of education as an explanatory variable to explain retirement age.[19] Controversy arises if we do not have good estimates of an econometric model to support the claim that race is not significant while education is.

Tailoring and the Immutability of Attributes.

Other things equal, it is better to tailor for personal characteristics that are not within the individual's control (e.g., age), or very costly to change (e.g., gender), than it is to tailor for characteristics that are subject to the individual's control (e.g., whether one is married, smokes cigarettes, eats a healthy diet, lives in a specific state, or works in an occupation requiring little human capital investment). Tailoring for changeable attributes is especially questionable the younger the person for whom the damage projection is being made.

Tailoring When the Impact of an Attribute Varies Over Time.

Another issue relates to changes in the effects of a particular characteristic over time. For example, male and female earnings have been slowly converging over the years, as have the earnings of whites and blacks. To what extent should such changes in the effect of being a female or being black be incorporated into earnings estimates? An earnings forecast for a child or young adult may need to pay particular attention to such trends. If the forecast period is so long into the future that one believes all racial and gender differences in earnings will by then be eliminated, forecasts over a period of similar length might be better if current racial and gender differences in earnings were ignored, or at least reduced below current levels. Can a good case be made that racial or gender differences in life expectancy and earnings will be wiped out in 10 years, 20 years, or 30 years? A paper attempting to answer this question as completely as possible using current and historical data and other studies that economists have conducted would make a useful addition to the forensic literature. In the same vein, changes in technology and discoveries of new treatments and therapies have changed the mortality and morbidity consequences of a variety of diseases and illnesses (e.g., having AIDS); and research may someday lead to a cure for certain major types of cancer, causing a large

change in the mortality effects of such activities as smoking. Which trends and anticipated future events and discoveries can be legitimately incorporated into an appraisal and which are too speculative?

Knowing When Tailoring Requires a Foundation from Other Experts.

Some types of tailoring seem rather straightforward. An injured person is known to be female, for example, and a decision is made by the forensic economic expert to use the National Center for Health Statistics life expectancy table for females. Other types of tailoring, such as the adjustment of life expectancy for a person having specific kinds of medical problems, will be outside the forensic economist's realm of expertise and require the opinion of someone with expertise in assessing life expectancy, whether a physician or other type of expert.[20] Similarly, the opinion of an expert in the field of vocational rehabilitation is typically needed when the forensic economic expert is required to estimate the post-injury earning capacity of a person not totally and permanently disabled by an injury. Another related issue concerns the forensic economic expert's use of a set of studies and tables (e.g., the studies summarized by Lew and Gajewski) without having that use guided and shaped by a medical expert retained to assist the economic expert in applying those studies to a particular plaintiff. Most forensic economic experts would probably want to have some medical opinion supporting the economic expert's use of relative mortality statistics for a plaintiff with a medical condition (e.g., diabetes or congenital heart disease). While it is recognized that the economic expert is only a "spear carrier in an opera" and can only advise the retaining attorney that support may be needed from other experts, the expert can hedge her damage estimates if such supporting expert opinion is not provided.

Tailoring may violate the KISS (keep it simple stupid) principle.

To assess whether the benefits of tailoring are worth the cost of tailoring, the forensic economic expert needs to be mindful of the quantitative effect on damages of tailoring for a particular attribute. If tailoring is complicated to perform but has only a small impact on damages, it may be more trouble than it is worth because (1) explaining it "puts the jury to sleep" or (2) it can be subjected to criticism that weakens the expert's overall credibility with the jury. Consider smoking. The published research by Ciecka (et al.) suggests that smoking reduces life expectancy to a greater relative degree than work life expectancy. If an appraisal only calls for an estimate of lost wages and not of other damages extending beyond work life expectancy (pensions, household services), tailoring for smoking may cause more trouble than it is worth. For example, it might raise the question of why there was not tailoring for other attributes, the absence of which would give the appearance that the expert is biased. As another example, applying a sophisticated model estimating the probabilities of educational attainment is difficult to explain to jury but produces an expected value for damages that lies in between those that would be found if losses for a high school graduate and a college graduate were computed. Hence, such tailoring is a major "violation" of the KISS principle and whether it is worth doing depends on whether there other important advantages, such as showing the jury a complete range of lifetime earnings outcomes.

Leaving Matters to the Judgment of the Jury.

One challenge in tailoring a report to fit individual circumstances is that we might not know whether tailored statistics are more relevant to the specific case than those for the larger group (e. g., work life expectancy for blacks compared to the general population, as discussed above). A second challenge might be that we do not know by how much the plaintiff's circumstances will raise or lower damages. We might know that Plaintiff A should expect higher earnings than the average for her class, but not by how much. We might know that Plaintiff B is likely to participate in the labor force beyond average work life expectancy, but not how much longer.

The forensic economic expert facing such a problem is in the same situation as any economic forecaster who knows that future events with unknown probabilities will determine the values of the variables to be forecast. Economic forecasters have found a way to give useful opinions while acknowledging what they don't know. They give contingent forecasts, or alternative scenarios (for example):

- Here are three alternative forecasts of GDP. Each assumes that war does not break out in the Mideast, and that the coming election keeps the current party balance of control of the White House and both houses of Congress. The first, which we call *Investment Boom,* is based on the further assumption that domestic investment demand continues to increase at its current pace and the dollar falls 10% against a market basket of foreign currencies leading to a fall in unemployment from 5.4% to 4.4%% over the next 24 months. We judge that this scenario has a probability of occurrence of no more than 15%. The second ...
- Assuming that future Federal Reserve policy leads mortgage rates to remain stable at their current level over the next year, our forecast for sales of plumbing supplies over the next eight quarters is as follows: ... If tighter monetary policy leads mortgage rates to rise from an average of 4% to an average of 4.5% over the next year, the forecast is ...

For a forensic economic expert, comparable issues might be:

- The average work-life expectancy for an employed female of the plaintiff's age *x* is *y* years. There are several reasons for believing that Plaintiff A will have a closer attachment to the labor force than the average for her age (list them) but I do not know the numerical impact. Therefore I calculate earnings based on several alternative ages of retirement, from age 60 (her work life expectancy with no time out of the labor force) to 67 (her age for normal retirement according to the Social Security Administration). I should point out that only __% of women employed at age *x* work beyond age 62, and only __ % work to age 67.
- The average life expectancy for a black male at age x is __ years, to age y. But Plaintiff B is not an average black male: (list reasons). If his education, environment, and lifestyle give him the same life expectancy as the average white male of his age, his life expectancy would be to age z. I have calculated pension

benefits under the assumption that the expected end of his life would be between y, as a minimum, and z, as a maximum with *w*, the average irrespective of race, falling in between.

This approach of providing different scenarios then leaves to the attorneys the task of presenting evidence to support outcomes favorable to their side and arguing for damages at the favorable end of the range.

Attractive as it is to step back and let the jury decide how to choose from the list of possibilities, as the number of uncertain variables increases arithmetically, the number of possible outcomes increases geometrically. A danger of working with too many uncertain variables is illustrated by a devastating critique recently leveled against the forecast performance of the Social Security Trust Fund by the Social Security Administration's Office of the Chief Actuary (OCACT) (Kashin *et al.*, 2015). The problem is that OCACT uses informal procedures based on expert judgment to assess the impact of a bewildering number of variables for which no firm statistical measures are available (or in some cases are ignored). As a result of attempting to take into account so many variables without externally generated numerical measures of their impact, trust fund forecasts have been systematically biased since the year 2000, leading to the conclusion in each year that the trust funds are in better shape than subsequently turns out to be the case. Even without such an extreme case of considering too many variables without numerical measures of their impact, it is a challenge to the forensic economic expert to determine how to present the range of possibilities to the jury without bewildering them with too many choices. Restraint in the consideration of tailoring variables for which one knows only the direction but not the size of impact is recommended, as is modesty in making judgments as to whether favorable and unfavorable influences are likely to be offsetting.

End Notes

[1] One reader of an earlier draft of this paper suggested that the term "tailoring" should be restricted to descriptions of the group under consideration that go beyond "generally accepted independent variables" such as sex, age, and education. That view has merit, but would limit our ability to address the difference between those characteristics for which tailoring is justified and others for which it is not.

[2] For example, in *Schieber v. City of Philadelphia* **(**2000) "an 'expert's testimony [regarding future earnings loss] must be accompanied by a sufficient factual foundation before it can be submitted to a jury.' " In *Elcock v. Kmart Corp* (2000) quoting Gumbs v. International Harvester, Inc., (1983) the court states that the testimony must "fit" the facts.

[3] For example, *Slavin v. Gardner* (1979) affirmed a judgment of $75,000 for the death of Tiffany R. Slavin, age 2 years, after finding that the evidence "...was sufficient to provide the jury with a reasonably fair basis for assessing the loss to the decedent's estate. While the evidence may not have conformed to any standard of mathematical exactness, it was legally sufficient to justify an award when considered by the jurors in light of their own knowledge and experience....With respect to the decedent's future earnings, appellees established that the decedent by all

appearances was a normal, healthy, young female child with her whole life before her. Decedent's father was a sales engineer earning $1,600.00 per month, and her mother intended to return to work once her youngest child reached school age. Both parents expected their child to attend college and, in light of their background and station in life, we do not think the hopes and aspirations they held for their daughter were unreasonable."

[4] There may be controversy about "age-rating" plaintiffs for whom life care plans are prepared but that is a controversy over how to carry out the tailoring for age, rather than whether to do it.

[5] Lest one smile dismissively at this last item, consider the paper of Dunifon, Duncan and Brooks-Ginn (2001), who find "...the cleanliness rating of one's home is predictive of (i) one's own earnings 25 years later; (ii) children's subsequent completed schooling; and (iii) children's earnings measured 25 years later." (p. 150).

[6] Evidence is "scattered" because no census bureau study after 1860 singles out this group; however, information about the occupations of their paternal grandfathers suggests that in 1950 nearly 60% of professionals in Washington, D. C. were descendants of free persons of color. (Their median year of birth was 1910; their paternal grandfathers were likely born well before emancipation, so occupations requiring literacy or capital would imply that the grandfathers had not been slaves). Information about ancestors' literacy gives similar evidence, because only 1% or 2% of slaves were (allowed to be) literate. Members of this group were responsible for the founding of the NAACP and for several schools to educate blacks; according to Sowell they are still the source for a large fraction of black doctorates.

[7] Sowell reports that West Indians are genetically and culturally closer, on average, to African forebears than are native blacks. This allows him to use the West Indians, and especially their children born in this country (whose speech patterns would be less distinctive than those of immigrants) as a counterexample to the claim that blacks are economically worse off than whites because of prejudice based on color. West Indians have greater representation in the professions, less crime, and lower unemployment than the average for the entire population, in addition to the relatively high income cited in the text.

[8] Sowell also points out that other groups of immigrants have experienced similar increases in IQ as they assimilated to the US.

[9] Mincer and Polachek (1974) found that interrupted work careers for married women may account for a substantial portion of the male-female earnings gap. For a more recent investigation see Regan and Oaxaca (2009).

[10] The two cases cited in the text are from a paper by Martha Chamallas (1994). This paper formed part of the basis for remarks given by Professor Chamallas at a session devoted to "Race and Gender Issues in Forensic Economics," at the NAFE Sessions of the Eastern Economics Association, New York City, Mar. 4 & 5, 2005.

[11] https://www.vcf.gov

[12] The population over 65 varies from 9.0% in Alaska to 18.7% in Florida; median ages in those two states differ by over 4 years (U.S. Bureau of the Census 2015).

[13] The data are for persons in the U.S. non-institutional population ages 18 and over; CPS data are for 2009-2014, and SIPP data are for 2009-2011. See Krueger and Skoog (2015), Table 5.

[14] Estimating the future earnings of deceased children is necessary in some states, such as Pennsylvania, where the case law defines the economic loss if a child dies as future earnings

once old enough to enter the labor force, less the cost of personal maintenance after the child enters the labor force.

[15] For recent detailed results from the General Social Survey relating educational attainment of sons and daughters to mother's and father's schooling, see Martin and Weinstein (2012), Table 4C.

[16] We are grateful to Frank Slesnick for pointing out this example in a private communication.

[17] The average life expectancy in 2000 was 43.5 years, and a person with that life expectancy in the year 2000 life table for all persons was just over age 35. See http://news.nationalgeographic.com/news/2005/06/0608_050608_aging_2.html http://www.cdc.gov/nchs/products/pubs/pubd/nvsr/51/51_03.htm Table 1, for the life expectancy inference.

[18] Gary Skoog has made this point in an unpublished communication, which we use here with his permission.

[19] We should not jump to the conclusion that this is the case, however: black incomes are distributed more unequally than white, if measured by the Gini coefficient on income quintiles (Sowell, 1978 p. 22).

[20] Physicians untrained in statistics may be poor judges of life expectancy but this note of caution is not meant to suggest that the economic expert should fail to state to the retaining attorney the need to obtain a life expectancy opinion from another type of expert.

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