Comparing Direct and Indirect Measures of Just Rewards*

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Comparing Direct and Indirect Measures of Just Rewards

Abstract

We offer the first comparison between "direct" and "indirect" methods for measuring perceptions of distributive justice in reward allocations. The direct method simply asks respondents what they would consider to be a fair salary for a particular person in a given set of circumstances. In contrast, the indirect method infers fair salaries from respondents' judgments about the relative unfairness of hypothetical salaries. The particular indirect method that we will assess is a vignette survey technique pioneered by Jasso and Rossi (1977) and used in a number of more recent publications. The vignettes describe characteristics of a hypothetical employee, with the objective of deriving what respondents believe to be the just reward for that employee. Our experimental test suggests that the two methods yield incompatible results and that neither is immune to bias. The indirect method also suffers from a type of specification error that leads to untenable results. We conclude by suggesting directions for new research to gain a better understanding of these problems and, ultimately, to circumvent them

Distributive justice is an important topic of research in both sociology and political philosophy (Deutsch 1985; Roemer 1996) encompassing at least four areas: the *processes* whereby distribution occurs, the *consequences* of distributions, the *norms* of distributive justice, and justice as it is *perceived* or *judged* by participants or observers (Schmidt 1992). We are most concerned with the last—perceptions and judgments of justice and injustice. Research in this area usually addresses one of two questions: Under some given set of circumstances, *(i)* "How fair/unfair is a particular reward?" or *(ii)* "What reward would be fair?"[1] The usual approach to the first question is to ask respondents to express degrees of perceived injustice on a continuous or ordinal scale (e.g., Markovsky 1985; Buckler and Unnever 2008). To address the second question, the most common approach is to ask respondents to provide a value or range for the amount of pay that would be fair (e.g., Kluegel et al. 1995; Younts and Mueller 2001).

Jasso and colleagues have developed and applied a unique approach that, in a way, combines the two questions. Their method *(i)* elicits responses to questions about the degree of unfairness of given rewards, and then *(ii)* uses these responses in calculations that infer the fair rewards. This so-called *indirect method* has been applied in a series of published studies (e.g., Jasso and Rossi 1977; Jasso 1998, 2006, 2007; Jasso and Webster 1997, 1999; Jasso and Wegener 1997; Jasso and Meyersson Milgrom 2008). Remarkably, however, there is no previous research that compares this indirect method to responses obtained with simple *direct* questions about what rewards would be fair.

Studies that use the indirect method justify its use by referring to a key passage (Jasso 1994:374):

> Little is known currently about how, or why, the two methods may yield different results. One conjecture is that the direct method yields estimates of the just reward that may be contaminated by strategic, rhetorical, role and response effects; for example, it would appear to be more difficult to engage in "gaming" when asked to provide a fairness rating than when asked to provide a fair wage. Another conjecture is that the young are less aware of the implicit notions of the just reward and that, therefore, direct and indirect measures converge with age. We hope that future research will include systematic studies of the direct and indirect measures of the just reward.

Sixteen years later, we now offer the first such study.

Our research was conducted in two parts. To determine whether or not the two methods yield different results, first we replicated the one-reward-per-rewardee version of the indirect method used recently by Jasso and Meyersson Milgrom (2008; henceforward "JMM 2008"). Second, we used a simple direct measure and compared its results to those of the indirect measure. This produced an unexpected finding: Not only did the two measures yield markedly different sets of values, but they were also not even correlated. At least one of the measures therefore must be highly inaccurate.

A vital component of our investigation is a close examination of the indirect method's mathematical and statistical procedures for inferring just rewards. The application of these procedures rests on explicit assumptions about how people process relevant information to formulate justice evaluations (Jasso 1978). For the purpose at hand we assume that Jasso's theoretical model is valid and utilize it exactly as prescribed for the indirect method. The central problem that we identify is not with the theoretical model, but with the way that it is transformed in the procedure for inferring just rewards. We will show that even if we assume that *(i)* respondents have in mind specific just reward values for each vignette they judge, and *(ii)* they evaluate departures from those just rewards exactly as specified in the theory, the procedure for inferring those just rewards still yields biased and untenable results.[2]

We will also address a related problem: Responses to the vignettes are assumed to provide insight into real and obdurate underlying beliefs about fair pay for the cases described. We explore an alternative possibility: Rather than revealing underlying beliefs about just rewards, the vignette responses instead reflect anchoring effects—judgment biases stemming from the randomized hypothetical salaries provided in the vignettes.

Direct and Indirect Methods

In the standard application of the indirect method, data are collected using factorial surveys (cf. Jasso 2006; JMM 2008). These surveys ask respondents to rate a series of vignettes, each describing a set of

characteristics, with each characteristic selected randomly from an array of possible values. For example (from Jasso 2006:412):

> The CEO is 45 years old, a woman who completed 20 years of school, receiving a doctoral diploma. She was a CEO elsewhere for 11 years. The firm, headquartered in the United States, is in the manufacturing sector. The firm has a market value of $50 billion. The proposed total compensation for the CEO for the first year is $1 million.

Respondents are reminded that the proposed compensation has been randomly assigned to the CEO described in the vignette. The respondent is asked to generate a number on an open-ended scale indicating his or her perception of the degree of injustice of the stated salary. Respondents use a negative number to indicate a perceived under-reward, a positive number for an over-reward, a larger absolute value for a greater injustice, and zero for perfect justice. Different vignettes present different combinations of the CEO's age, education, pay, etc. Multiple regression analysis determines the impact of each factor on the response variable (Rossi and Nock 1982). The last sentence in the above example highlights a key difference between the direct and indirect methods: Providing salary information would serve no purpose with the direct method, which simply asks the respondent to state what amount of pay would be fair in each case. With the indirect method, however, the just reward is *inferred* from a series of judgments about the magnitude of unfairness inherent in the stated salaries.

Following the standard notation in the literature on the indirect method, there are two key values for each rated vignette:

a_r : the *actual reward* received by the rewardee, *r,* described in the vignette

j_r : the *justice evaluation,* i.e., respondent's expressed judgment of the unfairness of a_r

From these two values, the indirect method infers a third:

c_r : the respondent's belief about the *just reward* for the rewardee in the vignette

The inference procedure is carried out as follows. First, the three values are related according to a mathematical formula called the *justice evaluation equation*, which is also the core assumption from Jasso's theory of distributive justice (e.g., JMM 2008:125-126):

$$j_r = \theta \ln(a_r/c_r) = \theta \ln a_r - \theta \ln c_r \qquad (1)$$

The parameter θ is called the *signature constant.* The absolute magnitude of θ is called the *expressiveness coefficient*, and its sign is called the *framing coefficient* (Jasso and Wegener 1997:406-409, 411, 416). Generally speaking, larger θ values indicate greater responsiveness to departures from perfect justice.

Given Equation 1, an algebraic transformation permits the just reward to be calculated (JMM 2008:130-131):

$$c_r = a_r e^{-j_r/\theta} \tag{2}$$

The justice evaluation, j_r, and the actual reward, a_r, are observable values. Still needed is the value of θ. The indirect method estimates the value of θ from the justice evaluations themselves. Jasso specifies a statistical model in which $-\theta \ln c_r$ from Equation 1 is replaced by the constant α and a stochastic term u_r:

$$j_r = \alpha + \theta \ln a_r + u_r \tag{3}$$

It is now straightforward to estimate α and θ for each respondent via linear regression, using the data for all the rewardees (r) across the multiple vignettes evaluated by the respondent. To solve for a given respondent's beliefs about just rewards, one simply plugs the estimated value of θ into Equation 2.

An Experimental Study of the Indirect *vs.* Direct Methods

Method

Replicating the design used by JMM (2008), we assembled two decks of 20 vignettes by randomly sampling feasible combinations of CEO characteristics and salaries. The two decks were identical except for counterbalancing the sex of the payees.[3] The vignettes were administered to a sample of student volunteers at the GameLab at Mälardalen University in Sweden, with all of JMM's instructions translated into Swedish. The Lab contained 14 computer stations separated by privacy screens. A computer provided instructions, followed by the administration of vignettes. Respondents could move freely among vignettes until all were completed.

As an adjunct to the JMM procedure above, respondents subsequently received these instructions:

> Next you will be given the same set of CEO descriptions, including the injustice ratings that you just provided. This time around we would like you to provide for each CEO a salary that you think would be fair.

So this second phase used a direct method to obtain the perceived fair pay for each vignette. The vignettes were shown again with the addition of the line "FAIR PAY: _____" at the bottom to be completed by the respondent. Following the second phase, respondents were debriefed and compensated with a movie pass.

Results

Forty-six respondents participated in the study, 32 males and 14 females ranging in age from 19 to 39 years. Decks 1 and 2 were completed by 32 and 14 respondents, respectively. One case was dropped from the analysis because the respondent answered the "fair pay" questions with the identical values that she had used for the "how unjust" questions. The remaining 45 respondents x 20 vignettes yielded 900 justice evaluation responses and a corresponding number of direct just pay measures. Results are summarized in Table 1, where each row corresponds to a vignette (male and female CEO decks combined). The table is sorted on the second column—the salary evaluated in the vignette. We have summarized the responses using median values.[4] For each vignette, the remaining columns show the medians of the justice evaluations, *j*; the indirect measures of the just salary, *c*; the direct measures of the just salary, *C*; and the absolute values of the difference between the direct and indirect measures, $|C-c|$.

Table 1 about here

Correlation Between Direct and Indirect Measures. Across the set of 900 data points, the direct and indirect measures of just salaries were uncorrelated (Pearson $r = -.009$). The discrepancy between the two measures also is apparent in the last column of Table 1 which reveals some truly extreme differences between the measures. Considering the actual measures rather than their medians, relative errors are larger still. In fact, the median values reported in Table 1 mask extraordinary variability, indicated by the ranges shown at the bottom of the table.

Correlation Between Stated Salaries and Measured Just Salaries. The vignettes were constructed through random sampling of combinations of characteristics, so the stated CEO salaries in the vignettes were uncorrelated with the characteristics assumed to determine the just reward. The CEO salaries presented in the vignettes should then be uncorrelated with the directly measured fair pay responses. Nonetheless, we observed a moderate positive correlation of .263. To see why this signals a potentially

serious problem, consider these two vignettes, very similar but for the hypothetical CEO salaries:

> **Vignette #1.** This CEO is a man [woman] who is 36 years old. He [she] has 6 years of college education, and 5 years of previous experience as a CEO. He [she] is recruited to a firm with a total stock value of 200 billion dollars. A hypothetical compensation is $175,000/year.
>
> **Vignette #18.** This CEO is a man [woman] who is 31 years old. He [she] has 5 years of college education, and 5 years of previous experience as a CEO. He [she] is recruited to a firm with a total stock value of 200 billion dollars. A hypothetical compensation is $300,000,000/year.

The median direct measures of just annual salaries for these two vignettes were, respectively, $1 million and $10,000,000—a 10-fold difference. The indirect measures also inferred a large difference in just pay for these two cases, but in the opposite direction: $6,200,159/year *vs.* $1,707,711/year. Because the vignettes are so similar, it is troubling that each method would yield such discrepant amounts when intuitively—and theoretically—the two CEOs' just salaries ought be very similar.

Discussion

The extraordinary ranges of the responses obtained in this study warrant further analysis. Although the observed range of the direct measures of just salaries was quite large—from $30,000 to $1 billion—the range of indirect measures of just salaries was literally beyond belief—from $0 to more than ten *nonillion,* the latter being vastly more than all of the money in the world. One possible explanation for the high variability in our results for the indirect measures was our respondents' unfamiliarity with CEO salaries. To check this we compared our findings to those reported by JMM (2008:133). Their sample consisted of MBA students who were presumed to have relevant knowledge and beliefs. We found that some of the indirect measures they obtained also were improbably large, at least into the octillions of dollars. Their actual range may have been even greater, but JMM only displayed the inferred just salaries for half of their cases.[5] We drew a random subsample from our data (41 respondents and 10 vignettes) matching the size of the data set reported by JMM (2008:133) and compared logged indirect measures. In our data versus theirs, respectively, the medians of the variances across 41 respondents were 2.05 versus 3.14; across 10 vignettes they were 2.68 versus 5.43; for all 410 responses pooled they were 3.84 versus 13.41. Thus, response variability was higher with the MBA students in the JMM (2008) study, suggesting that the variability we observed is not an artifact of any special conditions pertaining to our procedures or

sample.

In summary, we found no correlation between the direct and indirect measures of just rewards. This means that either one or both of the methods failed to represent accurately the respondents' beliefs about just salaries. Further, the indirect measures fell within an impossible range and are thus unlikely to be accurate indicators of respondents' beliefs. Finally, we observed correlations between hypothetical salaries stated in the vignettes and the directly measured just rewards. This correlation should be zero unless the stated salaries are somehow biasing responses. We will return to this finding shortly.

Analysis of the Inference Procedure

In this section we examine more closely the indirect method's procedure for calculating just rewards. We will first discuss a key assumption underlying the procedure, and then consider the statistical model.

Key Assumption

A procedure is unlikely to produce accurate results if its underlying assumptions are violated. The procedure for the indirect method rests on the rather strong psychological assumption that *every respondent has in mind a just reward for all possible rewardees described in the vignettes.* The assumption that people have precise ideas about justice has been useful for the development of distributive justice theories. Nonetheless, it seems highly unlikely that respondents will in general possess clear, consistent and nuanced beliefs about just rewards for twenty to forty unfamiliar people having specific sets of characteristics in particular organizational and industrial contexts. The resulting uncertainty would not pose major problems for the indirect method if its only effect were to increase random measurement error. However, there is a large body of research showing that uncertainty promotes the use of judgment heuristics whose effect is to make judgments malleable and easily biased by arbitrary contextual information (Kahneman et al. 1982; Baron 1993; Resh 1999). For this reason, uncertainty about just rewards throws into question both the direct and the indirect methods. For the direct method, the stated just salary should be irrelevant. However, there is reason to believe that it may instead shape the respondent's ideas about fair pay. Similarly with the indirect method, if the hypothetical salary

information affects ideas about fair pay, then it will also affect the justice evaluations that rely on those fair pay conceptions.

Anchoring is a judgment heuristic that operates when extraneous information exerts undue impact on the judgment at hand (Markovsky 1988; Chapman and Johnson 2002). The more uncertain the judgment and the more salient the anchor, the greater the anchoring bias. There are two kinds of anchoring effects: A *contrast effect* occurs if a stimulus object is compared to a stimulus-scale anchor. The contrast effect inflates the judgment when there is a lower anchor, or deflates the judgment when there is a higher anchor. For instance, the same 70-degree home can feel hot when entering it from wintery cold outside, or it can seem cold when entering from summer heat. The *assimilation effect* occurs if a potential response is compared to a response-scale anchor. This effect draws the response toward the anchor. Answers to the question "How many games do you think the Red Sox will win this year?" will be lower if the question is amended with "Will it be more than 60?" and higher if the respondent is asked "Will it be less than 120?"

Markovsky (1988) reported extremely robust contrast and assimilation anchor effects in justice vignette experiments. Both kinds of justice evaluations—fair rewards and degrees of unfairness—were strongly affected by anchors, as were judgments concerning punishments. In the indirect method, when a just reward is not already salient to the respondent, the stated reward—which *is* salient—is then likely to serve as an anchor. Hence anchoring theory would predict that uncertain beliefs about just rewards will assimilate toward the salaries stated in the vignettes. In the aggregate, this would produce a positive correlation between the hypothetical salaries stated in the vignettes and the directly measured fair salary judgments. This is precisely the correlation that we found in the present study. As predicted by anchoring theory, judgments of fair salaries were biased by the randomly determined hypothetical salary information presented in each vignette.

Recall that if the anchoring effect biases conceptions of fair salaries, then it should also affect judgments about degrees of injustice of hypothetical salaries vis-à-vis those fair salaries. These kinds of judgments is at the heart of the indirect method. Further, whereas the fair salary judgments would be expected to manifest assimilation effects, the injustice judgments would be predicted to have contrast

effects. To see just how potent the biasing effects can be, one need look no further than the results for Vignettes #1 and #18 shown earlier. These vignettes had very similar CEO and firm descriptors, but the hypothetical salary of $175,000 in Vignette #1 served as a *low anchor,* whereas the hypothetical salary of $300,000,000 in Vignette #18 provided a *high anchor*. If respondents held conceptions of fair salaries with any degree of certainty, the observed anchoring effect and correlations would not have occurred. Instead, there was a strong assimilation effect pulling the median fair salary judgment downward to $1,000,000 in the case of the lower anchor, and upward to $10,000,000 for the higher anchor. There was also the predicted contrast effect, with the indirect method inferring a relatively inflated fair salary of over $6 million when there was a low anchor, and a relatively deflated fair salary of under $2 million when the anchor was high. The clear implication is that with the indirect method, even if respondents are not asked explicitly to state fair salaries, the anchor effect still shifts the basis of their justice evaluations. More specifically, the low anchor helps to moderate the perceived negative injustice of a low hypothetical salary, leading to the deflation of the inferred fair salary. Conversely, the high anchor moderates the perceived positive injustice of a high hypothetical salary, leading to the deflation of the inferred fair salary. Judging by the sheer magnitude of the reported effect in these vignettes, it may be fair to say that responses were overwhelmed by anchoring effects, and scarcely influenced at all by any *a priori* notions of fair salaries that respondents may have held.[6]

In sum, the indirect method promotes anchoring effects because it requires stating a random hypothetical salary which, under conditions of uncertainty, strongly biases responses. The direct method is also strongly affected by anchors if they are present, but it does not require including information that might cause anchoring effects. Nevertheless, the fact that responses exhibit anchoring effects with both methods means that it is questionable whether respondents enter the judgment task with pre-existing ideas about fair rewards. We will return to this issue later.

Statistical Model

Recall the theoretical model from Equation 1,

$$j_r = \theta \ln a_r - \theta \ln c_r$$

and the statistical model from Equation 3:

$$j_r = \alpha + \theta \ln a_r + u_r$$

Earlier we pointed out that, in order to estimate θ in the theoretical model, the statistical model has replaced the unknown term ($-\theta \ln c_r$) with a constant, α, plus a stochastic term, u_r. As explained by JMM (2008:130), the "regression intercept α … can be shown, by properties of linear regression, to amalgamate all the unobserved true just rewards." However, the statistical model differs from the theoretical model in one crucial respect. Variation in the just rewards cannot be captured by the stochastic term because the theory assumes the just reward c_r to be *determined* by the characteristics of the rewardee r, as reflected by the justice evaluation j_r.[7] Stated differently, the justice evaluation equation specifies a unique just reward for each vignette, whereas the regression equation essentially replaces that array of just rewards with a single fixed value (with random errors) which is then assumed to hold for all of the respondent's vignettes. As a result of this model specification, the estimated values of θ and, by extension, the inferred just rewards, will err systematically from their "true" values *even if respondents fully abide by the theoretical equation in making their judgments*.[8]

A simple hypothetical case illustrates how systematic errors follow from the misspecification of the statistical model. Suppose that we have a respondent who evaluates two vignettes in which the stated salaries for the payee and the true just salaries in the respondent's mind are as shown in Table 2. Suppose further that this respondent's true signature constant is $\theta = 1$, as shown in row 3. Equation 1 then predicts the respondent's justice evaluations expressed for each vignette (row 4). Now using the indirect method, we estimate this respondent's θ (row 5) and, finally, estimate his/her beliefs about just salaries for these payees (row 6).[9] If the inference procedure were correctly specified, its inferred just salaries in row 6 should perfectly reproduce those in row 2 that the respondent had in mind. This is not what we find. While the just salaries that the respondent had in mind for the two vignettes were $5,000 and $100,000, the inferred just reward for both vignettes is $56,610.

Table 2 about here

A key problem is the poor estimate for θ, –.40 instead of the true value of 1.00. In theory, θ should always be positive when the payee regards pay as a "good" and negative when the payee regards pay as a "bad." Research conducted using the indirect method typically finds a few cases such as this with negative θ values (e.g. Jasso 1990). Such cases are treated as "contrarians." However, our example demonstrates that negative estimates of θ can occur for non-contrarian respondents purely as artifacts of the estimation procedure.[10]

To summarize for the indirect method, differences in the way its statistical model and its theoretical model are specified produce errors in the inferred just rewards. As illustrated by our example, these errors can be very large and even yield the wrong sign for the estimated signature constant. There is no such inference procedure for the direct method. Although this reduces the extremity of its errors and makes it the preferable method on this count, neither method generally can be assumed to yield accurate judgments when respondents are uncertain about fair rewards *a priori*.

Discussion and Conclusions

In this paper we have conducted the first study of whether direct and indirect methods of measuring just rewards give different results. We found that the methods in fact give extraordinarily different results, that both are biased by anchoring effects, and that the extreme values generated by the indirect method render it especially implausible. This is important because a number of major publications have based their findings on the indirect method (e.g., Jasso and Rossi 1977; Jasso 1998; Jasso and Webster 1997, 1999; Jasso and Wegener 1997) and it is still being used and recommended for future use (Jasso 2006; Jasso and Meyersson Milgrom 2008).

We identified two main issues. First, the statistical estimation procedure for the indirect method assumed that a respondent's beliefs about just rewards vary stochastically around a single constant value across vignettes. This contradicted the assumption from the theoretical model that the respondent has in mind a unique just reward for each vignette. If we believe the theoretical model to be true, then the statistically inferred just reward inferences must be inaccurate. Alternatively, if the inferred just rewards

were empirically true, then the theoretical model would have to be false.

Second, the indirect method assumed that respondents have in mind just rewards for a virtually limitless variety of specific circumstances. This assumption is implausible on its face, and we are unaware of any evidence to support it. Furthermore, it is problematic even if only considered a "simplifying assumption." Lacking definite ideas about just rewards creates uncertainty for respondents. Prior research demonstrated that uncertainty leads to anchor-biased judgments, both with regard to degrees of injustice as measured with the indirect method, and with regard to just rewards as measured with the direct method. Although the principal benefit claimed for the indirect method is its immunity to the biases suffered by direct measures, this was also asserted without evidence by proponents of the indirect method, and it is contradicted by prior research and by the present findings.

The first of the above issues should be resolvable by modifying the statistical model and adjusting the measurement techniques accordingly. However, if the advantages claimed for the indirect method do not in fact exist, then it may be wiser instead to focus on the second issue. This means working to improve the simpler direct method through investigating conceptions of fair rewards in particular cultural contexts or other social aggregates, e.g., their distribution, perceived legitimacy and the confidence with which they are held. It also means investigating in a more systematic way the conditions under which those conceptions are more or less malleable due to judgment heuristics. For instance, there is little research on popular beliefs about appropriate salaries for occupations of varying familiarity and status, and virtually no research on how such factors interact with judgment anchors or other heuristics in justice evaluation measures. If uncertainty is the rule rather than the exception in judgments of fair salaries, then a potentially important line of related work would be to investigate the conditions under which fair pay conceptions do or do not manage to crystallize into shared norms, the violation of which lead to social discontent and collective action.

A larger question also needs to be addressed: If anchoring is endemic to justice evaluations, then what becomes of existing justice theories? One possibility is to make explicit the fact that the scope of these theories is restricted to conditions where all of the requisite elements of the justice evaluation are regarded

with certainty by the evaluator, and shared by all evaluators in the given population. Such conditions are probably the exception rather than the rule, and so a more constructive approach may be to make anchoring processes an integral component of justice theories. The problem runs deeper than that observed in the present study, however. Justice evaluations have several components, each of which potentially is vulnerable to a variety of anchor effects. These may stem not only from hypothetical rewards in the judgment context, but other sources including prior rewards, prior justice evaluations, or other kinds of social comparisons. It may be necessary to account for anchoring effects for all such components if credence is to be given to injustice measures. Furthermore, justice theories may benefit by incorporating other judgment heuristics. For instance, the justice norm assumed to govern the evaluation may be determined by *vividness* or *availability* heuristics—respectively, the extent to which comparable judgment contexts are made salient, or the ease with which they are recalled from experience. We believe it is fortuitous that these interesting possibilities, along with other theoretical and practical considerations, have emerged from our analysis.

Notes

[1] We will use the terms “fair” and “just” interchangeably, and in each case our focus is on subjective judgments of fairness and unfairness.

[2] In analyzing her approach, Jasso (1990) noted how certain combinations of estimation procedures and distributional properties of the data may lead to biased parameter estimates. Here we are addressing different sources of bias, i.e., those stemming from misspecification of the statistical model (vis-à-vis the theoretical model) and from judgment heuristics affecting responses to the vignettes.

[3] Although our method for constructing vignettes was the same as that used by JMM (2008), they administered 40 vignettes per respondent rather than 20. They did so by combining the female CEO version of Deck 1 with the male CEO version of Deck 2 into a “superdeck,” as well as the male CEO version of Deck 1 with the female CEO version of Deck 2.

[4] Using medians rather than means here and elsewhere reduces the impact of extreme responses.

[5] After JMM first disseminated their data in a 2004 conference presentation, we made several requests to Jasso to obtain data from any and all of her published work using the indirect method. She deferred our requests to an unspecified future time, and we have not received any data at this writing.

[6] A ”multiple reward” version of the indirect method asks respondents to provide justice evaluations for multiple hypothetical salaries within each vignette (e.g., Jasso and Webster 1999). This does not circumvent the anchoring problem, however. Markovsky (1988) showed that all of the justice evaluations connected to a given vignette were strongly biased by anchors. We have focused on the single reward version of the indirect method both because it is simpler to describe and because it is the most frequently and recently published version of the indirect method.

[7] It is worth pointing out that the “multiple reward” version alluded to in the previous note is crucially different in this respect. In this version of the method, one avoids the problem of assuming a constant just reward across vignettes by making separate estimations of a respondent's expressiveness coefficient for

each vignette. Another methodological problem arises, however, as each respondent is now assigned a multitude of expressiveness coefficients. A fundamental—and far more reasonable—assumption of the standard "single reward" version of the indirect method is that each respondent's expressiveness is constant across fairness judgments.

[8] JMM (2008:130) recognized that substituting an expected value for an array of values can affect their estimates:

> "This means that great care must be exercised in the estimation of [Equation 2] to guard against omitted variables bias, which would arise if there is a correlation between the actual rewards and the unobserved just rewards. The steps taken to guard against such error are, first, ensure that the correlation of the actual reward and the reward-relevant characteristics (the CEO and firm characteristics) is zero in the vignette population, and, second, make clear to the respondents that the actual reward is random, stating this explicitly ('Each CEO has been randomly assigned a hypothetical total compensation for the first year.')."

The illustration to follow demonstrates that these steps do not guard against bias.

[9] In the two vignette case, we obtain the estimate of θ as the slope of the line through points (j_1, ln a_1) and (j_2, ln a_2).

[10] The two-vignette case will always yield the same just reward estimate for both vignettes. This is not so with more vignettes, but the bias problem still remains. To illustrate using 20 vignettes, we treated our respondents' expressed just rewards as their true just reward, as in row 2 of Table 2, and fixed $\theta = 1$ for all respondents in order to generate justice evaluations using Jasso's model. Estimated values for θ should be close to 1.00. Although they remained positive for all respondents, they ranged from .276 to 1.073—sufficiently erroneous to produce estimated fair annual salaries that ranged from $491 to around $342 trillion. Needless to say, instead of reproducing the true just rewards that provided the input for the

indirect method, the inferred just rewards departed wildly from those true just rewards and many of them were utterly implausible.

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Table 1: Results of Experimental Study

Vignette ID	Salary *(a)*	Median Justice Evaluation *(j)*	Median Indirect Measure of Just Reward *(c)*	Median Direct Measure of Just Reward *(C)*	Median Difference Between Measures $\|C - c\|$
1	175,000	-40	6,200,159	1,000,000	15,588,876
2	200,000	0	200,000	7,500,000	19,978,762
3	200,000	-50	78,315,661	2,000,000	116,597,991
4	250,000	-25	5,178,186	500,000	6,194,683
5	500,000	0	500,000	600,000	500,000
6	500,000	-3	518,026	500,000	389,038
7	600,000	0	600,000	750,000	749,999
8	600,000	10	600,000	670,000	600,000
9	600,000	0	600,000	600,000	400,000
10	1,000,000	0	421,769	1,000,000	372,081
11	5,000,000	10	1,172,580	2,000,000	954,689
12	10,000,000	0	6,024,564	5,000,000	4,887,236
13	10,000,000	0	5,504,503	10,000,000	4,965,777
14	50,000,000	20	3,116,305	10,000,000	9,456,892
15	75,000,000	5	19,562,871	8,000,000	19,992,363
16	200,000,000	40	985,835	10,000,000	6,727,327
17	300,000,000	50	204,589	3,000,000	3,389,309
18	300,000,000	25	1,707,711	10,000,000	9,968,278
19	500,000,000	50	1,072,631	5,000,000	8,927,369
20	500,000,000	50	1,095,816	9,000,000	9,252,048
Range:	**Minimum**	-1,000	0	30,000	0
	Maximum	600	1.338×10^{31}	10^9	1.338×10^{31}

Table 2: Illustration of the Effect of Misspecification

	Vignette	
	***r* = 1**	***r* = 2**
1. Payee's Salary (a_r)	\$10,000	\$85,000
2. Just Salary (c_r)	\$5,000	\$100,000
3. Signature Constant (θ)	1.00	
4. Justice Evaluation ($j_r = \ln a_r - \ln c_r$)	.69	–.16
5. Estimated Signature Constant	–.40	
6. Estimated Just Salary	\$56,610	\$56,610