What is a Fair Salary?

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Abstract

Pay satisfaction and pay fairness are of vital concern to the employee, the employer, and hence the entire economic structure. Although the importance of fairness to compensation decisions is widely acknowledged, the research examining how fairness perception relates to components of pay is relatively scarce. Here I model a dyadic employer-employee interaction as a "minimal" two-person game, in which an *allocator* (e.g., an employer) divides a monetary amount (e.g., a workplace net profit), between herself and a recipient (e.g., an employee). Assuming rational, self-interested players, I propose a level of aspiration model, according to which players' pay satisfaction is proportional to their *actual* payoffs, *relative* to their *aspired* payoffs. Solving for the points of equality between the players' levels of pay satisfaction, yields two possible "harmony" points, depending on the assumption made about the recipient's aspiration. Under the assumption that recipients aspire to receive 50% of the total amount, the predicted harmony allocation is $(\frac{2}{3}, \frac{1}{3})$, for the allocator and recipient, respectively. On the other hand, assuming that the recipient aspires to be treated equally, i.e., to receive the same amount as the allocator, the predicted harmony allocation is (φ, 1-φ), where φ ≈ 0.62 is the famous Golden Ratio, known for its important role in human aesthetics, and in many fields of science and technology.

For a dyadic employer-employee interaction, the above solution prescribes that a fair salary is any percentage of the net profit between ≈ 33% to ≈ 38%, with strong preference for the upper limit, which in addition to yielding higher pay and pay satisfaction, is also aesthetically pleasing.

Tests of the proposed model using field data on attitudinal pay fairness, actual pay data, and allocation behavior in experimental ultimatum bargaining, lend strong support to the validity of proposed solution.

Keywords: Pay satisfaction, Pay fairness, Salary, Aspiration level, Distributive justice, Resource allocation, Ultimatum game.

1. Introduction

Job satisfaction and pay satisfaction are of vital concern to the individual employee, the individual employer, and, in turn, the entire economic structure (Shapiro, 1976; Porter et al., 1974; Heneman & Schwab, 1985; Wallace & Fay, 1988). Job satisfaction, is related to employee motivation and performance (Ostroff, 1992), employee absenteeism and turnover rates (Hackett & Guion, 1985; Griffeth, Hom, & Gaertner, 2000), organizational citizenship behavior (Organ & Ryan, 1995), and more. Pay satisfaction, which I discuss in the present paper, is a much narrower construct than job satisfaction. However, it is also an important variable, linked to significant organizational outcomes. As examples, empirical evidence suggests that dissatisfaction with pay and work conditions may lead to decreased job satisfaction (Lumi et al., 1998), decreased motivation and performance (Lumi et al., 1998; Ostroff, 1992), increased absenteeism and turnover rates (Hackett & Guion, 1985, Griffeth, Hom, & Gaertner, 2000; Vandenberghe & Tremblay, 2008), more pay-related grievances and lawsuits (Cable & Judge, 1994; Gerhart & Milkovich, 1990), attitudes toward militancy and willingness to vote for going on strikes (Feuille & Blandin, 1976; Donnenwerth & Cox, 1978; Ng, 1991), and psycho-social problems (Butterworth et al., 2011).

Pay satisfaction is intimately related to the concept of *perceived pay fairness*. While the perception of fairness is important to all human resource decisions and processes (Cohen-Charash & Spector, 2001; Jawahar, 2007; Thurston & McNall, 2010, Jawahar & Stone, 2011), it is particularly important to compensation decisions. Perceived compensation fairness, the procedures used to make compensation-related decisions, and the manner in which compensation-related information is communicated, play an integral role in shaping reactions to critical elements of the compensation system (Milkovich and Newman, 2008; Nelson et al., 2008, Jawahar & Stone, 2011).

Despite the obvious relationship between pay satisfaction and pay fairness, the literatures on pay satisfaction and compensation, have evolved independently (Williams et al., 2006). Moreover, even though most researches would readily acknowledge that fairness is important to compensation decisions, the research examining the relationship between pay satisfaction and perceived pay fairness is relatively scarce (Jawahar & Stone, 2011).

Two major theoretical frameworks - equity theory (Adams, 1965) and discrepancy theory (Lawler, 1971, 1981) have been proposed to explain the relationship between pay satisfaction and perceived fairness in the workplace. Both theories posit that perceptions of fairness and equity in payment are central to explaining employee pay satisfaction or dissatisfaction (Ruiz-Palomino et al., 2013). Equity theory assumes that employees seek to maintain an equitable ratio between the inputs they bring to the relationship and the outcomes they receive from it (Adams, 1965). Equity theory in business, however, introduces the concept of social comparison, whereby employees evaluate their own input/output ratios based on their comparison with the input/outcome ratios of other employees (Carrell & Dittrich, 1978; Dittrich & Carell, 1979). Discrepancy theory (Lawler, 1971, Lawler & Porter, 1967) posits that the levels of satisfaction, including pay satisfaction, are negatively correlated with the discrepancy between the actual, and expected, job satisfaction.

Several empirical studies have investigated the main factors that influence the level of employees' pay satisfaction. In a study based on data from two similar companies engaged in the manufacture of aircraft components and systems for the government and private industry, Shapiro (1976) was able to delineate four important antecedents of pay satisfaction: (1) Actual pay -how much actual money the individual receives, (2) Social comparisons - how the individual's pay compares with his or her perceptions of what others receive, (3) Scale of living — satisfactory pay must cover a worker's basic needs, and (4) Wage history - How much the individual was paid in the past. Shapiro and Wahba, (1978) found that actual pay, social comparison, wage history, status, performance and job difficulty, were the best predictors of pay satisfaction. A more recent study on the antecedents and consequences of pay level satisfaction, (Williams et al., 2006) reported results from a meta-analysis of 28 correlates of pay level satisfaction, involving 240 samples from 203 studies conducted over 35 years. The analysis main findings indicate that the strongest predictor of pay satisfaction is the discrepancy between perceived amount of pay that should be received, and the perceived amount of pay received. Yet in another comprehensive study it was found that the three types of psychological determinants which contributed most to predicting pay satisfaction were: equity considerations, actual pay, and living standards (Berkowitz et al., 1987).

2. The proposed model

The proposed model could be viewed as a conceptualization, in strategic formal terms, of ideas drawn from both equity and discrepancy theories (Adams, 1965; Lawler, 1971, 1981). Despite different formalization, the proposed model, although interactive, holds resemblance to classical studies on aspiration levels in individual choice behavior (Hilgard et al., 1940; Lewin et al., 1944; Siegel, 1957; Simon, 1959), and to recent theories of level of aspiration in individual decision-making under risk (e.g., Lopes, 1987, Lopes, 1995; Lopes & Oden, 1999; Rieger, 2010).

In the context of allocation of profits between employers and employees, the present study asks: what is a fair salary? The strategy taken in the present study is to model a dyadic employer-employee interaction by a "minimal", two-person game, in which an *allocator* (e.g., an employer) must allocate a monetary amount (e.g., a workplace net profit), between himself or herself and a recipient (e.g., an employee). Assuming rational, self-interested players, the model posits that the players' payoff satisfaction levels are proportional to their *actual* payoffs, *relative* to their *aspired* payoffs. In formal terms, the level of satisfaction (LS$_i$) of an individual i, who is allocated x_i monetary units, when he or she had aspired for receiving A_i monetary units, is assumed to be a function of x_i/A_i, or LS$_i$ = F(x_i/A_i), where F(.) is an increasing function with its arguement. For the "minimal" dyadic interaction described above, assume that the allocator keeps x_a units, out of S monetary units, and transfers $x_r =$ S - x_a to the recipient. The levels of pay satisfaction of the two players, as prescribed by the model will be $LS_a = F_a(x_a/A_a)$ and $LS_r = F_r(x_r/A_r) = F_r((S - x_a)/A_r)$, for the allocator and recipient, respectively, where A_a and A_r are the maximal aspired payoffs of the allocator and the recipient, respectively. For simplicity, we assume linear relationships, such that $LS_a = x_a/A_a$ and $LS_r = x_r/A_j$.

The two players will be equally satisfied with their payoffs if $LS_a = LS_r$, or:

$$\frac{x_a}{A_a} = \frac{x_r}{A_r} = \frac{(S - x_a)}{A_r} \qquad \ldots\ldots (1)$$

Yielding:

$$x_a = \frac{A_a}{A_a + A_r} \text{S} \qquad \ldots\ldots (2)$$

And

$$x_r = S - \frac{A_a}{A_a+A_r} S = \frac{A_r}{A_a+A_r} S \qquad \ldots\ldots (3)$$

Determining the allocation (x_a, x_r), which guarantees a fair allocation - in the sense of equal levels of satisfaction - requires the assessment, or measurement of the players' maximal aspirations. In the absence of any constraints put on the allocator's decision, the maximal aspired payoff by a rational allocator is the entire sum S ($i.e., A_a$ = S). Hypothesizing about the recipient's maximal aspired payoff is trickier. We consider two plausible possibilities: 1. that the recipient might aspire to receive half of the net profit, or $A_r = \frac{1}{2}$ S, 2. that he or she might aspire to receive a sum that equals the sum that the allocator keeps for himself or herself. Although from first sight the two conjectures seem identical, they are not.

Under the first assumption we have A_a = S and $A_r = \frac{1}{2}$ S. Substitution in Equations 2 and 3 yields:

$$x_a = \frac{A_a}{A_a+A_r} S = \frac{S}{S+\frac{1}{2}S} S = \frac{2}{3} S \qquad \ldots\ldots (4)$$

And

$$x_r = S - \frac{2}{3} S = \frac{1}{3} S \qquad \ldots\ldots (5)$$

On the other hand, under the second assumption, we have A_a = S and $A_r = x_a$. Substitution in Equations 2 and 3 yields:

$$x_a = \frac{S}{S+x_a} S \qquad \ldots\ldots (6)$$

Solving for x_a we get:

$$x_a^2 + S\, x_a - S^2 = 0 \qquad \ldots\ldots (7)$$

Whish solves for:

$$x_a = \frac{-S \pm \sqrt[2]{S^2+4S^2}}{2} = \left(\frac{-1 \pm \sqrt[2]{5}}{2}\right) S \qquad \ldots\ldots (8)$$

For positive x_a values we get:

$$x_a = \frac{\sqrt[2]{5}-1}{2} S = \varphi\, S \approx 0.62\, S \qquad \ldots\ldots (9)$$

Where φ is the famous Golden ratio (see e.g., Livio, 2002; Posamentier & Lehmann, 2007). The corresponding portion for the recipient is:

x_r = (1- φ) S ≈ 0.38 S …… (10)

In summary, the proposed model predicts that if the recipient aspires to receive 50% out of the total amount; the point of equal levels of payoff satisfaction is achieved by him or her receiving *one third* of the total amount. On the other hand, if the recipient aspires to be treated equally (i.e., A_r = x_a), then the point of equal levels of payoff satisfaction is achieved by him or her receiving a portion of *1-* φ ≈ *0.38* of the total amount. We refer to these points as *harmony points*. Since rational allocators will not allocate to recipients more than they allocate to themselves, the difference between the predicted harmony points falls within the ±5% error range. With the absence of any information about the fairness principle adhered by individuals, in accounting for empirical reports of pay satisfaction, the model predicts a mean allocation for the recipient in the range between ≈ 0.33 and ≈ 0.38 of the entire amount.

The solution prescribing a Golden Ratio division is quite striking, given the appearances of this algebraic number in many fields of science and the arts. I shall say more on the appearances of the golden ratio in the concluding section. It is worth noting that none of the model's predictions of what constitutes fair allocations is a stable outcome. In the absence of binding rules (e.g., a minimum wage), or sanctions for allocating unfairly, rational allocators will strive to maximize their personal payoff. In game theoretical terms, the points of harmony, predicted by the model, are not in equilibrium. For a point of harmony to be stable, it must be supported by an external mechanism, such as an efficient institutional or social sanctioning mechanism (see e.g. Fehr & Fischbacher, 2004; Samid & Suleiman, 2008; O'Gorman et al. 2009).

3. Comparison with empirical findings

Tests of the model, whether in the workplace or in experimental settings, requires a reliable assessment of the interacting parties' aspiration levels. In the present papers I tested the model's predictions using data from studies in which measurements of aspiration levels were not conducted. Consequently, the model was tested under the rationality assumption, prescribing that the levels of aspired payoffs by the allocator and the recipient are A_a = S and $A_r = \frac{1}{2} S$, or x_a . The following subsections detail tests of the model's predictions using data from field and experimental studies.

3.1 Perceptions of pay fairness by executives and secretaries

In a classical questionnaire-based field study, Zedek & Cain Smith (1968) investigated the pay satisfaction of male junior executives (Group I), female secretaries in the maintenance department (Group II), and in the executive department (Group III), in a large academic institution in the United State. For determining the upper and lower thresholds of the perceived equitable payment, the "just meaningful difference" (jmd) of payment (analogous to the jnd in psychophysical measurement), and the points of subjective equity (PSE), the study used an adaptation of the Method of Limits (Woodworth & Schlosberg, 1954), The main results of the study are depicted in Table 1.

Table 1

Mean perceived fair salaries by executives and secretaries

(Source: Zedek & Cain Smith, 1977)

Perceived Mean Salary Ranges (in $)			
Group	< Fair	Equitable (PSE ± jmd)	> Fair
Junior executives	7008.00	7008.00 - 8832.00	8832.00
Secretaries	3578.58	3576.58 - 4050.00	4050.00
Group II	3278.58	3278.58 - 3870.00	3870.00
Group III	3722.73	3722.73 - 4115.45	4115.45

Calculation of the average perceived fair salary by the executives group, and the secretaries group, yields $\frac{1}{2}$ (7008+ 8832) ≈ \$7920 for the executives, and $\frac{1}{2}$ (3676+ 4050) ≈ \$3813 for the secretaries. Given the type of relationship between executives and secretaries, it makes sense to view the executives as "employers" and the secretaries as "employee". Calculating the secretaries' perceived fair pay, relative to the total pay gives: $\frac{\$3813}{(\$3813+\$7920)} \approx 0.33$, which is identical to the lower-limit of the predicted range of fair pay.

3.2 Salaries of senior and junior employee

I looked at *actual* mean salaries of senior and junior employee in two high-tech professions and two non-high-tech professions, from ten "developed" countries with high Gross National Income (GNI), and ten "developing" countries with low GNI, representing different cultures around the world. The high-tech professions were computer programmer and electrical engineer, and two non-high-tech (hereafter "low-tech") professions were: accountant and school teacher. The "developed" countries were: USA, England, Canada, Israel, Spain, New Zealand, Australia, Italy, Austria, and Japan, and the "developing" countries were: Pakistan, Jordan, Lebanon, Oman, India, Bahrain, Egypt, Saudi Arabia, Brazil, and Thailand. Table 2 depicts the average salaries and the ratios of juniors' salaries to the total salaries (junior salary/(junior salary + senior salary)), by levels of country development (developed vs. developing), and profession type (high-tech vs. low-tech). Table 3 depicts the mean ratios (and standard deviations) for the tested categories, across the sampled countries (see also Figure 1). As could be seen from the tables and the figure, for developed countries, the average ratios of the juniors' salaries to the total salaries are almost the same for the high and low-tech professions (≈0.37), and are only slightly below the Golden Ratio prediction of ≈0.38. On the other hand, for the low-tech professions, the mean ratio of the juniors' salaries is about 28% lower than the mean ratio of the seniors' salaries, with both ratios falling below the predicted 0.33-0.38 fairness range.

Notably, Egypt is an outlier among the developing countries, with a ratio of 0.19 for low-tech professions (which equals the mean ratio of developing countries), but with a more than fair ratio of 0.46 for the high-tech professions. Dropping Egypt from the sample yields means of 0.24 and 0.19, for the high and low-tech professions, respectively, with difference of 21% between the two. To compare the actual ratios in the various categories with the golden ratio prediction (≈ 0.38), I used a two One-Sided Test (TOST). A rule of thumb for testing equivalence using TOST is to set a confidence level at ±10%. For the developed countries, the equivalence between the observed and predicted proportions was statistically significant, $t(19) = -2.65$, $p < .01$, and $t(19) = -1.95$, $p < .05$, for the high- and low-tech professions, respectively. For developing countries the statistical tests of equivalence were non- significant, $t(19) = 2.71$, and $t(19) = 11.67$, for the high- and low-tech professions, respectively.

Table 2: Ratios of the junior salary to the total salaries, by country development, and profession level

Country	Technology					
	High-tech			Non-high-tech		
Developed	Junior ($)	Senior ($)	$\frac{Junior\ Salary}{total\ salary}$	Junior ($)	Senior ($)	$\frac{Junior\ Salary}{total\ salary}$
Italy	1887	2038	0.48	1986	2170	0.48
Canada	5898.5	6742	0.47	3969	4888	0.45
Japan	1924.5	2263	0.46	1789	2444	0.41
Austria	1463	1837	0.44	1705	2129	0.44
Astralia	4519	7017	0.39	3970	5757	0.41
New Zealand	3164	4794	0.40	2725	4273	0.39
England	2600	6400	0.29	2375	4975	0.33
USA	4275	14250	0.23	3000	5625	0.35
Israel	3347	6445	0.34	1475	4834	0.24
Spain	1268	4048	0.24	1336	7037	0.16
Mean ratio			**0.37**	**Mean ratio**		**0.37**
Developing	Junior Salary ($)	Senior Salary ($)	$\frac{Junior\ Salary}{total\ salary}$	Junior Salary ($)	Senior Salary ($)	$\frac{Junior\ Salary}{total\ salary}$
Egypt	1322	1546	0.46	707	2950	0.19
Thailand	569	1784	0.24	825	2208	0.28
Lebanon	900	2470	0.26	389	1287	0.23
Brazil	1361	3388	0.29	860	3449	0.20
Oman	1103	3760	0.24	583	2000	0.22
Saudi Arabia	1321.5	3089	0.33	155	1132	0.12
Jordan	621	1997	0.24	133	770	0.15
Bahrain	1122	4366	0.21	1506	7007	0.18
India	2278	11619	0.16	750	3489	0.18
Pakistan	322	1365	0.19	133	770	0.15
Mean Ratio			**0.26**	**Mean Ratio**		**0.19**

Table 3

Mean ratios (and SDs) by levels of development and profession

Development level	**Technology level**	
	High	Low
Developed	0.37 (0.09)	0.37 (0.10)
Developing	0.26 (0.09)	0.19 (0.05)

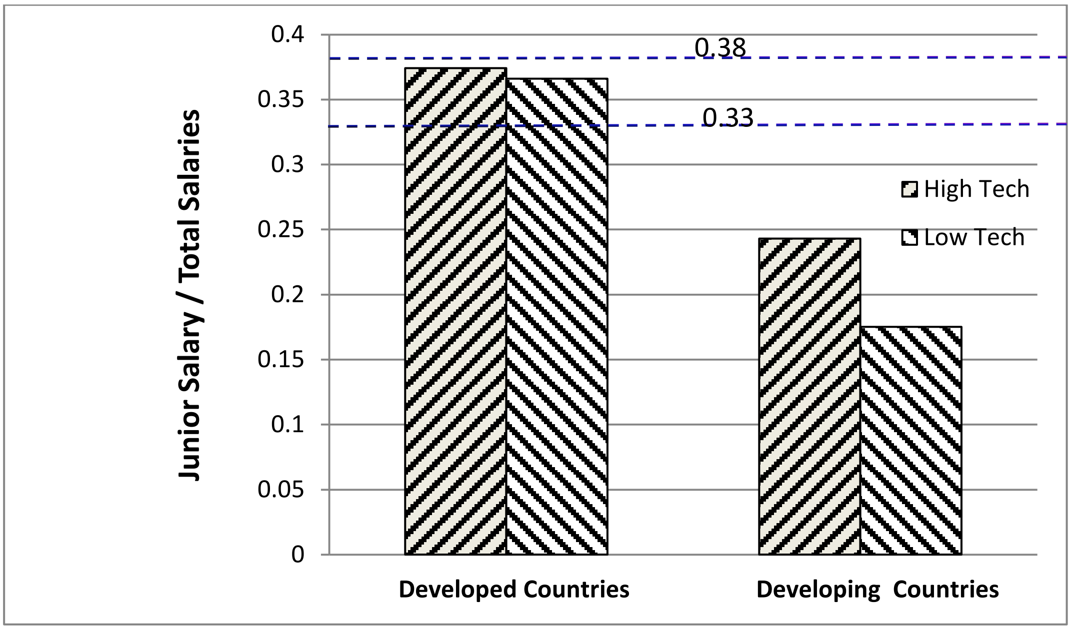

Figure 1: Mean ratios of junior salaries by country development and profession type

3.3 Allocation decisions in ultimatum game experiments

As noted in the section 2, for a point of harmony to be stable, it must be supported by an efficient external mechanism, such as an institutional or social sanctioning mechanism. In experimental economics, the effect of sanctions, whether by a second-party, third-party, or an institution, has been subjected to extensive investigation (e.g., Boyd & Richerson, 1992; Fehr, & Gächter, 2002; Fehr & Fischbacher, 2004; Henrich, et al. 2005; Samid & Suleiman, 2008; O'Gorman et al., 2009; Servátka, 2009; Baldassarria & Grossman, 2011). This line of research has shown, unequivocally, that the option of punishment, even though when it is costly and altruistic, is highly effective in enhancing cooperation and fairness in resource allocation games.

I tested the model's predictions using two large set of data on the ultimatum game: 1. A meta-analysis on 75 ultimatum game experiments conducted in twenty six countries, with different cultural backgrounds (Oosterbeek, Sloof & Van de Kuilen, 2004). 2. A large cross-cultural study conducted in fifteen small-scale societies, including three groups of foragers, six groups of slash-and burn horticulturalists, four groups of nomadic herders, and two groups of small-scale agriculturalists (Henrich et al., 2005). In the ultimatum game (Güth, Schmittberger & Schwartze, 1982; Camerer & Thaler, 1995) one player, designated the role of allocator, receives an amount of monetary units and must decide how much to keep for herself and how much to transfer to another player (the recipient). The recipient replies either by accepting the proposed allocation, in which case both players receive their shares, or by rejecting the proposal, in which case the two players receive nothing. Thus, while the allocator has complete entitlement to make an allocation decision, the recipient can inflict a harsh, although costly, punishment on an unfair allocator. The ultimatum game has proven to be a potent workhorse for studying selfishness, fairness, cooperation, competition, and punishment (Kahneman, Knetsch & Thaler, 1986; Prasnikar & Roth, 1992; Suleiman, 1996; Camerer, 2003).

Experimental findings of numerous UG ultimatum game studies show that the mean offers are about 40% and that offers of 20% or less are rejected with high probability (Camerer & Thahler, 1995; Suleiman, 1996; Camerer, 2003). The mean offer in the Oosterbeek et al. study was ≈ 0.41 of the entire amount, and in the Henrich et al. study it was ≈ 0.39. Clearly, the two results are quite close to the Golden Ratio prediction (≈ 0.38). A two One-Sided Test (TOST) validates this conjecture. For the Oosterbeek, et al. study the analysis yielded significant results for the upper and lower bounds of the equivalence range (upper bound=42.016, $p<0.0001$; lower bound=34.377, $p= 0.0425$; overall significance= 0.0425). For the Henrich et al. study the results were also significant (upper bound= 42.016, $p= 0.012$; lower bound = 34.377, $p = 0.0255$; overall significance= 0.0255). Similar tests for the adequacies for the $\frac{1}{3}$ harmony point and for an equality model (perscribing $\frac{1}{2}$), yielded insignificant results.

3.4 Learning to be fair

While the data of the two multi-cultural studies, as well as numerous other ultimatum studies, are strongly supportive of the model's (Golden Ratio) prediction, a proper test of the effectiveness of punishment in ultimatum bargaining requires testing the allocators decisions under different levels of punishment efficacy. I ran an experiment using a *repeated* δ-ultimatum game (Suleiman, 1996), with trial-to-trial feedback. In the δ-ultimatum game acceptance of an offer of [x, S-x] entails its implementation, whereas rejection of an offer of results in an allocation of [δ x, δ (S-x)], where S is the entire amount and δ is a reduction factor known to both players ($0 \leq \delta \leq 1$). The experimental design included two δ conditions: A standard UG (i.e., with δ=0) and a modified UG with δ= 0.8. We hypothesizes that given the option to learn from experience, allocators playing under the high punishment condition (δ=0) will learn to propose a fair offer of about 0.38 of the total amount, whereas under the low punishment condition, allocators will demonstrate a more greedy behavior, lowering their offers much below the fairness allocation.

Subjects and method

Sixty four subjects participated in the experiment. Four sessions were run under each δ condition, with eight subjects participating in each session. In each session, four subjects played the role of allocators, while the other four played the role of recipients for the entire game. On each trial of the game, allocators and recipients were randomly matched, and each pair was requested to divide a pie of 10 NIS (about $2.75). The entire game consisted of forty eight trials, with a between-trial-to-trial feedback regarding the players' decisions and their respective gains.

Results

Figures 2 depict the mean allocators' offers by trial block (12 trials in each block), under strong (δ = 0) and weak (δ = 0.8) punishment. The means (and standard deviations) of the allocators' offers and recipients' acceptance rates, under the two punishment conditions, are depicted in Table 4. As shown by the figure and the table, under the high punishment condition the allocators' offers an almost identical to the Golden ratio prediction of ≈ 0.382. In comparison, under the low punishment condition, the mean offers decrease from 0.22 of the entire amount in the first block to about 0.18 in the preceding blocks, with a mean across blocks of about 0.19 of the total amount. A one-way analysis of variance revealed that the mean offers under the high punishment condition is significantly higher than the mean offer under the low punishment condition ($F = 85.27$, $p < 0.0001$). A similar analysis for the recipients' acceptance rates revealed that the mean acceptance rate under the high punishment power is also significantly higher than the mean acceptance rate under the low punishment power ($F = 32.89$, $p<0.001$).

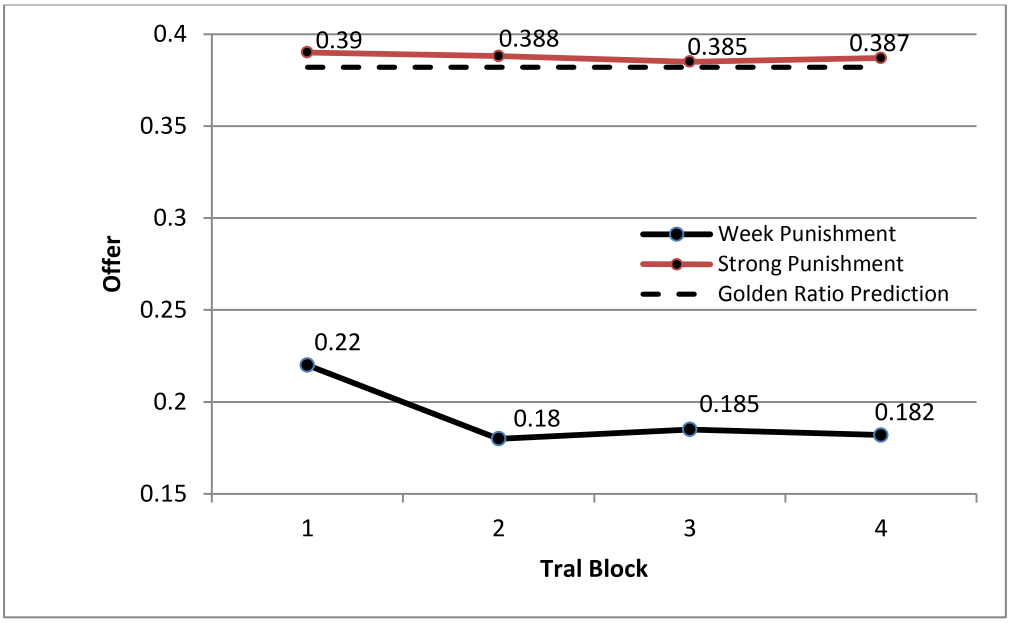

Figure 2: Allocators' offers by trial block under strong (($\delta = 0$) and weak ($\delta = 0.8$) punishment

Table 4

Mean (and standard deviations) of allocators' offers recipients' acceptance rates under strong and weak punishment conditions

	Punishment	
	Strong ($\delta = 0$)	Weak ($\delta = 0.8$)
Mean Offer	0.388 (0.09)	0.193 (0.13)
Acceptance Rate	0.73 (0.21)	0.44 (0.12)

4. Summary and concluding remarks

Under assumptions of rationality and linearity of level of satisfaction functions, the present paper proposed a formal model for the division of a net profit between an employer and an employee. The model is based on the assumption that the parties' payoff satisfaction levels are proportional to their actual payoffs, relative to their aspired payoffs. Depending on the assumption made about the recipient's aspiration, the model yields two numerical solutions, termed "harmony" points, at which the levels of pay satisfaction of the two interacting parties are equal. Under the assumption that the employee aspires to receive 50% of the total net profit, the predicted "harmony" pay for the employee is *one third* of the total amount. On the other hand, assuming that the employee aspires to be treated equally, i.e., to receive the same amount of the net profit as the employer, the predicted harmony pay is 1-φ ≈ 0.38 of the total amount, where φ ≈ 0.62 is the famous Golden Ratio.

The model's predictions were successful in accounting for the perception of salary farness reported by a field study (Zedek & Cain Smith (1968)); for fairness in actual salaries in developed countries; for the allocation decisions in ultimatum bargaining reported in two large-scale, cross cultural studies ((Oosterbeek et al., 2004; Henrich et al., 2005), and in a new experiment on ultimatum bargaining with different (high/low) levels of punishment power.

As demonstrated in Study 3, on the behavioral level, a point of harmony in resource allocation will not emerge and stabilize, unless supported by an effective punishment. A similar result was reported in a study by Nikoforakis & Normann (2008) on the effect of punishment on contribution to public goods. The authors varied the effectiveness of punishment, by changing the factor by which punishment reduces the punished player's income. Their findings indicate that contributions increased monotonically with punishment effectiveness. High effectiveness led to near complete cooperation, whereas below a certain threshold, punishment did not prevent the decay of cooperation.

Further development of the proposed model requires accounting for non-linearity in the individuals' perception of outcome fairness, reflected, among other things, in more sensitivity to underpayment than overpayment (Adams, 1963; Greenberg, 1988). Another generalization of the model is to account for perceptions and behaviors in multi-person resource allocation interactions. Moreover, the present analysis leaves out several individual and organizational, non-pay-related factors, such as the employee "voice", i.e., the opportunity to present an opinion in the decision making process (e.g., Lind et al., 1990; Tyler & Lind, 1992), and the employee level of engagement (e.g., Saks, 2006; Bakker & Demerouti, 2008; Shuck et al. 2011). Further theoretical and experimental effort is needed for incorporating these factors in the model.

The Golden Ratio as a point of harmony

The appearance of the Golden Ratio as a point of harmony between the player's pay satisfaction levels, adds to several appearances of this algebraic number in the social sciences, including in human aesthetics (Green, 1995; Pittard et al., 2007), ethical judgment (Lefebvre, 1985), market behavior (Nikolic et al., 2011), and brain functioning (Weiss & Weiss, 2003; Roopun et al., 2008). A review of the role played by the Golden Ratio in all fields of science and the arts is beyond the scope of this paper. A very short list includes biology (e.g., Klar, 2002), chemistry (e.g., Shechtman et al, 1984), physics (e.g., Coldea et al., 2010; Suleiman, 2013), brain science (e.g., Weiss & Weiss, 2003; Conte et al., 2009; Roopun et al., 2008), aesthetics and the arts (Pittard et al., 2007; Hammel & Vaughan, 1995, Livio, 2002; Olsen, 2006). It is not implausible to conjecture that the role of the Golden Ration in human cognition and behavior has deep evolutionary roots, in earlier times in the evolution of our universe, even before the evolution of life. Aside from contributing to the demystification and secularization of the Golden Ratio, such perspective could generate some interesting testable hypotheses. As example, one might hypothesize that humans' psychophysiological responses to receiving fair offers, in a resource allocation game, will be similar to the responses aroused by visual or auditory stimuli characterized by Golden Ratio symmetries. In fact, a similar, although opposite hypotheses, was recently confirmed by Chapman et al. (2009). In a study published in *Science*, the authors demonstrating that photographs of disgusting contaminants, and receiving unfair offers, evoked similar activation of muscle region of the face characteristic of an oral-nasal rejection response.

Going back to the opening question: What is a fair salary?, the present paper suggests that it is any percentage out of the entire resource, in the range 33% to 38%, but with high preference to the upper limit, since it is not only fair and yields higher pay employee satisfaction, but also more aesthetically pleasing.

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