Unfairness at work: Well-being and quits

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Abstract

We here consider the effect of the level of income that individuals consider to be fair for the job they do, which we take as measure of comparison income, on both subjective well-being and objective future job quitting. In six waves of German Socio-Economic Panel data, the extent to which own labour income is perceived to be unfair is significantly negatively correlated with subjective well-being, both in terms of cognitive evaluations (life and job satisfaction) and affect (the frequency of feeling happy, sad and angry). Perceived unfairness also translates into objective labour-market behaviour, with current unfair income predicting future job quits.

Keywords: Fair income, subjective well-being, quits, SOEP.

JEL Classification: D63, J28, J31.

1. Introduction

Not all aspects of our life are fair. Unfairness is perhaps particularly salient in the labour market, with its great variety of different job types and rewards, many of which are visible to others. Full-time workers in the OECD devote 62% of their day, or close to 15 hours, to personal care (eating, sleeping, and so on) and leisure (socialising with friends and family, hobbies, games, computer and television use, etc.).[1] Individuals' perceptions of the labour market are thus directly salient for almost 40% of the day, and may well colour individuals' feelings even when they are not at work.[2]

Unfairness can manifest itself in a variety of job aspects, with unfair income likely being one of the most obvious. Income is of course only one aspect of a job, as underlined in the job-quality literature (see Clark, 2015, for a recent contribution), but is undeniably a key element of a good job, certainly quantifiable (as opposed to effort, say) and potentially visible. A worker who perceives their pay as unfair may in return feel less committed to the job and take actions ranging from putting less effort into it to the more extreme decision of quitting for an alternative job, as in the fair wage-effort hypothesis of Akerlof (1982) and Akerlof and Yellen (1990). Workers develop sentiments for their firm and co-workers, and provide effort in excess of the minimum work standard as a gift in exchange for a wage that is above the market-clearing level. Workers' conceptions of fair wages are based, among other things, on comparisons to a reference group composed of similar workers, or the wages that the individuals received themselves in the past.

There is a considerable empirical literature showing that individuals do compare their incomes, which are evaluated not only in absolute terms but also relative to some reference level. This latter can be external (social comparisons) or internal (past or expected future outcomes). Regarding social comparisons, individuals compare their situation to that of others such as people working in the same firm or industry, neighbours, or friends (Clark, 2003, Clark and Oswald, 1996, Ferrer-i-Carbonell, 2005, and Luttmer, 2005).[3] For the internal reference, individuals evaluate their actual situation relative to their own situation in the past (Frederick and Loewenstein, 1999), their aspirations (Stutzer, 2004) and expectations (McBride, 2010). These comparisons have been evoked to explain the Easterlin paradox (Easterlin, 1974, 2001), whereby in developed countries the time trend in satisfaction is often

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[1] See http://www.oecdbetterlifeindex.org/topics/work-life-balance/.
[2] Clark and Senik (2010) find that 60% of the individuals who say that they compare their income do so to work colleagues; the latter are also amongst the most popular comparison groups in US (American Life Panel) and German (Socio-Economic Panel) data (see Goerke and Pannenberg, 2015, and Dahlin *et al.*, 2014).
[3] There is of course a large literature on attitudes to inequality, but much of this does not explicitly refer to fairness. Clark and D'Ambrosio (2015) is a recent survey.

flat while that in real GDP per capita is positive, despite the positive cross-section relationship between satisfaction and income.

Other empirical work has explicitly appealed to the notion of fairness. Experimental work has provided evidence for the fair wage-effort hypothesis, with individuals adjusting their effort according to fairness considerations (Mathewson, 1969, Cohn *et al.*, 2014, Blinder and Choi, 1990, Bewley, 1999, and Fehr *et al.*, 1993; Fehr and Gächter, 2000, provide a review of this literature).

Survey evidence on the wage-effort relationship is rarer, due to a scarcity of appropriate data. Clark *et al.* (2010) use 1997 ISSP data to show that individuals who have lower income relative to a comparison group (defined by country, sex, education and age) are less likely to report working harder than they have to in order to help their firm. The physiological responses to unfair treatment are explored in recent work by Falk *et al.* (2017), who look at the effect of earning an unfair wage on workers' health using both experimental and survey data (the survey data is the same as that used here). They find that workers who perceive their wage as unfair are more likely to suffer from stress-related diseases such as cardiovascular health problems.[4]

Our aim here is to relate an individual measure of fair income to both well-being and behaviour. The well-being literature here is far more scant. Experimental evidence of the effect of fairness on emotions is provided by Pillutla and Murnighan (1996) in ultimatum games, and by Bosman and Van Winden (2002) and Ben-Shakhar *et al.* (2007) in the context of the two-player power-to-take game. These show that participants exhibit negative emotions when treated unfairly, and react by rejecting ultimatum offers and punishing unfair behaviour. The feeling of anger produced by unfairness is also correlated with physiological measures of skin conductance (see Ben-Shakhar *et al.*, 2007). Pfeifer (2017) uses the same survey data as we do here to show that unfairness perceptions increase the frequency of feeling angry.

We use data from six waves of a nationally-representative survey, the German Socio-Economic Panel Survey (SOEP), that provide us measures of the income that the individual would consider fair for the job that they currently do. We take this 'fair-income' as a viable measure of the income comparisons that individuals make. One advantage of this measure is that it exhibits considerable within-person variation over time. Most of the non-experimental income-comparison literature has considered comparison income that is either predicted from an earnings regression, or calculated as a cell mean. Of course, we do not know whether this

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[4] See also Pfeifer (2015), who finds that the perception of unfair pay is correlated with less sleep and more sleep disorders.

is the comparison income each particular individual has in mind. There is a small literature that has asked individuals to whom they compare (Clark and Senik, 2010, and Mayraz *et al.*, 2009), but this still only identifies broad comparison groups, not actual individual comparison-income levels. The fair income measure we use here comes straight from the horse's mouth.

In addition, the time variation within-individual of predicted income or cell-mean income is only rather small, making panel analysis problematic. The fair-income data we use here does exhibit a reasonable amount of within-subject variation, rendering the panel analysis of comparison-income effects on individual well-being feasible.

Our contribution then is take this individual-level measure of fair income and relate it to both cognitive measures of subjective well-being (job and life satisfaction) as well as measures of positive and negative affect in large-scale panel data. Controlling for the level of income, we find that the fair income gap (the difference between what you earn and what you consider as the fair income for your job) is associated with significantly lower levels of both job and life satisfaction in panel regressions. We also show that the fair income gap influences worker affect, such as the frequency of feeling happy (positive affect), and sad and angry (negative affects), with the largest effect size being on anger.

We also confirm the validity of these results by showing that unfair income is associated with not only subjective evaluations but also objective behaviour: the probability of quitting the job within the next year. We are not aware of any existing work that has shown that unfair income leads to quits. As a robustness check, we estimate a standard 'comparison income' measure as that of individuals of the same age. The inclusion of standard comparison income does not change the importance of fair income in predicting both well-being and quits.

The remainder of the paper is organised as follows. Section 2 describes the data, and Section 3 contains the empirical strategy and results. The robustness checks are discussed in Section 4. Last, Section 5 concludes.

2. Data

We use data from the SOEP, a longitudinal survey that has been conducted yearly since 1984 and that currently covers about 11,000 households and just under 30,000 individuals per year. Starting in 2005, every two years SOEP respondents are asked if they think that the

income they earn in their current job is fair[5] and, if not, what the fair net monthly amount would be.[6] The questions asked are the following:

     • *Is the income that you earn at your current job fair, from your point of view?* (Yes/No)

→ If No:

     • *How high would your net income have to be in order to be fair?* (Euros p/m)

The question appears every second year: we thus here analyse six SOEP waves (2005, 2007, 2009, 2011, 2013 and 2015). We restrict the sample to the employed aged 25 to 65 (as many Germans are still in education at younger ages; the results using those aged 18-65 turn out to be very similar).[7]

More than one-third (36 percent) of respondents think that the income they earn is not fair, with very similar figures for men and women (see Table 1). Lower-educated individuals are more likely to report their income as unfair (39 percent) than the highly educated (30 percent). The proportion of individuals reporting unfair income is also related to age, with the highest figures being found in the youngest cohort (aged up to 35: 40 percent). Almost half of the respondents from East Germany consider their income as unfair (48 percent), which is a much higher figure than that in West Germany (33 percent). The percentage of respondents perceiving their income as unfair was lowest in 2013 (at 29 percent) and highest in 2015 (at 44 percent). 45% of poor individuals, here defined as those in the bottom half of the income distribution, consider their income to be unfair, while only 29% of the non-poor do so.

In terms of the income considered to be fair and the income gap, respondents who consider their income unfair earn on average a net income level per month that is about 631 Euros lower than what they consider to be fair, which corresponds to a gap of about 51% relative to their actual income (see column 4). The level of income perceived as fair is much higher for men than for women in absolute terms, and rises with education and age. However, the percentage gap to the fair income is larger for women than for men. The same pattern of a higher fair income figure but a smaller percentage gap is seen for the higher-educated relative

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[5] We thus consider fairness only with respect to labour income, although it doubtless plays a role elsewhere in the labour market. For example, Zechmann *et al*. (2018) find that both distributive and procedural injustice mediate the relationship between unemployment and depression in German panel data.

[6] Respondents are also asked whether they think their pay is fair in HILDA (see Long, 2005), but not what the level of fair income would be. Fair earnings questions appear in the 1999 and 2009 ISSP cross-sections (www.issp.org), with five qualitative answers from "*Much less than is just*" to "*Much more than is just*". Last, the cross-section International Social Justice Project asks respondents what income they felt they deserved from their job or business (http://www.edac.eu/opinion_survey_desc.cfm?v_id=5).

[7] There are over half a million observations in the full SOEP data, and approximately 150 000 in the six years we use. Of the latter 106 000 are aged 25-65, of whom 67 000 were employed with positive hours. Dropping individuals with missing values on income and fair income produces our final estimation sample of just above 47 500 observations.

to the low-educated, and in West compared to East Germany. The size of the income gap has broadly been rising over time, both as an absolute amount and as a percentage gap from the actual income received.

The income variable we use is the net income the individual declared to receive the month before the interview, deflated using CPI (base 2010).[8] We top-trim the top 1% of our sample according to the income gap top due to some reported fair-income amounts that can be attributed, almost surely, to entry mistakes (for example, a monthly net fair-income figure of 80,000 Euros in one year, while it was around 3,000 Euros for the same individual in the other sample years). This top trimming makes no substantial difference to our empirical results.

Table 1 - Percentage of respondents considering their income unfair, average amount of fair income and income gap (fair income – income) by population subgroup

	Number of observations	Income is Unfair (%)	Mean Fair Income	Gap from Actual Income (%)
Gender				
Female	23,490	36.1	1736.7	539.8 (56.0)
Male	24,037	36.3	2547.7	718.9 (47.3)
Education				
Less than high school	3,973	39.0	1646.4	505.7 (63.3)
High school	29,856	38.4	1963.3	570.3 (50.1)
More than high school	13,698	30.5	2843.1	843.1 (51.0)
Age				
25-35	9,947	40.0	1911.3	553.3 (51.7)
36-45	14,547	35.5	2164.7	627.7 (50.0)
46-55	15,346	36.2	2229.6	653.7 (51.4)
56-65	7,687	32.6	2312.6	709.4 (54.9)
West/East Germany				
West	37,127	33.0	2235.1	634.5 (47.9)
East	10,400	47.7	1934.6	621.6 (60.5)
Income Level				
Non Poor	25,258	28.8	3020.9	798.5 (35.9)
Poor	25,269	44.6	1510.5	508.0 (63.0)
Year				
2005	7,294	28.7	2047.0	503.4 (39.5)
2007	7,701	39.2	2140.7	585.1 (46.1)
2009	7,623	34.1	2031.6	584.8 (52.3)
2011	6,849	32.7	2116.9	645.9 (54.1)
2013	7,196	34.8	2172.5	685.7 (55.9)
2015	10,864	43.8	2264.6	704.7 (56.3)
Total sample	47,527	36.2	2148.5	630.8 (51.5)

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[8] This variable is the answer individual give to the following question: "*How high was your net income from employment last month? If you received extra income such as vacation pay or back pay, please do not include this. Please do include overtime pay.*"

3. Empirical strategy and results

We estimate the effect of perceiving one's own income as unfair on subjective well-being, as measured by job and life satisfaction, and emotional well-being. Job and life satisfaction are both measured on 11-point scales ranging from 0 (completely dissatisfied) to 10 (completely satisfied). Positive and negative affect are given by the frequency of feeling happy (positive), and sad, angry and worried (negative) in the past week on 5-point scales (1=very rarely; 5=very often). In order to control for unobservable factors such as personality traits or response style, we exploit the panel nature of the dataset and estimate linear models with fixed-effects. All of our estimates here are thus within-subject, comparing my response at a given wave to my average response.

Estimating fixed-effects models requires within-subject variation over time. We first calculate how many people switch from reporting their income as fair to reporting it as unfair. Over the 25326 individuals in our sample, 86% never make the fair to unfair switch, 12.4% make the fair-unfair switch once, 1.3% twice, and a tiny number three times. The analogous figures for the mirror movement, from unfair to fair income, are 88%, 11.3%, 0.9%, and again a tiny number for three switches. There are also changes in the intensive margins of unfairness, where an individual reports unfair income in two consecutive waves of data. There are 2354 people who do this. Only 12% of this group never change their fair income figure, almost half do once, one quarter twice, and 16% three or more times. In general, the within variance of the fair-income figure is around half of the between variance.

Fixed effects do not of course control for everything: we could have within-subject time-varying changes in response style or mood, for example. Consider someone who wakes up in a bad mood, or has had a recent negative experience, and therefore provides a lower than usual response to the subjective well-being question. This will be a problem if this mood effect also changes their response to the right-hand side variable, here fair income, with 'grumpy' individuals (relative to their usual state) reporting higher fair-income figures and lower well-being scores. As this variability is at the same degree of disaggregation as our data, we cannot control for it via any kind of fixed effect. Section 4, on predicting future outcomes, helps to shed light on this issue. If these were transient mood effects, then we would not expect to see them reflected in future behaviour. But we will below show that higher fair-income figures are associated with a greater probability of future quits.

All of our regression models include the following controls: individual net monthly income, age and education dummies, marital status, number of children, hours worked, health

status, an East Germany dummy, the regional unemployment rate, firm size, and industry, occupation and wave dummies. Given that subjective well-being is often considered to be concave in income, income is introduced in logarithm form. The summary statistics of all the variables used in the analyses appear in Appendix Table A1. The standard errors in our regressions are clustered at the region-year level, as this is the aggregation level of regional unemployment.[9]

Our key fairness variable is the gap between the level of income considered to be fair and the actual income received. The income gap is entered in log form: ln(1 + Fair Income − Actual Income), so that those whose income is fair have a log income gap value of zero (we drop the under one per cent of observations in which individuals report earning more than what they consider to be fair).

Table 2 displays the results for job and life satisfaction. For both dependent variables, we first estimate a baseline specification with income and the basic controls and then add the income gap in a second specification.

The estimated coefficients on income are significant for both job and life satisfaction in the baseline specification (columns 1 and 3), with (perhaps unsurprisingly) a stronger effect on job satisfaction. The results with respect to the other control variables are very standard in the literature, and the full table of results is relegated to Appendix Table A2. Compared to the married, those who are separated, divorced or widowed are less satisfied with their life, while there is no difference regarding job satisfaction. Education has no significant impact on life satisfaction; however, we do find that higher-educated individuals are less satisfied with their jobs, which may well reflect occupational aspirations and job-related stress.[10] General health, as self-reported by respondents, is strongly positively correlated with both measures of satisfaction. Higher annual hours are associated with lower job satisfaction. Individuals in East Germany are significantly less satisfied with their jobs. Firm size has a positive effect on both job and life satisfaction. Last, the regional unemployment rate is estimated to significantly reduce life satisfaction, which is a common finding in the literature.

The fair-income gap is significantly correlated with both job and life satisfaction. Those whose pay is unfair report significantly lower job and life satisfaction compared to individuals who perceive their income as fair. An individual with the sample mean levels of income and fair income from Table 1 (of 1520 and 2150 respectively) reports a level of life satisfaction

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[9] Clustering at the individual level does not change the nature of any of our results.

[10] It should be remembered that these are fixed-effect regressions. Education does not vary that much within individual over time, making the interpretation of the estimated education coefficients a little more difficult.

that is 0.13 points lower than the same individual when their income is considered to be fair.[11] The analogous effect on job satisfaction is 0.42.[12]

Table 2 – The fair income gap and life and job satisfaction

	Life satisfaction		Job satisfaction	
	(1)	(2)	(3)	(4)
Net individual income (ln)	0.139***	0.123***	0.472***	0.420***
	(0.033)	(0.034)	(0.049)	(0.048)
Income gap (ln)		-0.021***		-0.065***
		(0.003)		(0.004)
Controls	Yes	Yes	Yes	Yes
Wave dummies	Yes	Yes	Yes	Yes
Individual fixed-effects	Yes	Yes	Yes	Yes
N	47527	47527	47527	47527
R-squared overall	0.19	0.20	0.05	0.06

Notes: These are linear models with individual fixed effects. ***=p<0.01; **=p<0.05; *=p<0.10. Standard errors in parentheses are clustered at the region*year level. Income gap (ln) = ln(1 +fair income - income). Additional controls: age dummies, marital status, education, number of children, health status, hours worked, regional unemployment rate, firm size, industry, occupation and wave dummies and individual fixed-effects.

Our second type of well-being measure refers to affect. We show results separately for positive affect (the frequency of feeling happy), and for negative affects (the average frequency of feeling sad, angry and worried). These measures are not available in 2005, so we have one wave less than for the satisfaction analyses. Tables 3 and 4 show the estimates on emotional well-being (the full list of estimated coefficients appears in Appendix Table A3).

Income is significant only for negative affects,[13] while the gap between fair and actual income is significantly correlated with both, increasing the average frequency of feeling sad, angry and worried, and reducing the frequency of happiness.

Looking at the three negative affects separately, we can see that this result is driven by the effect of unfairness on anger and, to a lesser extent, sadness (see Table 4). The effect of fairness on anger is consistent with the literature on fairness and reciprocity suggesting that the punishment of unfair treatment, in the form for example of less effort or negative reciprocity, is due to feelings of dissatisfaction and anger. In the disaggregated results, we also note that the frequency of feeling worried is significantly negatively correlated with the absolute level of income while fairness considerations do not play any role. The size of the

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[11] As the log of the gap of 630 here (2150-1520) is 6.4, to be multiplied by the income gap coefficient in Table 2.

[12] We did also consider a role for the lagged income gap, conditional on its current level. The regression results reveal an estimated coefficient on this lag that is significant and negative for both life and job satisfaction, of about one quarter to one third the size of the coefficient on the contemporaneous income gap.

[13] Kahneman and Deaton (2010) use data on US respondents to the Gallup-Healthways Well-Being Index to show that income is more strongly correlated with a cognitive/evaluative measure of subjective well-being (the Cantril Ladder) than with positive and negative affect. In the cross-country regressions of Gallup World Poll data in Layard *et al.* (2012), GDP per capita is correlated with neither positive nor negative affect once controls are introduced (but is correlated with the Cantril Ladder: see their Table 3.1, page 65).

marginal effect of log income on worry is notably larger than the size of the log income gap on the other affects.

We do worry about missing values for our fair-income measure here. We investigated using the missing-indicator approach. By year, we replaced at random the missing values for the fair-income dummy (i.e. the answer to is your income fair or not) with ones and zeroes in the same proportion as those who replied to this question. Then for those who were assigned a one we put in an income-gap figure equal to the average income gap in that year. Last, we added a missing-value dummy to the regression to flag that this individual had had their fair-income information imputed. The regression results here are remarkably similar to those in Tables 3 and 4, with changes in the estimated income-gap coefficients, if any, of the order of 0.001 to 0.002.

Table 3 – Effect of fair income on emotional well-being

	Positive affect[a]		Negative affects[b]	
	(1)	(2)	(3)	(4)
Net individual income (ln)	0.006	0.002	-0.020*	-0.016
	(0.017)	(0.017)	(0.011)	(0.011)
Income gap (ln)		-0.006***		0.007***
		(0.001)		(0.001)
Controls	Yes	Yes	Yes	Yes
Wave dummies	Yes	Yes	Yes	Yes
Individual fixed-effects	Yes	Yes	Yes	Yes
N	41496	41496	41496	41496
R-squared overall	0.06	0.07	0.06	0.06

<u>Notes</u>: [a] *Frequency of feeling happy;* [b] *Average of frequency of feeling sad, angry and worried. Income gap (ln) = ln(1 +fair income - income). These are linear models with fixed effects. ***=p<0.01; **=p<0.05; *=p<0.10. Standard errors in parentheses are clustered at the region*year level. Additional controls: age, marital status, education, number of children, health status, hours worked, regional unemployment rate, firm size, industry, occupation and wave dummies, and individual fixed-effects.*

Table 4 – Effect of fair income on individual positive and negative affects

	Happy	Sad	Angry	Worried
Net individual income (ln)	0.002	0.006	-0.007	-0.046***
	(0.017)	(0.020)	(0.018)	(0.015)
Income gap (ln)	-0.006***	0.006***	0.016***	-0.001
	(0.001)	(0.002)	(0.002)	(0.002)
Controls	Yes	Yes	Yes	Yes
Time effects	Yes	Yes	Yes	Yes
Individual fixed-effects	Yes	Yes	Yes	Yes
N	41496	41496	41496	41496
R-squared overall	0.07	0.05	0.03	0.04

*Notes: These are linear models with fixed effects. ***=p<0.01; **=p<0.05; *=p<0.10. Standard errors in parentheses clustered at the region*year level. Additional controls: age, marital status, education, number of children, health status, hours worked, regional unemployment rate, firm size, industry, occupation and wave dummies, and individual fixed-effects.*

These results complement those in the existing literature using the SOEP fair-income question. Falk *et al*. (2017) show that unfair wages are associated with stress-related diseases

such as cardiovascular health problems; Pfeifer (2017) finds that unfairness perceptions increase the frequency of feeling angry. We add new information compared to both of these contributions. Falk *et al*. only use one wave of fair-income data, and therefore do not estimate fixed-effect regressions for their health outcomes.[14] They do not consider subjective well-being outcomes. Pfeifer uses four waves of data and runs fixed-effect regressions. However, his only outcome variable is anger and he does not consider any other affect outcomes, nor job or life satisfaction as outcome variables. In addition, he only looks at the dummy variable for reporting that the wage is unfair, not the level of the fair income if current income is unfair. Neither paper relates unfairness to future quits, as we now do in the following section.

4.   Unfair income and the probability of quitting the job

We now turn from subjective to objective outcomes, and estimate the relationship between unfair income and the probability of quitting the job. We relate the information on unfair income to the probability of quitting the job over the next year. Since 2016 data is not currently available, we restrict our quit analysis only up 2014. We define a job quit as a job change that was caused by the worker leaving the job intentionally (i.e. resigning). About seven percent of employees in the 2005, 2007, 2009, 2011 and 2013 waves separate from their job over the next year; 44% of these separations come about from the worker resigning (see Appendix Table A4). We create a dummy variable for the respondent quitting their job and use this as the dependent variable to estimate the relationship between fairness and job quitting.

The results appear in Table 5 (the full table of coefficients appears in Appendix Table A5). We estimate linear probability models (the results using probit models are similar and are available upon request). The first two columns show the cross-section results from the estimation of quits: column 1 shows the results including only income and the other controls, and column 2 then adds the gap between fair and actual income. Columns 3 and 4 show analogous results from the panel estimation of the quit equation, which is identified by comparing the income gap of a specific individual when they are observed to quit to the income gap of the same individual in the years that they do not quit.

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[14] We control for subjective health in all of our regressions. We did experiment with dropping subjective health from our main job- and life-satisfaction regressions (in Table 2). This had a considerable effect on the estimated income coefficient (part of the effect of income on well-being then works via health), but a much smaller effect on the estimated coefficients on the income gap, which changed by ten per cent or less. The same conclusion is reached if health is not controlled for in the affect regressions in Table 3.

As expected, income systematically reduces job quits, with an effect that is larger in panel than in cross-section (so that higher-income 'types' quit more often). In columns 2 and 4, we find a significant effect of unfairness on the probability of quitting. Income remains significant here with only a slightly smaller estimated coefficient. Given the small proportion of people quitting their job from one year to another (about 3% on average in the overall period), these effects are quite large: an individual with the mean income gap of 630 has a quit probability that is 1.3 percentage points higher than the same individual with a fair income.[15]

Table 5 – Probability of quitting job by t+1

	(1)	(2)	(3)	(4)
Net individual income (ln)	-0.015***	-0.013***	-0.031***	-0.029***
	(0.003)	(0.003)	(0.007)	(0.007)
Income gap (ln)		0.002***		0.002***
		(0.000)		(0.001)
Controls	Yes	Yes	Yes	Yes
Wave dummies	Yes	Yes	Yes	Yes
Individual fixed-effects	No	No	Yes	Yes
N	30964	30964	30964	30964
R-squared overall	0.02	0.02	0.01	0.01

Notes: Income gap (ln)= ln(1 + fair income - income). These are cross-section linear probability models. Standard errors in parentheses are clustered at the region*year level. Controls: gender, age dummies, education, marital status, hours work, East, regional unemployment rate, number of children, health, firm size, and industry, occupation and wave dummies. ***=p<0.01; **=p<0.05; *=p<0.10.

5. Additional results: subgroup analysis and comparison income

In this last section we first consider heterogeneity in the effect of fairness considerations on well-being (life satisfaction, job satisfaction and anger) and quits with respect to two individual characteristics: gender and income. We then turn to the relationship between unfair income and the measures of relative income that have often been estimated in the well-being literature.

A large literature has documented a gender gap in income. We might therefore expect women to perceive their income as less fair than do men, although our summary statistics actually reveal no difference in the percentage of males and females perceiving their income as unfair. To see whether unfairness affects men and women differently, we introduce an interaction between gender and the income gap into our regressions: Table 6 displays the results. This interaction term attracts a negative significant coefficient in both satisfaction regressions: men's satisfaction is more affected by unfairness than is that of women. This may reflect gender differences in preferences over competition, with women perhaps reacting less

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[15] In columns 2 and 4, 0.002*ln(630) = 0.013.

to competitive environments than do men (see Gneezy *et al.*, 2003, and Croson and Gneezy, 2009, for example). There is no significant gender difference for the affective well-being variables or for job quits.

The second characteristic is income. The emotional and behavioural consequences of fairness may well differ along the income distribution. Shaw and Gupta (2001) show, for example, that individuals in financial need, defined as those with children, married, and without alternative sources of income, are less likely to quit their jobs because they are economically dependent, but they suffer from greater dissatisfaction and depression. We here ask whether those in the bottom half of the income distribution have less economic independence than those in the top half.[16] The results including an interaction term between the income gap and a dummy for being poor are shown in Table 7.

In line with Shaw and Gupta (2001), we find that the job satisfaction of those in the bottom half of the income distribution is more affected by income unfairness.[17] Regarding our second type of well-being measure, individual affects, there is a significant effect only for happiness, which is less affected by income unfairness.

Table 6 - Fair income and gender

	Life satisfaction	Job satisfaction	Happy	Sad	Angry	Worried	Job Quit
Net individual income (ln)	0.120***	0.417***	0.003	0.006	-0.006	-0.047***	-0.029***
	(0.034)	(0.049)	(0.017)	(0.020)	(0.018)	(0.015)	(0.007)
Income gap (ln)	-0.013***	-0.055***	-0.007***	0.008***	0.013***	0.001	0.001
	(0.004)	(0.006)	(0.002)	(0.002)	(0.003)	(0.003)	(0.001)
Income gap*male	-0.015***	-0.018**	0.003	-0.003	0.006	-0.004	0.001
	(0.004)	(0.008)	(0.003)	(0.004)	(0.004)	(0.004)	(0.001)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	47527	47527	41496	41496	41496	41496	30964
R-squared overall	0.20	0.07	0.06	0.05	0.03	0.05	0.01

*Notes: ***=p<0.01; **=p<0.05; *=p<0.10. Standard errors in parentheses are clustered at the region*year level. Controls: age dummies, educational level, marital status, hours work, East Germany, regional unemployment rate, number of children, health, and firm size, industry, occupation and wave dummies.*

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[16] Using an index of financial need based on single-parent household, level of savings and financial worries did not produce significant results.

[17] In Schneider (2012), fairness perceptions are measured by comparing what respondents say they think individuals in a certain number of occupations earn to what the same respondents say that these individuals should earn. This produces an individual measure of the fairness of the income distribution. Schneider finds that more unfairness is associated with lower life satisfaction, and that this correlation is stronger for those with higher incomes.

Table 7 – Fair income and poor

	Life satisfaction	Job satisfaction	Happy	Sad	Angry	Worried	Job Quit
Net individual income (ln)	0.102***	0.419***	0.007	0.005	-0.016	-0.056***	-0.025***
	(0.034)	(0.054)	(0.018)	(0.022)	(0.019)	(0.017)	(0.007)
Income gap (ln)	-0.022***	-0.055***	-0.008***	0.007***	0.015***	-0.000	0.002***
	(0.004)	(0.005)	(0.002)	(0.003)	(0.003)	(0.002)	(0.001)
Income gap*poor	0.002	-0.023***	0.006*	-0.004	0.001	-0.000	0.000
	(0.004)	(0.007)	(0.003)	(0.004)	(0.004)	(0.003)	(0.001)
Poor (1 if Income<median)	-0.057*	0.035	0.004	0.003	-0.025	-0.027	0.010*
	(0.030)	(0.044)	(0.016)	(0.020)	(0.023)	(0.023)	(0.005)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	47526	47526	41495	41495	41495	41495	30964
R-squared overall	0.19	0.06	0.07	0.05	0.03	0.04	0.01

<u>Notes</u>: ****=p<0.01; **=p<0.05; *=p<0.10. Standard errors in parentheses are clustered at the region*year level. Controls: gender, age dummies, educational level, marital status, hours work, East Germany, regional unemployment rate, number of children, health, and firm size, industry, occupation and wave dummies. "Poor" here refers to being in the bottom half of the income distribution.*

We end this sub-section by asking if these unfairness effects actually reflect the comparison/relative income effects that have been highlighted in the existing literature. Given our limited number of survey years, we use as a comparison group all individuals in the same age group in the same wave. We then add this regressor to the specification above in Table 1: the results appear in Table 8. Columns (1) and (4) reproduce the corresponding models of Table 1 for ease of comparison. Both fair income and comparison income have independent negative effects on subjective well-being, but the fair-income estimated coefficient in column (3), when comparison income is controlled for, is identical to that in column (1). The R-squared statistics suggest that fair income fits the well-being data better than does comparison income.

We perform a similar analysis for the probability of job quitting. As is evident from Table 9, comparison income does not explain job quitting, whereas the perception of unfair income does.

Table 8 – The fair income gap, the mean reference income and life and job satisfaction

	Life satisfaction			Job satisfaction		
	(1)	(2)	(3)	(4)	(5)	(6)
Net individual income (ln)	0.123***	0.140***	0.123***	0.420***	0.472***	0.420***
	(0.0335)	(0.0328)	(0.0335)	(0.0484)	(0.0487)	(0.0485)
Income gap (ln)	-0.021***		-0.021***	-0.065***		-0.065***
	(0.0030)		(0.0030)	(0.0037)		(0.0037)
Mean ref. income (ln)		-0.932**	-0.897*		-1.516**	-1.408**
		(0.4656)	(0.4681)		(0.6785)	(0.6793)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Wave dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
N	47527	47527	47527	47527	47527	47527
R-squared overall	0.20	0.19	0.20	0.06	0.05	0.06

Notes: These are linear models with individual fixed effects. ***=p<0.01; **=p<0.05; *=p<0.10. Standard errors in parentheses are clustered at the regional*year level. Income gap=ln(1 + fair income-income). The mean reference income is estimated as the average income of individuals in the same age class. Additional controls: age dummies, marital status, education, number of children, health status, hours worked, regional unemployment rate, firm size, industry, occupation and wave dummies and individual fixed-effects.

Table 9: Probability of quitting job in t+1 and mean reference income

	(1)	(2)	(3)	(3)
Net individual income (ln)	-0.013***	-0.024***	-0.013***	-0.024***
	(0.003)	(0.007)	(0.003)	(0.007)
Income gap (ln)	0.002***	0.003***	0.002***	0.003***
	(0.000)	(0.001)	(0.000)	(0.001)
Mean ref. income (ln)			0.105	0.129
			(0.102)	(0.122)
Controls	Yes	Yes	Yes	Yes
Wave dummies	Yes	Yes	Yes	Yes
Individual fixed-effects	No	Yes	No	Yes
N	27274	27274	27274	27274
R-squared overall	0.02	0.01	0.02	0.01

Notes: Income gap (ln)= ln(1 +fair income - income). The mean reference income is estimated as the average income of individuals in the same age class. These are cross-section linear probability models. Standard errors in parentheses are clustered at the region*year level. Controls: gender, age dummies, education, marital status, hours work, East, regional unemployment rate, number of children, health, firm size, and industry, occupation and wave dummies. ***=p<0.01; **=p<0.05; *=p<0.10.

As noted in the Introduction, we do not know if this cell-mean measure is the correct one. We in addition considered age (four groups) *x* education (three groups) *x* wave, and age *x* education *x* wave *x* East/West Germany. In neither case did the inclusion of comparison income change the estimated coefficients on fair income. All of the above results referred to fixed-effects estimation. We have also considered the same specifications in a pooled analysis, with the same results.

6. Conclusions

This paper has considered the relationship between unfairness (the gap between actual income and that considered fair) and well-being and quits in large-scale panel survey data. Our results suggest that the absolute level of income is not a sufficient statistic to predict well-being or behaviour. As has been emphasised in previous experimental work, there is an independent role for fairness. Income unfairness systematically predicts job and life satisfaction in panel regressions; it also predicts measures of positive and negative affect. We in particular show that happiness, sadness and especially anger are correlated with the income gap (and are uncorrelated with individual income). On the contrary, worry is correlated with absolute income, but not with the income gap. Moving onto objective outcomes, workers are more likely to quit their job if they perceive their income as unfair, conditional on the level of income received.

Fairness then drives both well-being and behaviour. We have emphasised that we consider fairness as one aspect of the general phenomenon of income comparisons, including to others. The policy implications are not the same though. One unpleasant implication of comparisons to others is that any policy that makes one person better off will make another worse off (we cannot all earn more than the average). Fairness is not zero-sum in this way: we could all in theory be paid fairly.

The complete understanding of fairness requires knowledge of where these evaluations come from. It is tempting to consider the latter as being at least partly influenced by general movements in income inequality, economic insecurity (see for example Bossert and D'Ambrosio, 2016) or macroeconomic conditions. However, with comparisons being in the majority to work colleagues, some part of fairness concerns can likely directly be affected by the firm. In this context, it might be useful to think about wage secrecy: Are fairness concerns harmed by the provision of information on the actual structure of pay (as in Card *et al.*, 2012), or does this provision rather actually correct erroneous perceptions? The relationship between the actual distribution of income and what individuals believe it to be[18] will likely continue to be an area of continuing interest for academic research.

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[18] See the OECD's Compare Your Income tool (http://www.compareyourincome.org/) in this context.

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Appendix

Table A1 - Descriptive statistics

	Mean	Std. Dev.	Min	Max
Gender (male)	0.51	0.50	0	1
Age (ref.: <35)				
36-45	0.31	0.46	0	1
46-55	0.32	0.47	0	1
>55	0.16	0.37	0	1
Education level (ref.: <High school)				
=High school	0.63	0.48	0	1
>High school	0.29	0.45	0	1
Marital status (ref.: married)				
Single	0.21	0.41	0	1
Widowed	0.02	0.12	0	1
Divorced/separated	0.13	0.33	0	1
Ind. Monthly income (ln)	7.28	0.68	2.68	10.8
% with unfair income	0.36	0.48	0	1
Ln (1 + Income gap)	2.23	3	0	8.57
No. children	0.69	0.96	0	10
Annual hours worked/100	19.61	7.07	0.17	62.09
East Germany	0.22	0.41	0	1
Health status (ref: very good)				
Good	0.1	0.30	0	1
Fair	0.33	0.47	0	1
Poor	0.47	0.50	0	1
Bad	0.09	0.29	0	1
Regional unemployment rate	7.20	3.76	2.9	21.4
Job quit	0.03	0.18	0	1
Life satisfaction	7.24	1.59	0	10
Job satisfaction	7.06	1.96	0	10
Happy	3.59	0.80	1	5
Sad	2.29	0.98	1	5
Angry	2.91	0.97	1	5
Worried	1.87	0.93	1	5

Notes: The number of observations is always 47,527 except for job quits, affects and personality traits for which it is lower.

Table A2 – Effect of fair income on life and job satisfaction. Full table.

	Life satisfaction		Job satisfaction	
	(1)	(2)	(3)	(4)
Net individual income (ln)	0.139***	0.123***	0.472***	0.420***
	(0.033)	(0.034)	(0.049)	(0.048)
Income gap (ln)		-0.021***		-0.065***
		(0.003)		(0.004)
Age (Ref.: 25-35)				
Age 36-45	-0.004	-0.006	0.058	0.051
	(0.032)	(0.032)	(0.046)	(0.045)
Age 46-55	0.013	0.014	0.082	0.085
	(0.040)	(0.040)	(0.059)	(0.058)
Age >55	0.084*	0.083*	0.093	0.090
	(0.049)	(0.048)	(0.080)	(0.078)
Education level (Ref.: <High school)	-	-	-	-
=High school	0.039	0.042	-1.332***	-1.322***
	(0.291)	(0.289)	(0.257)	(0.250)
>High school	0.096	0.111	-1.358***	-1.311***
	(0.301)	(0.300)	(0.260)	(0.256)
Marital status (Ref.: Married)	-	-	-	-
Single	-0.031	-0.030	-0.038	-0.036
	(0.036)	(0.036)	(0.054)	(0.053)
Widowed	-0.554***	-0.569***	0.097	0.051
	(0.170)	(0.169)	(0.161)	(0.161)
Divorced/Separated	-0.121***	-0.119***	0.009	0.016
	(0.037)	(0.037)	(0.052)	(0.052)
Health status	0.446***	0.443***	0.389***	0.381***
	(0.011)	(0.012)	(0.014)	(0.014)
No. hours worked/100	-0.002	-0.001	-0.016***	-0.013***
	(0.002)	(0.002)	(0.002)	(0.002)
East Germany	-0.185*	-0.182	-0.390***	-0.381***
	(0.110)	(0.110)	(0.132)	(0.132)
Regional unemployment rate	-0.032***	-0.032***	-0.009	-0.009
	(0.005)	(0.005)	(0.007)	(0.007)
No. children	0.008	0.008	-0.029	-0.027
	(0.014)	(0.014)	(0.018)	(0.018)
Firm size (Ref.: < 20)	-	-	-	-
20 – 199	0.108***	0.110***	0.158***	0.164***
	(0.031)	(0.031)	(0.045)	(0.045)
200 – 2000	0.117***	0.120***	0.148***	0.155***
	(0.036)	(0.035)	(0.051)	(0.051)
> 2000	0.125***	0.125***	0.147***	0.147***
	(0.032)	(0.032)	(0.056)	(0.054)
Constant	4.124***	4.252***	3.956***	4.358***
	(0.315)	(0.318)	(0.457)	(0.439)
Wave dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Occupation dummies	Yes	Yes	Yes	Yes
N	47527	47527	47527	47527
R^2 Overall	0.19	0.20	0.05	0.06

Notes: Linear models with fixed effects. ***=p<0.01; **=p<0.05; *=p<0.10. Standard errors in parentheses are clustered at the region*year level. Source: SOEP, waves 2005, 2007, 2009, 2011, 2013 and 2015.

Table A3 – Effect of fair income on emotional well-being. Full table.

	Positive affect		Negative affects	
	(1)	(2)	(3)	(4)
Net individual income (ln)	0.006	0.002	-0.020[*]	-0.016
	(0.017)	(0.017)	(0.011)	(0.011)
Income gap (ln)		-0.006[***]		0.007[***]
		(0.001)		(0.001)
Age (Ref.: 25-35)	-	-	-	-
Age 36-45	-0.025	-0.026	0.000	0.001
	(0.020)	(0.020)	(0.015)	(0.015)
Age 46-55	-0.002	-0.002	0.015	0.015
	(0.025)	(0.025)	(0.021)	(0.021)
Age >55	0.019	0.018	0.051[**]	0.052[**]
	(0.034)	(0.034)	(0.025)	(0.025)
Education level (Ref.: <High school)	-	-	-	-
=High school	0.243	0.243	-0.200	-0.200
	(0.177)	(0.177)	(0.133)	(0.132)
>High school	0.237	0.241	-0.277[*]	-0.282[**]
	(0.169)	(0.170)	(0.140)	(0.140)
Marital status (Ref.: Married)	-	-	-	-
Single	-0.020	-0.020	-0.032	-0.032
	(0.027)	(0.027)	(0.021)	(0.021)
Widowed	-0.452[***]	-0.456[***]	0.442[***]	0.446[***]
	(0.093)	(0.092)	(0.070)	(0.070)
Divorced/Separated	-0.012	-0.012	0.067[***]	0.066[***]
	(0.028)	(0.028)	(0.022)	(0.022)
Health status	0.143[***]	0.142[***]	-0.172[***]	-0.171[***]
	(0.006)	(0.006)	(0.006)	(0.006)
No. hours worked/100	-0.001	-0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
East Germany	-0.035	-0.035	0.172[***]	0.171[***]
	(0.057)	(0.057)	(0.062)	(0.062)
Regional unemployment rate	0.003	0.003	0.008[**]	0.008[**]
	(0.004)	(0.004)	(0.003)	(0.003)
No. children	-0.012	-0.012	-0.022[**]	-0.021[**]
	(0.009)	(0.009)	(0.010)	(0.010)
Firm size (Ref.: < 20)	-	-	-	-
20 – 199	0.018	0.018	-0.003	-0.004
	(0.018)	(0.018)	(0.014)	(0.014)
200 - 2000	0.014	0.015	-0.018	-0.019
	(0.019)	(0.019)	(0.017)	(0.016)
> 2000	-0.010	-0.010	-0.012	-0.013
	(0.020)	(0.020)	(0.018)	(0.018)
Constant	2.369[***]	2.401[***]	3.084[***]	3.046[***]
	(0.245)	(0.246)	(0.173)	(0.171)
Wave dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Occupation dummies	Yes	Yes	Yes	Yes
N	41496	41496	41496	41496
R^2 Overall	0.06	0.07	0.06	0.06

Notes: Linear models with fixed effects. ***=p<0.01; **=p<0.05; *=p<0.10. Standard errors in parentheses are clustered at the region*year level. Source: SOEP, waves 2007, 2009, 2011, 2013 and 2015.

Table A4 – Reason for job termination

	Freq.	Percent
Company Shut Down	162	9.2
Own Resignation	777	44.3
Dismissal	260	14.8
Mutual Agreement	204	11.6
Temporary Contract Expired	235	13.4
Reached Retirement Age, Pension	9	0.5
Leave of Absence, Sabbatical	28	1.6
Business Closed Down (Self-Employed)	77	4.4
Total	1,752	100

Table A5 - Probability of quitting job by $t+1$. Full Table

	(1)	(2)	(3)	(4)
Net individual income (ln)	-0.015***	-0.013***	-0.031***	-0.029***
	(0.003)	(0.003)	(0.007)	(0.007)
Income gap (ln)		0.002***		0.002***
		(0.000)		(0.001)
Male	0.004*	0.003	.	.
	(0.002)	(0.002)	.	.
Age (Ref.: 25-35)	-	-		-
Age 36-45	-0.021***	-0.021***	-0.004	-0.004
	(0.003)	(0.003)	(0.006)	(0.006)
Age 46-55	-0.030***	-0.029***	-0.004	-0.004
	(0.003)	(0.003)	(0.007)	(0.007)
Age >55	-0.039***	-0.038***	-0.007	-0.007
	(0.003)	(0.003)	(0.009)	(0.009)
Education level (Ref.: < High school)	-	-		-
= High school	0.000	0.000	-0.000	-0.001
	(0.004)	(0.004)	(0.010)	(0.011)
> High school	0.012***	0.012***	-0.052*	-0.054*
	(0.004)	(0.004)	(0.029)	(0.029)
Marital status (Ref.: Married)	-	-		-
Single	0.003	0.003	0.017**	0.017**
	(0.003)	(0.003)	(0.008)	(0.008)
Widowed	-0.001	-0.001	0.018	0.019
	(0.005)	(0.005)	(0.012)	(0.012)
Divorced/Separated	0.009***	0.008***	-0.004	-0.004
	(0.003)	(0.003)	(0.006)	(0.006)
Health status	0.002**	0.003***	0.003**	0.004**
	(0.001)	(0.001)	(0.002)	(0.002)
No. hours worked/100	0.001**	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
East Germany	-0.009***	-0.010***	-0.031	-0.031
	(0.003)	(0.003)	(0.025)	(0.025)
Regional unemployment rate	0.000	0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.001)	(0.001)
No. children	0.002	0.002	0.005**	0.005**
	(0.001)	(0.001)	(0.002)	(0.002)
Firm size (Ref.: < 20)	-	-		-
20 – 199	-0.007**	-0.008***	-0.000	-0.000
	(0.003)	(0.003)	(0.006)	(0.006)
200 - 2000	-0.010***	-0.010***	0.002	0.002
	(0.003)	(0.003)	(0.009)	(0.009)
> 2000	-0.010***	-0.010***	-0.008	-0.009
	(0.003)	(0.003)	(0.009)	(0.009)

Constant	0.142**	0.125*	0.223***	0.209***
	(0.068)	(0.067)	(0.060)	(0.059)
Wave dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Occupation dummies	Yes	Yes	Yes	Yes
Individual fixed-effects	No	No	Yes	Yes
N	30964	30964	30964	30964
R^2 Overall	0.02	0.02	0.01	0.01

Notes: Linear probability models. Standard errors in parentheses are clustered at the region*year level.
***=$p<0.01$; **=$p<0.05$; *=$p<0.10$. Source: SOEP, waves 2005-2014.