Workplace inequality is associated with status-signalling expenditure

Naomi Muggleton[a,b,c,1], **Anna Trendl**[c], **Lukasz Walasek**[d], **David Leake**[c], **John Gathergood**[e], **and Neil Stewart**[c]

[a] Department of Social Policy and Intervention, University of Oxford, Oxford OX1 2ER, United Kingdom ; [b] Brasenose College, University of Oxford, Oxford OX1 4AJ, United Kingdom ; [c] Warwick Business School, University of Warwick, Coventry CV4 7AL, United Kingdom ; [d] Department of Psychology, University of Warwick, Coventry CV4 7AL, United Kingdom ; [e] Department of Economics, University of Nottingham, Nottingham NG7 2RD, United Kingdom

This manuscript was compiled on February 8, 2022

Regional inequality is known to magnify sensitivity to social rank. This, in turn, is shown to increase people's propensity to acquire luxury goods as a means to elevate their perceived social status. Yet existing research has focused on broad, aggregated datasets and little is known about how individual-level measures of income interact with inequality within peer groups to affect status signalling. Using detailed financial transaction data, we construct 32,008 workplace peer groups and explore the longitudinal spend and salary data associated with 683,677 individuals. These data reveal new links between people's status spending, their absolute salary, salary rank within their workplace peer group, and the inequality of their workplace salary distribution. Status-signalling luxury spend is found to be greatest amongst those who have higher salaries, whose workplace's exhibit higher inequality, and who occupy a lower rank position within the workplace. We propose that low rank individuals in unequal workplaces suffer status anxiety and, if they can afford it, spend to signal higher status.

income inequality | status signalling | social rank | digital footprints

Economic inequality has grown substantially in recent years across the world, with 70% of the global population experiencing rising levels of income disparity (1). As well as concerns surrounding meritocracy and equality of opportunity (2–4), there is growing interest in the potential impact that rising inequalities might have on health, societal, and economic outcomes. It is now well established that inequality is associated with increased political polarisation (5), higher rates of obesity and diabetes (6), weaker educational performance (7), and lower life expectancy (8), among many other negative outcomes (9–12). One prominent explanation for these findings is the status anxiety hypothesis, which posits that, in the presence of high income inequality, people feel more threatened about, and pay more attention to, their position in the social hierarchy (11, 13). The psychological stress that accompanies the need to monitor and improve one's social status fosters narcissism, a sense of entitlement, and expression of self-enhancement values (10, 14, 15). At the same time, high levels of inequality elevate the role of money in expressing one's worth, which motivates people to engage in conspicuous consumption and the purchasing of positional goods. In other words, the status anxiety hypothesis predicts that, when inequality is high, people devote more resources (both economic and psychological) to the pursuit of goods that can function as signals of one's wealth and income, such as luxury brands and expensive possessions. Indeed, expenditure on luxurious, high-status items is higher in unequal regions, suggesting that conspicuous goods may be regarded as salient markers of success (13, 16–18). These effects are also consistent with the findings that individuals living in more unequal regions borrow more and save less, in part to finance their desire to Keep Up With the Joneses (19–21).

The intuitive appeal of this perspective is apparent: income inequalities elevate concerns with one's income-defined status, which is reflected in a preoccupation with luxury goods. Yet many critical questions remain unanswered, as the existing research does not yet specify the conditions under which inequality can influence one's consumption. Much of the prior work on status consumption has relied on aggregate behaviour across thousands or millions of individuals to identify correlations between inequality and some measure of the interest or pursuit of positional goods (22–24). But aggregating over large geographical regions prevents one from controlling for individuals' absolute income and income rank. This is problematic for two reasons. First, it relies on ecologically-fallacious reasoning. For example, it is possible that spending on luxury goods in unequal regions may be driven merely by those who can afford it (i.e., those with the highest incomes). It is therefore possible that the effects of inequality on the pursuit of luxury could be explained by the higher number of rich individuals in unequal regions. To understand whether the aggregate-level evidence for the status anxiety hypothesis applies to the individual, individual-level data must be used. The second issue stems from the empirical finding that satisfaction with one's income

Significance Statement

Scholars ~~are increasingly concerned with the growth of income inequality and its consequences for~~have identifed that inequality is a notable detriment to well-being . Status-signalling luxury expenditure is taken as a symptom of the reduced well-being associated with income inequality. Despite evidence that status-signalling luxury expenditure is higher in unequal regions, it remains unclear who, exactly, is affected by inequality. We use payroll and daily spend data from 683,677 individuals in 32,008 precisely-defined workplace peer groups to show that workers at unequal firms spend significantly more on high status, luxury goods. This ~~effect~~ is also seen in those with a high absolute salary, but low salary rank within their workplace. Compared to aggregated, regional data, our financial data allows us to identify accurately groups of workplace peers and offers a precise measurement of status-signalling expenditure for each individual.

N.M. and A.T. constructed the variables and prepared all figures and tables. L.W. conducted a review of the existing literature. D.L. secured access to the data. D.L., J.G., and N.S. secured funding for the research. All authors contributed to the design of the analysis, interpretation of the results, and writing the manuscript.

The authors declare no competing interest.

[1] To whom correspondence should be addressed. E-mail: naomi.muggleton@spi.ox.ac.uk

is best predicted by income rank, not the absolute amount one earns (25). Consequently, it remains unclear whether the rise of conspicuous consumption in response to inequality is driven by those who occupy lower or higher rank positions in the income distribution. Without understanding how income inequality relates to the level and rank of income, our understanding of inequality and status anxiety is incomplete.

Table 1. Exemplar merchants by expenditure group. Thirty merchants that are illustrative of luxury, discretionary, and necessity expenditure.

Expenditure	Description
Luxury	
British Airways	Airline
Center Parcs	Tourism
Booking.com	Hotel
Gett	Taxi
Land Rover	Motor
Marriott	Hotel
Pandora	Jewellery
Sky TV	TV Subscription
Sotheby's	Art and Antiques
Uber	Taxi
Discretionary	
Apple App Store	Entertainment
Costa	Coffee Shop
Debenhams	Department Store
Google Play	Entertainment
JD Wetherspoons	Pub
John Lewis	Department Store
Just Eat	Food Delivery
Pret A Manger	Sandwich Shop
Starbucks	Coffee Shop
Very	Clothing
Necessity	
Asda	Supermarket
Boots	Pharmacy
British Gas	Utilities
Direct Line	Car Insurance
Lidl	Supermarket
Shell	Petrol
Superdrug	Pharmacy
Transport for London	Commuter
TV Licence	Utilities
Vision Express	Opticians

Here we uncover the ~~effect of~~complex relationship between individual-level inequality ~~on~~and spending behaviour. We achieve this by leveraging our unique access to mass-transactional banking data from a large UK retail bank. We combine two key data assets: (i) the accurate tracking of luxury expenditure across individuals for ten months using mass transactional spending data; (ii) the precise measurement of inequality and income rank (specifically, salary) among these individuals, who constitute small peer groups of, on average, 28 co-workers in a firm, via payroll data. To classify luxury expenditure, we draw upon electronic transactions associated with 4,118 merchants according to their merchant category and subcategory descriptions (Supplementary Table S1). All transactions were classified as luxuries, discretionaries, necessities, or unknown. Luxury merchant categories include hotels, airlines, antiques, jewellery, champagne retailers, and furriers. 11% of transactions could not be classified and were excluded from further analysis. Exemplar merchants are given in Table 1 (for definitions, see Supplementary Tables S1 to S3).

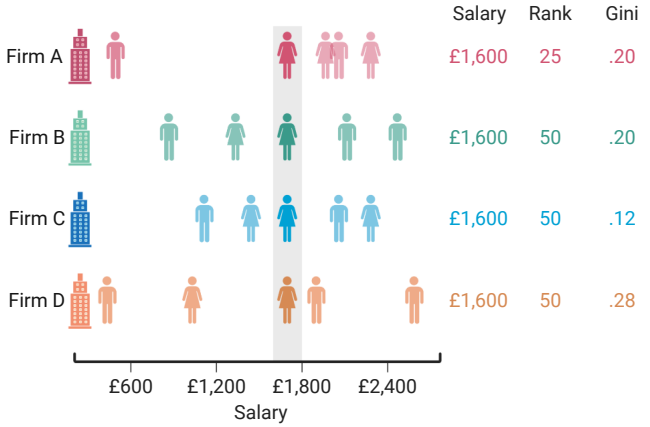


Fig. 1. Computation of rank and inequality. Individuals belong to a peer group (firm j), which comprises of peers who receive different salaries (x-axes). Based on their position in the peer group's salary distribution, each individual in firm j is assigned a rank between 0 (lowest salary in peer group) and 100 (highest salary in peer group). Based on the dispersion of salaries within a peer group, all individuals within firm j are assigned the same inequality value, a value between 0 (perfect equality) and 1 (perfect inequality). All four target individuals (highlighted in grey) receive the same salary (£1,600), but differ in their peer group inequality and comparative rank within their peer group.

Figure 1 is an illustration of how inequality (here Gini coefficient) and rank are calculated at the monthly level in our data. This example shows four target individuals (see grey shading) from four different peer groups. Each target individual has a salary of £1,600 per month but differs in her salary rank (pink: 25th percentile; green, blue, and orange: 50th percentile) and peer group inequality (blue: low; pink and green: medium; orange: high). Higher inequality indicates a more unequal distribution of salaries (cf. Firm C, low inequality, and Firm D, high inequality, Figure 1).

We consider who purchases luxury goods when inequality is high. To do this, we test how luxury spending is ~~affected~~predicted by absolute salary, salary rank position within the firm, and firm inequality.

Results

We modelled the interaction between salary, rank, and inequality, plus demographic controls using the individual level data. The sample comprised of 683,677 individuals in 32,008 workplaces, across ten months of spending. Table 2 reports two models, estimating the relationship between luxury spend (as a proportion of total expenditure) and workplace inequality (Model 1) and the rank position of the individual's salary within the firm (Model 2). Standard errors are robust, addressing the possible non-independence of months within an individual. Model 1 shows that luxury expenditure is positively associated with salary and workplace inequality measured by Gini. These main effects are qualified by a salary-by-Gini interaction: Figure 2 (left) shows the effect of Gini is smaller at higher salaries.

Model 2 also shows that luxury expenditure is positively associated with salary, with the coefficient almost unchanged from Model 1. There is a main effect of rank salary, such that the proportion of spending on luxury goods reduces for those with higher ranking salary. These main effects are qualified

Table 2. Linear regression (N = 683,677) of proportion of expenditure spent on luxury goods, as a function of (1) workplace Gini and the Gini × Salary interaction, and (2) one's salary rank within the workplace, and the Rank × Salary interaction. Both models control for an individual's salary, age, and gender. Standard errors in the regressions are robust, clustered by individual.

	(1)		(2)	
Variable	*B*	*SE*	*B*	*SE*
Intercept	.10060 ***	.00041	.10007 ***	.00041
Salary	.01437 ***	.00013	.01465 ***	.00017
Gini	.00211 ***	.00012		
Salary × Gini	−.00146 ***	.00011		
Rank			−.00086 ***	.00015
Salary × Rank			−.00049 ***	.00012
Gender (woman = 0)	.02372 ***	.00024	.02319 ***	.00024
Age	.00003 **	.00001	.00005 ***	.00001
R^2		.01225		.01207

B = standardised regression coefficient; SE = standard error; ***= $p < .001$.

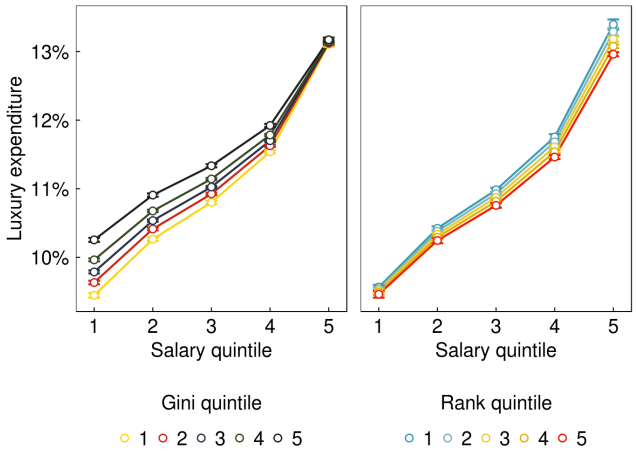


Fig. 2. Fitted proportion of spend on luxury goods by salary and Gini (left, from Model 1) and salary and rank salary (right, from Model 2). Spend is on purchases at $t + 1$ across 683,677 individuals, between March – December 2019. Individuals are binned by their net salary in month t and their peer group inequality measured by Gini (left) or peer group rank salary (right). Salary, Gini, and rank bins were determined by cutting each variable into five equally-sized quintile bins. Higher Gini quintiles (in black) denote individuals from firms with highly unequal salary. Higher rank quintiles (in red) denote individuals with the highest salaries within their firm. Error bars are 95% CIs.

by a salary-by-rank interaction. The negative coefficients on rank and the salary-by-rank interaction mean that the effect of salary rank is larger for those with higher salaries (see Figure 2, right).

To test the role of gender as a moderating factor, we reran all analysis separately for men and women. ~~Further analysis shows~~This showed that these effects of inequality and rank position on luxury spending are moderated by gender. Specifically, the luxury expenditure of men is sensitive to inequality within the firm, whereas the luxury expenditure of women is sensitive to rank position within the firm (Supplementary Figure S1). This is a new insight into gender differences in status-signalling behaviour. However, w~~W~~e did not have a theoretical reason to anticipate this effect, ~~but~~so report for robustness separate analyses for each gender (see Supplementary Table S4).

As a robustness check, we replicated these findings with industry sector and subsector fixed effects, to control for a scenario where, say, a management consultants' luxury expenditure is artificially high, owing to a reliance on hotels, taxis, and airplanes for his or her work (Robustness checks subsection, Materials and Methods section).

Discussion

This paper used objective transaction-level data from 683,677 individuals to reveal the association between inequality and status-seeking expenditure. Our results reveal complex relationships between luxury expenditure and one's salary, salary rank, and inequality. Status-signalling luxury spend is found to be greatest amongst those who have higher salaries, whose workplaces exhibit higher inequality, and who occupy a lower rank position within the workplace.

Taken together, our results advance our understanding of how inequality promotes status-seeking behaviour at the level of the individual. By using granular transactional data, we can identify who in the salary distribution is particularly sensitive to rank and inequality, thereby providing a richer understanding how, and who within, society is particularly sensitive to inequality. We see that high earners are more sensitive to rank position, but low earners are more sensitive ~~and~~to inequality. This supports prior work, which posits that luxury spending is a signal by which individuals can improve their status and, consequently, their self-esteem and self-worth (16–19). We also observe that individuals with low peer group status but higher salaries spend comparatively more on luxury goods. This observation is in line with the predictions formed by the status anxiety hypothesis, which anticipates that status anxiety (here, low rank) combined with the means to purchase more expensive goods (measured here as high salary) will result in a higher proportion spent on luxury goods.

The present findings demonstrate the ~~impact of~~relationship between inequality and rank in precisely-defined peer groups. Previous work has typically relied on observational data to approximate peer groups at the level of cities, states, or countries. By identifying peer groups of, on average, 28 individuals per group, we show the ~~impact of~~association between one's immediate reference group ~~on~~and individual spending behaviour. Further, by using person-level, rather than aggregate, data, we identified which members of the peer group are driving the increased consumption of status-seeking goods. The prior work which has relied on group-level measures shows that regional inequality increases consumption of, and online searches for, luxury brands and goods (22, 23, 26). Yet aggregate data do not allow researchers to identify who in the peer group is driving increased status competition.

The present study has a number of limitations that could be addressed with further study. First, our sample is composed of individuals who were in work for each of the ten months in our observation period (1 March to 31 December 2019). As such, the results might not generalise to individuals who are working intermittently, or who work for multiple employers and thus have multiple, concurrent peer groups. Second, although our sampling restrictions attempted to capture individuals for whom we have a comprehensive view of spending behaviour, we do not rule out the possibility that individuals have alter-

native means for paying for their essential and non-essential expenditure. Third, we are unable to measure the well-being implications of our findings. For example, high-ranking individuals spend higher sums on luxury goods when placed in an unequal peer group. We do not, however, determine whether this behaviour is associated with higher or lower subjective well-being. Individuals may experience utility from their elevated status (27, 28). Alternatively, these individuals might be averse to inequality and experience negative emotions such as guilt. Given the objective, observational nature of our data, although measuring spending with great accuracy, we do not reliably infer subjective well-being. SimilarlyRelatedly, we cannot reliably measure bank customers' levels of anxiety, nor whether this is the sole factor shaping individuals' increasedhigher luxury expenditure. Future work adopting survey-based methods could provide valuable insight into the moderators of inequality-induced luxury spend. Future research may be able to combine survey data with transactional data to shed light on these relationships (notwithstanding the challenges of obtaining large samples of survey data with matched administrative data). Such data might allow tests of whether luxury expenditure is symptomatic of status-signalling behaviour, or a generalised preference for expensive items.

The findings also raise questions about the role of small peer groups in shaping the social, health, and economic outcomes that have been documented in the status anxiety literature. Prior work has explained the relationship between political polarisation (5), obesity and diabetes (6), weaker educational performance (7), and lower life expectancy (8), among other negative outcomes (9–12), through the status anxiety hypothesis. The association between peer group and status-enhancing expenditure that we observe here suggests that future research exploring the relationship between one's peer group rank and broader outcomes could be fruitful.

Conclusion

We find that status-seeking expenditure is positively associated with peer group inequality. This relationship is robust and particularly strong among individuals with a low rank among peers. These results raise the possibility that status-seeking spend is a marker of rank insecurity in peer groups where inequality and rank are salient. Exploring the impact of these findings will have important implications for our understanding of how inequality affects subjective well-being, societal hierarchy, and the role of consumer debt in society.

Materials and Methods

Ethical approval. The Privacy Risk and Impact Assessment Committee at the retail bank granted ethical approval for the study. Upon opening an account, all customers consented for their data to be used for research. The Humanities and Social Sciences Research Ethics Committee at the University of Warwick waived the requirement for an additional ethics review, as in cases where appropriate ethical review has already taken place at another collaborating institution, so as to avoid unnecessary duplication.

Expenditure data. Spending behaviour is measured by electronic transactions to merchants identified by the bank in its typology of transactions. A transaction is defined as any spending behaviour that occurs using a debit card or credit card. This includes electronic transfers, online transactions, and chip and pin or contactless in-store transactions, but neither cash transactions nor cheques.

Each spend transaction is associated with a merchant string denoting the name of the seller, of which there were 4,118 in our sample. These merchants are categorised into one of four categories: necessity, discretionary, luxury, and unknown. Of all transactions occurring during our observation window, 11% were classified as unknown. Of the remaining transactions, 24% were tagged as necessity, 54% as discretionary, and 10% as luxury. Merchants are classified according to their merchant category and subcategory descriptions (terms are provided in the Supplementary Tables S1 to S3). This was constructed independently of the authors and prior to the analysis commencing. The pre-existing classification that is reported here is the only classification that the authors analysed.

To construct a measure of spending, we classified all spending transactions conducted by a customer with a merchant. This excludes inter- and intra-account transfers, as well as payments to friends and family. Spending behaviour was observed between 1 April 2019 and 31 December 2019. 1 April 2019 represents the first date that the bank began to utilise the classification system that identified spend as being a luxury, discretionary, or necessity spend. December 2019 represents the last full calendar month prior to data analysis beginning. Transaction amounts by spend type tag (necessity, discretionary, luxury, unknown) were aggregated at the monthly level and divided by the total monthly spend. For example, if individual i in month t spent £500 at necessity, £400 at discretionary, £100 at luxury, and £50 at unclassified merchants, then their total spend = £1,000 and the proportion spent is be defined as: necessity (£500 / £1,000) = .50; discretionary (£400 / £1,000) = .40; luxury (£100 / 1,000) = .10. Unclassified spend was excluded from this calculation (i.e., removed from the denominator) to avoid a scenario where individuals with high volumes of unclassified spend has artificially low values for necessity, discretionary, and luxury spend. As such, the denominator represents the sum of necessity, discretionary, and luxury spend for individual i in month t, which means that the proportion of luxury, discretionary, and necessity spend sums to 1.

Our primary dependent variable is the luxury expenditure, because the main prediction of the status anxiety hypothesis is a positive association between inequality and spending on positional goods. But since our data contains records of all transactions, we report results for discretionary and necessity expenditure as well. Supplementary Table S5 shows that the median proportion spent on luxury goods and services was .03 (mean = .12). For discretionary expenditure, the median was .41 (mean = .42). For necessity expenditure, the median was .46 (mean = .46).

Payroll data. Payroll data are measured by electronic transactions from firms identified by the bank in its typology of transactions. Payroll names are aggregated, such that subtle variations in company name are merged. For example, should a company change its name from 'ABC Ltd.' in month t to 'ABC and Co. Ltd.' in month $t+1$, the firms are grouped as 'ABC' across the observation period. This resulted in the inclusion of 66,965 firms across 11 sectors and 56 subsectors.

Salary was calculated as the total inflows (after tax) from firm j to individual i in month t. If i's payment cycle was weekly, all payments made from firm j in month t were aggregated to give a value for monthly salary. The upper and lower 1% of salary (£6849 and £201) was removed. Rank refers to an individual's position on the salary ladder at firm j in month t. Inequality was defined as the Gini coefficient across all salaries at firm j in month t. Summary statistics for payroll are presented in Supplementary Table S6. To aid the interpretation of regression coefficients, salary, rank, and inequality are standardised such that the mean = 0 and $SD = 1$.

Sample selection.

Inclusion criteria. Our analyses contain a representative sample of the in-work UK population. Of the 52.4m adults in the UK, 1.5m (2.9%) are unbanked. Our in-scope sample was approximately 10.6% of the adult UK population. We used the retail bank's definition of an active customer as an individual whose account(s) process at least twelve transactions per month. This definition was constructed independently of the authors and prior to the analysis commencing. Internal work at the retail bank has shown that 12 is the optimal minimum threshold for estimating whether a customer

is active or inactive. The definition avoids including cases where individuals hold dormant bank accounts. The inclusion criteria also ensured that all individuals were aged 18 years or older during the observation timeframe. This was to avoid potential ethical implications of conducting research on underage persons.

Exclusion criteria. Our sample consisted of a sample of the in-work population of the UK. To avoid small-sample biases of the Gini coefficient (29), we first identified all UK-based firms (j) with ten or more employees who banked with the retail bank in at least one given month between 1 March 2019 and 1 December 2019 ($N_j = 83{,}502$). These dates reflect one lagged month prior to the expenditure data. This accounts for the fact that we lagged our independent variables so that salary, rank, and inequality at time t are used to predict spending at $t+1$. Individuals who worked in an 'Unidentified' sector were excluded, as this is often indicative of payment portals used to pay contractors, such as umbrella companies. As such, these individuals often do not have contact with other individuals with whom they share payroll data, and so are not peers. After this step, our sample included 72,168 firms.

Next, for all firms, we identified any individuals (i) who received a regular income from firm j ($N_i = 6{,}205{,}787$). Participants with payroll data missing for some or all months were removed. This removed individuals who were unemployed, retired, on unpaid sick leave, or maternity / paternity leave for one or more months, but did not remove individuals who changed firm during the observation period. For those individuals who moved firm, we redefined their peer group in the month that their employment changed. After this step, our sample included 4,296,954 individuals and 66,667 peer groups.

Finally, to ensure that peers were working in close proximity (e.g., in the same office), we sought to exclude those who didn't work for small to medium firms, defined as 250 employees (30). Based on the bank's market share, we inferred that this equated to 100. As such, we excluded individuals who worked in firms with more than 100 coworkers in a given month. This excludes employees for large firms with multiple sites across the UK. Our final sample comprised of 683,677 individuals from 32,008 peer groups. The mean peer group size was 28.29 (median = 21).

Model specifications. The dependent variable is the proportion of an individual's monthly spend that is classified as luxury spend. The independent variables were salary, rank, and inequality, plus all interaction terms, and the individual's age and gender as control variables. The unit of analysis in this sample was an individual calendar month. We lagged our independent variables so that salary, rank, and inequality at time t are used to predict spending at $t+1$.

Model 1 takes the following form:

$$\text{luxury}_{it+1} = \beta_S X_{S(it)} + \beta_G X_{G(it)} + \beta_{SG} X_{S(it)} X_{G(it)} + \boldsymbol{X_C} \beta_{C(i)} + \epsilon_{it+1} \quad [1]$$

Model 2 takes the following form:

$$\text{luxury}_{it+1} = \beta_S X_{S(it)} + \beta_R X_{R(it)} + \beta_{SR} X_{S(it)} X_{R(it)} + \boldsymbol{X_C} \beta_{C(i)} + \epsilon_{it+1} \quad [2]$$

where luxury_{it+1} is the dependent variable indicating the proportion of individual i's monthly spend that was tagged as being a luxury, S refers to the salary term, G refers to the Gini coefficient term, R refers to the salary rank term, while $\mathbf{X_C}$ is the matrix of covariates, including age and gender. β is the coefficient for a given term, while ϵ_{it+1} is the error term. The equations for discretionary and necessity spend are identical to Equations 1 and 2, with the only change being that of switching the dependent variables to $\text{discretionary}_{it+1}$ and necessity_{it+1} respectively.

Robustness checks.

Necessity and discretionary spend. If our findings are consistent, we should expect to find opposing effects for necessity spend relative to luxury spend. We should also find that the effects for discretionary spend lie somewhere between the effects observed for luxury and necessity spend. To test whether our results were consistent, we replicated our findings in Supplementary Tables S7 to S8.

Occupation effects. As a robustness check, we replicated these findings with industry sector and subsector fixed effects (Supplementary Tables S9 to S10) to control for a scenario where, say, a management consultants' luxury expenditure is artificially high, owing to a reliance on hotels, taxis, and airplanes for his or her work. Additionally, we replicated the findings by excluding workers from the subsector 'Investments', which contains occupations such as asset or wealth management, investment banking, and hedge fund management (Supplementary Table S11).

Definitions of necessity spend. Purchases at some necessity-labelled vendors could reflect necessities or luxuries (e.g., bananas vs. champagne at the supermarket). To control for potentially luxurious expenditure in merchants labelled as providing necessities, we conducted sensitivity analyses with either supermarket, hospital, dental, or motor spend excluded from one's total spend (Supplementary Tables S12 to S15).

ACKNOWLEDGMENTS. We acknowledge funding from ESRC Grants ES/P008976/1, ES/N018192/1, and ES/V004867/1.

1. United Nations, World Social Report 2020, (United Nations, New York, NY), Technical report (2020).
2. R Chetty, N Hendren, P Kline, E Saez, N Turner, Is the United States still a land of opportunity? Recent trends in intergenerational mobility. *Am. Econ. Rev.* **104**, 141–147 (2014).
3. M Corak, Income inequality, equality of opportunity, and intergenerational mobility. *J. Econ. Perspectives* **27**, 79–102 (2013).
4. S Aiyar, C Ebeke, Inequality of opportunity, inequality of income and economic growth, (International Monetary Fund), Technical report (2019).
5. NM McCarty, KT Poole, H Rosenthal, *Polarized America: The dance of ideology and unequal riches.* (MIT Press, Cambridge, MA), p. 642 (2006).
6. K Pickett, S Kelly, E Brunner, T Lobstein, R Wilkinson, Wider income gaps, wider waistbands? An ecological study of obesity and income inequality. *J. Epidemiol. & Community Heal.* **59**, 670–674 (2005).
7. M Kearney, P Levine, Income inequality, social mobility, and the decision to drop out of high school, (Brookings Papers on Economic Activity), Technical report (2016).
8. GA Kaplan, ER Pamuk, JW Lynch, RD Cohen, JL Balfour, Inequality in income and mortality in the United States: Analysis of mortality and potential pathways. *BMJ* **312**, 999–1003 (1996).
9. NR Buttrick, S Oishi, The psychological consequences of income inequality. *Soc. Pers. Psychol. Compass* **11**, e12304 (2017).
10. K Pickett, R Wilkinson, *The spirit level: Why equality is better for everyone.* (Penguin, London, UK), (2010).
11. R Wilkinson, K Pickett, *The inner level: How more equal societies reduce stress, restore sanity and improve everyone's well-being.* (Penguin, London, UK), (2019).
12. KE Pickett, RG Wilkinson, Income inequality and health: A causal review. *Soc. Sci. & Medicine* **128**, 316–326 (2015).
13. T Bogaerts, M Pandelaere, Less is more: Why some domains are more positional than others. *J. Econ. Psychol.* **39**, 225–236 (2013).
14. S Loughnan, et al., Economic inequality is linked to biased self-perception. *Psychol. Sci.* **22**, 1254–1258 (2011).
15. M Paskov, K G erxhani, HG van de Werfhorst, Giving up on the Joneses? The relationship between income inequality and status-seeking. *Eur. Sociol. Rev.*, jcw052 (2017).
16. T Carthy, et al., On the contingent valuation of safety and the safety of contingent valuation: Part 2 - the CV/SG "chained" approach. *J. Risk Uncertain.* **17**, 187–214 (1998).
17. DH Frank, K Wertenbroch, WW Maddux, Performance pay or redistribution? Cultural differences in just-world beliefs and preferences for wage inequality. *Organ. Behav. Hum. Decis. Process.* **130**, 160–170 (2015).
18. T Veblen, *The theory of the leisure class.* (Routledge, Oxford, UK), (2017).
19. MD Carr, A Jayadev, Relative income and indebtedness: Evidence from panel data. *Rev. Income Wealth* **61**, 759–772 (2014).
20. M Christen, RM Morgan, Keeping up with the Joneses: Analyzing the effect of income inequality on consumer borrowing. *Quant. Mark. Econ.* **3**, 145–173 (2005).
21. F Alvarez-Cuadrado, M El-Attar, Income Inequality and Saving, (Institute of Labor Economics (IZA)), IZA Discussion Papers 7083 (2012).
22. L Walasek, GDA Brown, Income inequality and status seeking: Searching for positional goods in unequal U.S. states. *Psychol. Sci.* **26**, 527–533 (2015).
23. L Walasek, GDA Brown, Income inequality, income, and internet searches for status goods: A cross-national study of the association between inequality and well-being. *Soc. Indic. Res.* **129**, 1001–1014 (2016).
24. L Walasek, S Bhatia, GDA Brown, Positional goods and the social rank hypothesis: Income inequality affects online chatter about high and low status brands on Twitter. *J. Consumer Psychol.* (2017).
25. CJ Boyce, GD Brown, SC Moore, Money and happiness: Rank of income, not income, affects life satisfaction. *Psychol. science* **21**, 471–475 (2010).
26. KR Blake, B Bastian, TF Denson, P Grosjean, RC Brooks, Income inequality not gender inequality positively covaries with female sexualization on social media. *Proc. Natl. Acad. Sci.* **115**, 8722–8727 (2018).
27. SJ Solnick, D Hemenway, Is more always better?: A survey on positional concerns. *J. Econ. Behav. & Organ.* **37**, 373–383 (1998).
28. C Anderson, JAD H., L Howland, Is the desire for status a fundamental human motive? A review of the empirical literature. *Psychol. Bull.* **141**, 574 (2015).

29. G Deltas, The small sample bias of the gini coefficient: results and implications for empirical research. *Rev. Econ. Stat.* **85**, 226–234 (2003).
30. OECD, Enterprises by business size (2017).

Supplementary Table S1. Luxury expenditure. Definition of luxury purchases.

Category	Subcategory
Airline	All
Hotels & accommodation	All
Vehicle dealers / servicing	All
Travel	All except: ‘passenger railway’ and ‘local commuter transport’
Clothing stores	Furriers & fur shops
DIY stores	Lumber / build supply stores
DIY stores	Hardware equipment / supply
Other	Telecommunication equipment
Other	Cable / pay TV services
Other	Marinas, service & supply
Other retail stores	Champagne stores
Other retail stores	Antique reproduction stores
Other retail stores	Swimming pools / sales / servicing
Other retail stores	Jewellery stores
Other retail stores	Art dealers and galleries

Supplementary Table S2. Discretionary expenditure. Definition of discretionary purchases.

Category	Subcategory
Household stores	All
Pubs, restaurants, recreation	All
Clothing stores	All except: 'furriers & fur shops'
Food stores	pkg stores / beer / wine / liquor
Food stores	Candy / nut confection store
DIY stores	All except: 'lumber / building supply stores' and 'hardware equipment / supplies'
Other retail stores	All except: 'chemicals / allied prods', 'commercial equipment', 'commercial furniture', 'construction materials', 'dental / lab / med equipment', 'industrial supplies', 'office / photo equipment', 'inbound telemarketing merchant', 'outbound telemarketing merchant', 'drug stores & pharmacies', 'orthopaedic goods', 'pet stores / food & supply', 'hearing aids / sales / service', 'champagne stores', 'antique reproduction stores', 'art dealers & galleries', 'swimming pools / sales / servicing', 'jewellery stores'
Services	Beauty / barber shops
Services	Dry cleaners

Supplementary Table S3. Necessity expenditure. Definition of necessity purchases.

Category	Subcategory
Travel	Passenger railway
Travel	Local commuter transport
Petrol stations	All
Food stores	All except: ‘pkg stores / beer / wine / liquor’ and ‘candy / nut confection store’
Financial services	Insurance sales / underwrite
Financial services	Direct marketing insurance
Other	Telecommunication services
Other	Utilities / electricity / gas / water / sanitary
Other retail stores	Drug stores & pharmacies
Other retail stores	Orthopaedic goods
Other retail stored	Pet stores / food and supply
Other retail stores	Hearing aid / sales / service
Services	Child care services
Services	Funeral services / crematories
Services	Hospitals
Services	Heating, plumbing, air conditioning
Services	Electrical contractors
Services	Dentists / orthodontists
Services	Doctors / physicians
Services	Medical / dental labs
Services	Med / health services - def
Services	Opticians

We have found that the effect of inequality and salary rank within a firm interact with gender. This finding was not the focus of our analysis and we did not have a theoretical motivation for expecting these gender differences. Instead, the possibility of gender differences in salary led us to check the robustness of our results for men and women separately, and in doing so we reveal a pattern where men but not women are sensitive to inequality and women but not men are sensitive to rank. The first two columns of Table S4 show a large main effect of Gini (inequality) for men but a much smaller effect for women. The last two columns show a large main effect of salary rank for women but a much smaller effect for men. Figure S1 visualises these effects. The main effect of Gini for women but not men is evident in the spacing, or lack of spacing, between the lines in the left panels. The Gini-by-salary interaction is such that the effect of Gini is smaller at higher salaries. The main effect of rank for men but not women is evident in the spacing, or lack of spacing, between the lines in the right panels. The rank-by-salary interaction is such that the effect of rank is larger at higher salaries. These serendipitous findings for gender are intriguing and require theoretical explanation, but should be taken with caution: Gender is correlated with many economic variables, and there will be differences by gender and salary in who selects into having an active sole (rather than joint) account, and thus who selects into appearing in our dataset.

Supplementary Table S4. Linear regression of proportion of expenditure spent on luxury goods, as a function of (1) workplace Gini and the Gini $\times$ Salary interaction, and (2) one's salary rank within the workplace, and the Rank $\times$ Salary interaction. Both models control for an individual's salary, and age, and are modelled separately for men and women.

	Luxury spend							
	(1)				(2)			
	Women		Men		Women		Men	
	B	SE	B	SE	B	SE	B	SE
Intercept	$.11967^{***}$	.00054	$.11070^{***}$	.00055	$.11971^{***}$	.00054	$.10882^{***}$	.00055
Salary	$.01629^{***}$	.00020	$.01315^{***}$	.00017	$.01777^{***}$	.00026	$.01238^{***}$	.00023
Gini	$.00044^{***}$	.00017	$.00345^{***}$	.00017				
Rank					$-.00245^{***}$	.00022	$-.00036^{**}$	.00021
Age	$-.00042^{***}$	.00001	$.00036^{***}$	.00001	$-.00039^{***}$	.00001	$.00038^{***}$	.00001
Salary $\times$ Gini	$-.00149^{***}$	.00017	$-.00193^{***}$	.00015				
Salary $\times$ Rank					$-.00224^{***}$	.00018	$.00087^{***}$	.00017
R^2	.00799		.00592		.00810		.00556	

B, standardised regression coefficient. Probability values: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.

Supplementary Table S5. Summary statistics for expenditure data. Summary statistics for spending data by purchase type for all individual $\times$ months. Panel A reports monthly expenditure in pounds. Panel B reports monthly expenditure as a proportion of total monthly expenditure. SD denotes standard deviation. N states total number of individuals in the sample.

			Percentiles				
	Mean	SD	*p*25	*p*50	*p*75	*p*90	*p*99
Panel A: Monthly expenditure (£)							
Luxury	178.88	819.46	0.00	22.31	116.74	361.99	2454.591
Discretionary	406.48	542.98	118.59	273.22	517.41	873.10	2321.361
Necessity	399.71	399.06	150.18	313.03	546.84	834.33	1601.920
Panel B: Monthly expenditure (%)							
Luxury	.12	.18	.00	.03	.14	.35	.86
Discretionary	.42	.24	.25	.41	.58	.74	1.00
Necessity	.46	.24	.28	.46	.64	.80	1.00
N = 683,677							

Supplementary Table S6. Summary statistics for payroll data. Salary is calculated per individual $\times$ month (N = 6,275,509); N colleagues and Inequality are calculated per firm $\times$ month (N = 274000). SD denotes standard deviation. N states total number of individuals in the sample.

			Percentiles				
	Mean	SD	*p*25	*p*50	*p*75	*p*90	*p*99
Salary (£)	$1,918.98$	$3,815.93$	$1,195.33$	$1,613.28$	$2,241.83$	$3,103.92$	$6,849.05$
Inequality (Gini)	.24	.09	.18	.23	.29	.36	.55
N colleagues*	28.29	19.64	14	21	35	58	93
N = 683,677							

**N* colleagues who bank with the retail bank. Note that, due to data limitations, in some cases we do not see the full size of a given firm.

Supplementary Table S7. Linear regression of proportion of expenditure spent on discretionary goods, as a function of (1) workplace Gini and the Gini $\times$ Salary interaction, and (2) one's salary rank within the workplace, and the Rank $\times$ Salary interaction. Both models control for an individual's salary, age, and gender.

	Discretionary spend			
	(1)		(2)	
	B	SE	B	SE
Intercept	$.60458^{***}$	$.00063$	$.60045^{***}$	$.00064$
Salary	$.01527^{***}$	$.00019$	$.01534^{***}$	$.00025$
Gini	$.01203^{***}$	$.00018$		
Rank			$-.00476^{***}$	$.00022$
Gender (woman = 0)	$-.03345^{***}$	$.00039$	$-.03596^{***}$	$.00039$
Age	$-.00399^{***}$	$.00001$	$-.00393^{***}$	$.00001$
Salary $\times$ Gini	$-.00205^{***}$	$.00015$		
Salary $\times$ Rank			$.00475^{***}$	$.00017$
R^2	$.05984$		$.05808$	

B, standardised regression coefficient. Probability values: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.

Supplementary Table S8. Linear regression of proportion of expenditure spent on necessity goods, as a function of (1) workplace Gini and the Gini $\times$ Salary interaction, and (2) one's salary rank within the workplace, and the Rank $\times$ Salary interaction. Both models control for an individual's salary, age, and gender.

	Necessity spend			
	(1)		(2)	
	B	SE	B	SE
Intercept	$.29483^{***}$	.00070	$.29948^{***}$	.00070
Salary	$-.02964^{***}$	.00020	$-.02999^{***}$	.00027
Gini	$-.01414^{***}$	.00020		
Rank			$.00563^{***}$	.00025
Gender (woman = 0)	$.00973^{***}$	.00043	$.01277^{***}$	.00043
Age	$.00396^{***}$	.00002	$.00388^{***}$	.00002
Salary $\times$ Gini	$.00351^{***}$	.00017		
Salary $\times$ Rank			$-.00426^{***}$	.00019
R^2	.05932		.05671	

B, standardised regression coefficient. Probability values: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.

Supplementary Table S9. Linear regression of proportion of expenditure spent on luxury goods, as a function of (1) workplace Gini and the Gini $\times$ Salary interaction, and (2) one's salary rank within the workplace, and the Rank $\times$ Salary interaction. Both models control for an individual's salary, age, and gender, and contain sector fixed effects.

	Luxury spend			
	(1)		(2)	
	B	SE	B	SE
Salary	$.01451^{***}$	$.00013$	$.01484^{***}$	$.00018$
Gini	$.00225^{***}$	$.00012$		
Rank			$-.00096^{***}$	$.00015$
Gender (woman = 0)	$.02354^{***}$	$.00025$	$.02314^{***}$	$.00025$
Age	$.00003^{***}$	$.00001$	$.00006^{***}$	$.00001$
Salary $\times$ Gini	$-.00152^{***}$	$.00011$		
Salary $\times$ Rank			$-.00050^{***}$	$.00012$
R^2	$.01237$		$.01217$	

B, standardised regression coefficient. Probability values: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.

Supplementary Table S10. Linear regression of proportion of expenditure spent on luxury goods, as a function of (1) workplace Gini and the Gini $\times$ Salary interaction, and (2) one's salary rank within the workplace, and the Rank $\times$ Salary interaction. Both models control for an individual's salary, age, and gender, and contain subsector fixed effects.

	Luxury spend			
	(1)		(2)	
	B	SE	B	SE
Salary	$.01401^{***}$	.00013	$.01397^{***}$	.00018
Gini	$.00213^{***}$	.00012		
Rank			$-.00038^{***}$	.00015
Gender (woman = 0)	$.02316^{***}$	.00025	$.02289^{***}$	.00025
Age	$.00005^{***}$	.00001	$.00008^{***}$	.00001
Salary $\times$ Gini	$-.00144^{***}$	.00011		
Salary $\times$ Rank			$-.00036^{***}$	.00012
R^2	.01296		.01278	

B, standardised regression coefficient. Probability values: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.

Supplementary Table S11. Linear regression of proportion of expenditure spent on luxury goods, as a function of (1) workplace Gini and the Gini $\times$ Salary interaction, and (2) one's salary rank within the workplace, and the Rank $\times$ Salary interaction. Both models control for an individual's salary, age, and gender. Model excludes employees working in the investment subsector.

	Luxury spend			
	(1)		(2)	
	B	SE	B	SE
Intercept	$.10049^{***}$	$.00041$	$.09994^{***}$	$.00041$
Salary	$.01437^{***}$	$.00013$	$.01461^{***}$	$.00017$
Gini	$.00207^{***}$	$.00012$		
Rank			$-.00084^{***}$	$.00015$
Gender (woman = 0)	$.02374^{***}$	$.00024$	$.02322^{***}$	$.00024$
Age	$.00003^{***}$	$.00001$	$.00005^{***}$	$.00001$
Salary $\times$ Gini	$-.00150^{***}$	$.00011$		
Salary $\times$ Rank			$-.00045^{***}$	$.00012$
R^2	$.01223$		$.01205$	

B, standardised regression coefficient. Probability values: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.

Supplementary Table S12. Linear regression of proportion of expenditure spent on luxury goods after excluding supermarkets from total spend, as a function of (1) workplace Gini and the Gini $\times$ Salary interaction, and (2) one's salary rank within the workplace, and the Rank $\times$ Salary interaction. Both models control for an individual's salary, age, and gender.

	Luxury spend			
	(1)		(2)	
	B	SE	B	SE
Intercept	$.11219^{***}$	$.00047$	$.11221^{***}$	$.00047$
Salary	$.01389^{***}$	$.00015$	$.01369^{***}$	$.00020$
Gini	$.00042^{***}$	$.00014$		
Rank			$.00036^{**}$	$.00017$
Gender (woman = 0)	$.02951^{***}$	$.00028$	$.02939^{***}$	$.00028$
Age	$.00052^{***}$	$.00001$	$.00053^{***}$	$.00001$
Salary $\times$ Gini	$-.00134^{***}$	$.00012$		
Salary $\times$ Rank			$-.00096^{***}$	$.00013$
R^2	$.01200$		$.01198$	

B, standardised regression coefficient. Probability values: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.

Supplementary Table S13. Linear regression of proportion of expenditure spent on luxury goods after excluding hospitals from total spend, as a function of (1) workplace Gini and the Gini $\times$ Salary interaction, and (2) one's salary rank within the workplace, and the Rank $\times$ Salary interaction. Both models control for an individual's salary, age, and gender.

	Luxury spend			
	(1)		(2)	
	B	SE	B	SE
Intercept	$.09938^{***}$	$.00041$	$.09885^{***}$	$.00041$
Salary	$.01436^{***}$	$.00013$	$.01458^{***}$	$.00017$
Gini	$.00209$	$.00012$		
Rank			$-.00079^{***}$	$.00015$
Gender (woman = 0)	$.02378^{***}$	$.00024$	$.02327^{***}$	$.00024$
Age	$.00005^{***}$	$.00001$	$.00007^{***}$	$.00001$
Salary $\times$ Gini	$-.00146^{***}$	$.00011$		
Salary $\times$ Rank			$-.00045^{***}$	$.00012$
R^2	$.01236$		$.01217$	

B, standardised regression coefficient. Probability values: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.

Supplementary Table S14. Linear regression of proportion of expenditure spent on luxury goods after excluding dental-related transactions from total spend, as a function of (1) workplace Gini and the Gini $\times$ Salary interaction, and (2) one's salary rank within the workplace, and the Rank $\times$ Salary interaction. Both models control for an individual's salary, age, and gender.

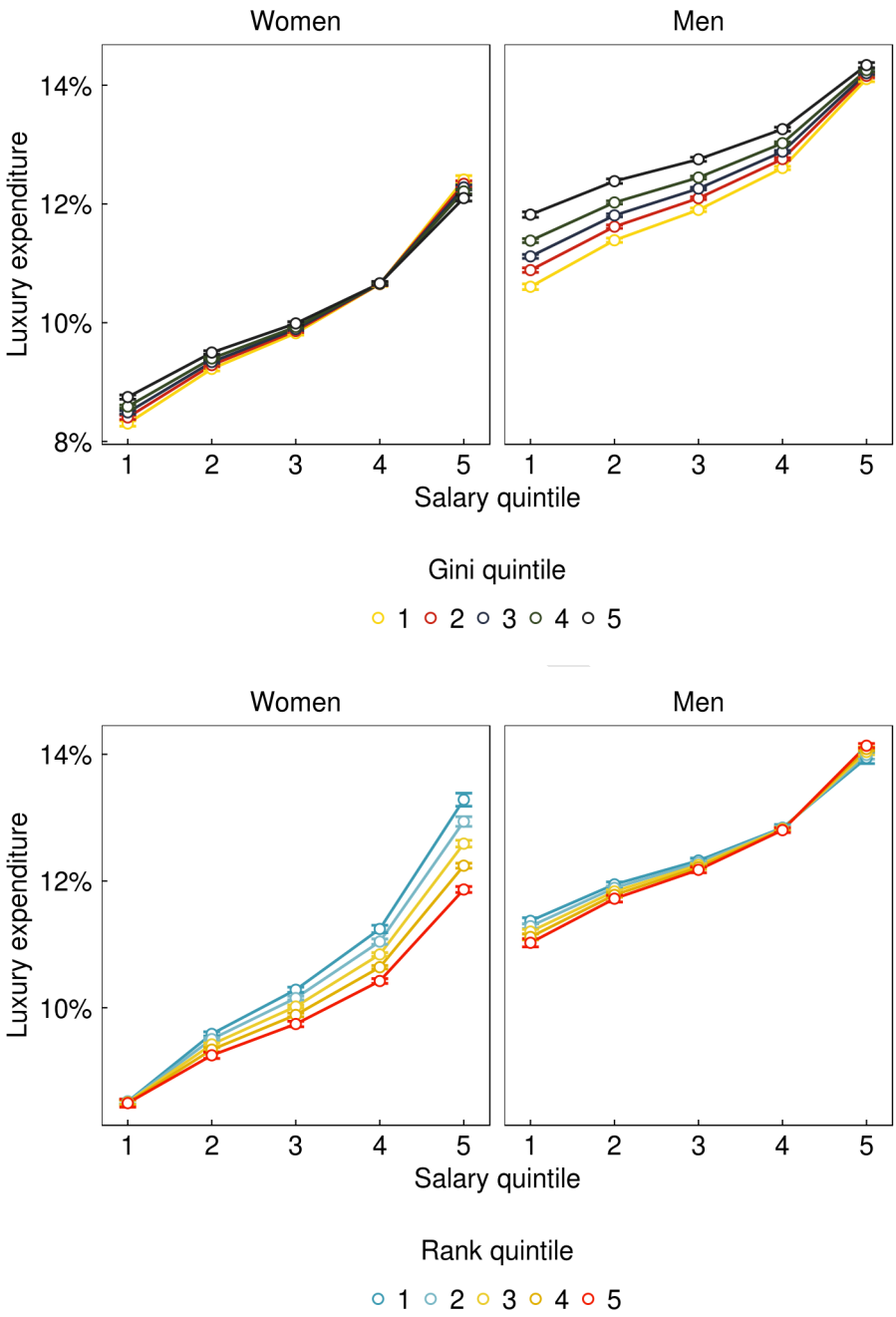
	Luxury spend			
	(1)		(2)	
	B	SE	B	SE
Intercept	$.09925^{***}$	$.00041$	$.09872^{***}$	$.00041$
Salary	$.01444^{***}$	$.00013$	$.01468^{***}$	$.00017$
Gini	$.00212^{***}$	$.00012$		
Rank			$-.00082^{***}$	$.00015$
Gender (woman = 0)	$.02387^{***}$	$.00024$	$.02334^{***}$	$.00024$
Age	$.00006^{***}$	$.00001$	$.00009^{***}$	$.00001$
Salary $\times$ Gini	$-.00147^{***}$	$.00011$		
Salary $\times$ Rank			$-.00046^{***}$	$.00012$
R^2	$.01242$		$.01223$	

B, standardised regression coefficient. Probability values: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.

Supplementary Table S15. Linear regression of proportion of expenditure spent on luxury goods after excluding cars from total spend, as a function of (1) workplace Gini and the Gini $\times$ Salary interaction, and (2) one's salary rank within the workplace, and the Rank $\times$ Salary interaction. Both models control for an individual's salary, age, and gender.

	Luxury spend			
	(1)		(2)	
	B	SE	B	SE
Intercept	$.09687^{***}$	.00039	$.09614^{***}$	.00039
Salary	$.01322^{***}$	.00012	$.01418^{***}$	.00017
Gini	$.00274^{***}$	.00011		
Rank			$-.00194^{***}$	.00014
Gender (woman = 0)	$.01133^{***}$	.00023	$.01061^{***}$	.00023
Age	$-.00023^{***}$	.00001	$-.00020^{***}$	.00001
Salary $\times$ Gini	$-.00104^{***}$	.00010		
Salary $\times$ Rank			$-.00024^{**}$	.00011
R^2	.00879		.00857	

B, standardised regression coefficient. Probability values: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$.



Supplementary Figure S1. Fitted proportion of spend on luxury goods by salary and Gini (left, from Model 1) and salary and rank salary (right, from Model 2), separated for women and men. Spend is on purchases at $t + 1$ across 683,677 individuals, between March – December 2019. Individuals are binned by their net salary in month t and their peer group inequality measured by Gini (left) or peer group rank salary (right). Salary, Gini, and rank bins were determined by cutting each variable into five equally-sized quintile bins. Higher Gini quintiles (in black) denote individuals from firms with highly unequal salary. Higher rank quintiles (in red) denote individuals with the highest salaries within their firm. Error bars are 95% CIs