# Who Makes It to the Top? Differential Rewards to Personality across Gender and Occupation in the UK

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# ABSTRACT

# Who Makes It to the Top? Differential Rewards to Personality across Gender and Occupation in the UK*

This study tests whether personality traits are legitimately rewarded in the labour market or whether there are differing rewards across gender that cannot be explained with productivity. We investigate if personality traits affect the likelihood of making it to the top income quintile within an occupation differently by gender using UK Household Longitudinal data. We find that being agreeable hurts men more than women across a majority of occupations, which points at the role of gender norms for wages. Further, female legislators and senior officials who are conscientious, extraverted, neurotic and open are more likely to be among the top earners than men. Other than that, we find small gender differences in personality rewards.

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# 1. Introduction

It is often stated that specific occupations attract and retain individuals with specific personality traits; an example would be that politicians tend to be extraverted and kindergarten teachers are caring. Evidence of this can be found in Table 1 that shows the average personality traits by five exemplary occupations. Concretely, it demonstrates that in the UK 'Legislators and senior officials' and 'Corporate managers' have markedly higher rates of extroversion as compared to 'Life science and health professionals'. Table 1 also suggests other differences such as that 'Teaching professionals' are significantly more open than 'Physical, mathematical and engineering science professionals'.[1]

**Table 1:** Average Big Five personality traits by five white-collar occupations

|  | Agreeable ness | Conscientious ness | Extraversion | Neuroticism | Openness |
|---|---|---|---|---|---|
| Legislators and senior officials | 5.497 | 5.629 | 4.850 | 3.402 | 5.077 |
|  | (0.984) | (0.938) | (1.138) | (1.234) | (1.032) |
| Corporate managers | 5.461 | 5.608 | 4.682 | 3.321 | 4.756 |
|  | (0.979) | (0.957) | (1.252) | (1.290) | (1.099) |
| Physical, mathematical and engineering science professionals | 5.388 | 5.394 | 4.316 | 3.415 | 4.895 |
|  | (0.982) | (0.939) | (1.258) | (1.289) | (1.092) |
| Life science and health professionals | 5.506 | 5.576 | 4.334 | 3.456 | 4.673 |
|  | (1.012) | (0.954) | (1.327) | (1.319) | (1.097) |
| Teaching professionals | 5.702 | 5.610 | 4.711 | 3.662 | 5.107 |
|  | (0.896) | (0.970) | (1.263) | (1.358) | (1.122) |

**Note:** The data is from the UK Household Longitudinal Study (UKHLS) that is an annual panel data set in the UK from 1991 to 2018. The sample is restricted to people with a positive amount of work hours and who have indicated their personality at least once. The table shows the average level of personality among workers in white-collar occupations. Each Big Five personality trait ranges from 1 (low level) to 7 (high level). The white-collar occupations follow the ISCO-88 occupation classification in two-digit code occupations. The full set of ten white-collar two-digit code occupations are in Table A-1 in the appendix. White-collar occupations include the top ten white-collar ISCO-88 two-digit occupations. Occupations with an ISCO-88 one-digit code of 1, 2 or 3 is regarded as high skilled white-collar (https://www.eurofound.europa.eu/surveys/ewcs/2005/classification).

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[1] We find that the means are statistically different from each other at the 5% level running a t-test.

The reason why individuals with specific personality traits end up more frequently in specific jobs is less clear. First, it could happen that a specific personality trait is valued within an occupation *legitimately*. One can imagine, for example, that teachers ('Teaching professionals' above) need to be more agreeable than other workers to successfully convey knowledge to pupils or that legislators and senior officials ('Legislators and senior officials' above) need to be particularly extroverted as their job involves public engagement. These intuitions are reflected in Table 1. Individuals may either sort into those occupations based on their personality and/or there is adaption of personality traits to job requirements over time. The channels through which personality traits affect wages legitimately could be both direct and/or indirect (Heineck and Anger 2010). Directly, personality traits are seen to enhance an individual's productivity (e.g. conscientious individuals may be more hard-working) and their wage bargaining power (e.g. extroverted individuals may have higher confidence that helps them bargain for higher wages). Indirectly, personality traits have been shown to impact educational attainment (Heckman and Kautz 2012) and occupational sorting (Cobb-Clark and Tan 2011), which in turn increase wages. Further, personality traits may predict preferences for risk or competition that differ across gender (Bertrand 2011). Employers may value personality traits either intrinsically or because they increase productivity or workers' incentives and hence lower an employer's monitoring costs when labour effort is endogenous (K. John and Thomsen 2014).

Second, it is also possible that specific personality traits are rewarded *inefficiently*. For example, extroverted individuals are better at asking for pay rises and promotions, and as such they garner higher pay and status without adding additional value. Of course, it is not easy to observe this phenomenon. In general, it is difficult to elicit inefficient rewards by personality as productivity is often unobservable (Cubel et al. 2014) and the direct mechanisms of personality on productivity remain largely inconclusive. However, evidence of inefficient rewards can be observed if we consider whether an individual's personality traits are rewarded differently depending on a person's innate characteristics. An example would be differential pay by gender for the exact same level of personality traits, all else equal. Personality traits may be rewarded differently for men as compared to women with some traits being regarded positively or negatively in men but not in women (Manning and Swaffield 2008; Blau and Kahn 2017). Agreeableness could be, for example, seen positively in men as a sign of their empathy but negatively in women as it conveys weakness. Equally, agreeableness could also hurt men as men are usually expected to be less agreeable than women and a highly agreeable

man would speak against this expectation. Also, personality could provide women with a wage advantage as compared to men, as they consistently score higher on many personality variables (Borghans, Ter Weel, and Weinberg 2014; Gensowski, Gørtz, and Schurer 2021; Li, Chen, and Zhang 2021). In this paper, we test whether personality traits are in fact inefficiently rewarded.

Specifically, we explore whether women with the same level of personality traits have a different likelihood of making it to the top as compared to men. We estimate the probability of being in the top income quintile for men and women and compare across high versus low levels of different personality traits. We focus on the Big Five factor model as a measurement of personality, which encompasses conscientiousness, neuroticism, openness, agreeableness and extraversion and has been shown to impact labour market outcomes in a comparable way to cognitive ability (Costa and McCrae 1992; Heckman and Kautz 2012). We draw on the data from the UK Household Longitudinal Study (UKHLS).[2] Our analysis is restricted to individuals in high-skilled white-collar occupations (i.e., professionals) as they are more homogeneous in terms of the tasks performed by men and women. The key outcome measured in this study is the likelihood of being among the top 20% income earners. Over the past decades, the gender wage gap has closed at a much slower pace at the top of the income distribution than in the middle and bottom distributions; a finding that has been attributed to the growing share of the unexplained part of the gender gap at the top (Blau and Kahn 2017; Fortin, Bell, and Böhm 2017). While the causes for the unexplained part of the gender wage gap are multiple there is reason to believe that discrimination and differential treatment plays an important role for income gaps at the top (Blau and Kahn 2017). We hence look at whether men and women with the same intensity in personality traits have a different likelihood of making it to the top within their occupation and calculate gender-specific personality pay differentials by occupation.

The methodology of this study broadly builds on Goldin (2014) who also focuses on within occupation differences in earnings between men and women. In particular, they look at how within occupation differences in earnings across gender relate to differences in hours worked using data from the American Community Survey. Similarly, we also look at the coefficient of female and occupation interacted and then add personality to the interaction to see how

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[2] Different waves from the UKHLS have been previously used to study the impact of personality on labour market outcomes such as on wages (Heineck, 2011), on personality pay gaps by personality quantile (Nandi and Nicoletti, 2014) and on wages across the wage distribution (Collischon, 2020).

earnings differ across gender and personality within different occupations. Extending past empirical research, these estimates provide a nuanced insight into the premiums of each specific Big Five personality trait at the occupation level, enabling a direct comparison of rewards across occupations and gender. By including occupation fixed effects, we also hold selection into occupations by gender constant.

This study finds that men and women face a different likelihood of making it to the top, i.e. of being among the top income quintile earners, but the differences in the likelihood across gender and personality are mostly small. For both high and low intensities of each personality trait, women are punished as compared to men; a finding that reflects the gender gap in the likelihood of making it to the top irrespective of personality traits. We do find, however, that agreeableness is more often punished for men than it is for women. This finding points at differential rewards to personality resulting from the disconfirmation of gender norms (i.e., we do not expect men to be agreeable so if they are it plays out negatively for them). Further, we find the largest gender differences in relative rewards to personality in the 'Legislators and senior officials' occupation group, in which women are more likely to be in the top income quintile if they are conscientious, extroverted, neurotic and open as compared to men with the same traits. Men are punished for being agreeable, conscientious and extroverted. In the remaining eight two-digit code occupations we look at, having a high versus a low intensity of personality traits only slightly impacts the likelihood of making it to the top differently for men as compared to women with some traits being rewarded and others punished. Our finding is interesting, as it shows that while the underlying mechanisms of personality are difficult to identify, personality does not affect the likelihood of making it to the top differently for women relative to men in professional occupations very much other than for agreeableness. For agreeableness we do see a clear impact of gender norms on wage outcomes; a finding that reflects differential personality expectations of men and women in the labour market. Women do not gain or lose out greatly from higher levels of non-cognitive skills as compared to men in white-collar occupations. We cannot, however, rule out that personality is rewarded differently in the recruitment process that affects sorting into specific occupations based on those traits. Though there is some evidence that finds that psychosocial traits do not influence entrance into higher paid occupations differently for men and women (Antecol and Cobb-Clark 2013).

## 1.1. Context

The Big Five personality traits have been commonly associated with labour market outcomes. Of the Big Five, agreeableness is associated with 'labour-friendly' characteristics such as being compliant (O. John and Srivastava 1999) but may also hamper success due to the pursuit to please others (Barrick, Mount, and Judge 2001). Conscientiousness is the "tendency to be organized, responsible, and hardworking" (Almlund et al. 2011), which relates to grit or perseverance; characteristics, that tend to be demanded by employers. Extroverted individuals derive energy from social interaction and positive emotions (Borghans, Ter Weel, and Weinberg 2006), which may be helpful for some occupations. Neuroticism is the facet of the Big Five that is often negatively associated with work outcomes, as neurotic individuals are anxious (Viinikainen et al. 2010). Openness to experience is the "tendency to be open to new aesthetic, cultural, or intellectual experiences" (Almlund et al. 2011). The effect of openness at work is ambiguous, potentially because it is multidimensional in its facets (Griffin and Hesketh 2004; Heineck and Anger 2010). Of the Big Five traits, agreeableness and neuroticism exhibit the largest gender differences with women scoring higher than men on those two items (Bertrand 2011). With the different nature of each of the Big Five personalities their potential impact on wages is likely to differ by type of occupations that are equally diverse in terms of work characteristics and tasks (K. John and Thomsen 2014).

One reason for differing likelihoods of making it to the top and occupational segregation by gender for personality could be that individuals sort into jobs that align with their identity. Akerlof and Kranton (2000) model how one's gender identity directly influences economic decision-making and one's utility function. They highlight that some occupations are generally regarded as male occupations, such as marines, and some generally as female, such as nurses. Being successful at a male-dominated job then comes with the expectation to act manly and to fulfil expected gender roles.

By examining whether men and women have different income premiums across five personality traits, we are essentially asking whether the phenomenon of differential expectations of male and female personality traits are observed in the labour market. Intuitively, our work, which calculates differing likelihoods of making it to the top at the occupation level, also relates to work that considers whether personality proxies reduce the gender pay gap in individual wage regressions focusing on differences in personality across

gender. For example, Mueller and Plug (2006), using data from the Wisconsin Longitudinal Study of US students, estimate the impact of personality on earnings for men and women. They find that agreeableness is the only Big Five trait that has a statistically significant impact on the gender gap with men being rewarded for being antagonistic (i.e., the reverse of agreeable). Similarly, Judge, Livingston and Hurst (2012) find that agreeableness is punished for men as compared to women when using US survey data. Nyhus and Pons (2005) also analyse gender-specific returns to personality using the Big Five inventory and Dutch data from the DNB Household Survey. They find that employers are more sensitive to personality differences in women than that in men. They also find strong negative effects of agreeableness and extraversion for the total and the female sample. Neuroticism has a negative impact for men and women. The authors highlight that their relatively small overall effect sizes might stem from excluding occupation-specific rewards to personality in their analysis. In a twin study in Finland, Maczulskij and Viinikainen (2018) find that while neuroticism negatively impacts long-term earnings overall, this effect is stronger for women. They also find that activity (i.e., a facet of extraversion) is positively related to long-term earnings of men. Braakmann (2009) uses data from the German Socio-Economic Panel (SOEP) and looks at how differences in personality across gender contribute to the gender gap as part of a wage decomposition. They find an overall negative effect of conscientiousness and agreeableness on wages with this negative effect being larger for men for conscientiousness and larger for women for agreeableness. Higher levels of openness are only associated with higher wages for men. Extraversion does not affect wages for either gender. Neuroticism is generally associated with negative wage effects with those being larger for women. They find that gender differences in agreeableness, neuroticism and conscientiousness explain between five percent and 18 percent of the gender pay gap.

In response to the differential effect of personality on the gender wage gap on average, Cobb-Clark and Tan (2011) highlight the importance of looking at the gendered impact of personality on wages within an occupation, as we do here. Average effects omit that sorting into occupations occurs based on personality. In their study they estimate the effect of non-cognitive skills on occupational segregation by gender and on within occupation wage gaps using the Household, Income, and Labour Dynamics in Australia (HILDA) survey. They find that men and women enter occupations at a different rate despite having the same personalities, which does, however, not explain lower wages of women overall that stem from earning differences within occupations rather than across occupations. Controlling for occupational segregation,

they do not find that non-cognitive skills help to explain the unexplained part of the gender pay gap but women's non-cognitive skills give them a slight wage advantage. Using US data from the National Longitudinal Study of Adolescent Health, Antecol and Cobb-Clark (2013) look at masculine traits, self-esteem, analytical problem-solving approach, willingness to work hard, impulsiveness, problem avoidance and self-assessed intelligence as proxies for psychosocial traits. They find that men and women sort into occupations very differently depending on these traits, however, this gender segregation on the workplace has no effect on selection into high-paid occupations. This finding highlights the importance of studying within-occupation personality effects on job rewards. That is the approach taken in this work. We focus on white-collar occupations and the outcome of interest is the probability of being in the top income quintile. White-collar occupations are more homogeneous in terms of the tasks performed by men and women. And we focus on the probability of being in the top income quintile because the share of the unexplained gender wage gap has been growing at the top earning levels as compared to the middle and bottom distribution of incomes.

## 2. Data and descriptive statistics

This study draws on the merged UK Household Longitudinal Study (UKHLS) from 1991 until 2018. The data set is well-suited for modelling the impact of personality on labour market outcomes given its panel nature and large sample. We restrict the sample to individuals who work a positive number of hours (i.e. part and full-time). We further restrict the sample to individuals who have indicated their personality at least once. The sample size of this restricted sample is 86,924 observations.[3]

The main outcome variable used in this study is a binary variable equal to one if an individual is in the top quintile (i.e., the top 20%) of an individual's gross hourly inflation-adjusted and within-occupation wage using CPI information from the Office of National Statistics (ONS) in 2015.[4] The analysis is clustered at the two-digit occupation level. Basic summary statistics (mean and standard deviation) of the key variables are provided separately by gender in Table

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[3] The large sample allows for a statistically meaningful analysis of personality traits with sufficiently large power. Statistical significance is discussed with the results. Given the large amount of previous research that find substantial effect sizes regarding personality and labour market outcomes, we are confident that our hypothesis of differential rewards to personality is valid. That is, statistical power is ensured.

[4] When individuals indicate that they are paid a monthly wage instead of an hourly wage, the hourly wage is computed using the gross monthly income from all labour market earnings divided by the normal and overtime hours worked per week multiplied by 4.33.

A-2 in the appendix. The UKHLS panels have been previously used to study the impact of personality on labour market outcomes such as on wages and across the wage distribution (Nandi and Nicoletti 2014; Collischon 2020; Heineck 2011). We extend this research by analysing whether personality is rewarded differently for men as compared to women in white-collar occupations. White-collar occupations are defined as high skilled occupations with an ISCO-88 one-digit code of 1, 2 or 3.

**Big Five personality traits**

The personality variables are dummy variables equal to one if an individual is in the top tertile of the personality distribution of the Big Five personality traits and zero otherwise. Dummies are used for personality as we are interested in wage associations for individuals at the top of the personality distribution and as it makes the interaction with gender and occupation easier to interpret.

Respondents were asked a reduced version of the Big Five survey (i.e., fifteen questions, three per personality trait) with answers on a seven-point Likert-scale in 2005 and 2011 (see Table A-3 in the appendix for the survey questions). The component score for each of the five traits is then calculated following UKHLS guidelines as "the average item response if no more than one of the three input responses is missing" (Institute for Social and Economic Research 2020).

The Big Five traits are assumed to be constant for individuals across waves and exogenous to wages. This assumption is a limitation to this specification due to the potential reverse causality of personality and labour market outcomes (Roberts, Caspi, and Moffitt 2003). However, evidence shows that the Big Five tend to be relatively stable over time, particularly after the age of 30 (Roberts and DelVecchio 2000). Cobb-Clark and Schurer (2012) further find that the Big Five traits remain stable during working age. To net out the linear and non-linear effects of age on individual personality, we regress personality on age and age squared. The residuals from this regression control for age effects and some of the reverse causality between the labour market and personality (Heineck 2011; Josten and Lordan 2020) and is used as personality measurement in the main specification. The individual age-effect-free residuals of each personality trait are standardised to have a mean of zero and a standard deviation of 1. We create five binary variables that classify individuals as scoring high in a specific personality trait if their individual standardised value is in the top tertile of this distribution. In a later robustness check, this cut-off is varied to above and below the mean of each personality trait

to account for the fact that gender rewards may differ at different levels of the personality distribution.

Further, Busic-Sontic, Czap and Fuerst (2017) test for stability in the personality variable across the two waves in the UKHLS recorded in 2005 (i.e. wave 15 of the BHPS) and 2011 (i.e. wave 3 of Understanding Society). They find no systematic difference across the two waves. We hence use personality variables from 2011 for our main specification and replace it with the 2005 value only if an individual's personality trait is missing for 2011.

## 2.1. Likelihood of making it to the top by gender and personality

Our analysis is at the two-digit occupation level.[5] This allows for job sorting based on personality and for tasks and requirements differing across occupations. We focus on white-collar occupations as they can be easily grouped and exhibit some heterogeneity as regards to employees' education and tasks on the job and can hence be compared across more easily.

Table 2 shows the likelihood of being in the top income quintile within white-collar occupations by all five Big Five personality traits and gender. Overall, the likelihood is higher for individuals who are in the top tertile as compared to the bottom tertile of a Big Five personality traits for all Big Five personality traits but for openness. The difference in likelihoods between the top and the bottom personality traits is not large across gender. The likelihood of being in the top 20 percent of top income earner is always lower for females as compared to males.

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[5] We slightly amend the ISCO-88 two-digit occupation codes by reassigning some three-digit code occupations to different two-digit occupation codes. An example would be '332: Pre-primary education teaching associate professionals' that now falls under the two-digit code '23: Teaching professionals' instead of '33: Teaching associate professionals' as that ensures a sufficient sample size of teachers. See Table A-4 for occupation classifications.

**Table 2:** Likelihood of being in the top income quintile by Big Five tertile and gender

|  |  | Female | Male | Total |
|---|---|---|---|---|
| Agreeableness | Top tertile | 0.195 | 0.290 | 0.249 |
|  |  | (0.396) | (0.454) | (0.432) |
|  | Bottom tertile | 0.106 | 0.168 | 0.131 |
|  |  | (0.308) | (0.374) | (0.337) |
| Conscientiousness | Top tertile | 0.172 | 0.269 | 0.227 |
|  |  | (0.378) | (0.444) | (0.419) |
|  | Bottom tertile | 0.122 | 0.188 | 0.148 |
|  |  | (0.328) | (0.390) | (0.355) |
| Extraversion | Top tertile | 0.150 | 0.250 | 0.204 |
|  |  | (0.357) | (0.433) | (0.403) |
|  | Bottom tertile | 0.160 | 0.245 | 0.193 |
|  |  | (0.367) | (0.430) | (0.395) |
| Neuroticism | Top tertile | 0.159 | 0.246 | 0.208 |
|  |  | (0.365) | (0.431) | (0.406) |
|  | Bottom tertile | 0.142 | 0.256 | 0.183 |
|  |  | (0.349) | (0.436) | (0.387) |
| Openness | Top tertile | 0.140 | 0.224 | 0.175 |
|  |  | (0.347) | (0.417) | (0.380) |
|  | Bottom tertile | 0.166 | 0.261 | 0.215 |
|  |  | (0.372) | (0.439) | (0.411) |

**Note:** The table shows likelihood of being in the top income quintile by white-collar occupations for individuals who score high and low in each of the Big Five personality traits for males and females and overall. The table shows the mean and the standard deviation in brackets.

## 2.2. Personality by gender and occupation

Table 3 below shows the average personality levels of agreeableness, conscientiousness, extraversion, neuroticism and openness by gender and occupation. Overall, the mean level of all Big Five personality traits other than openness is larger for women in all occupations than for men, which is consistent with Schmitt et al. (2008) who find women to score higher in all Big Five personality traits but openness in 55 cultures. The largest differences between men and women are for 'Legislators and senior officials' for extraversion and neuroticism with women scoring disproportionately higher than men and agreeableness with the difference between men and women being very small and not statistically significant. For 'Managers of small enterprises' the difference across gender is particularly small for openness and conscientiousness as compared to other occupations and particularly large for agreeableness. In 'Life science and health professionals' women are particularly conscientious and are similar to men in terms of neuroticism. All differences in mean for men and women are statistically significant other than that of agreeableness and openness for 'Legislators and senior officials'.

**Table 3:** Big Five personality traits by gender and occupation

| | Agreeableness | | Conscientiousness | | Extraversion | | Neuroticism | | Openness | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male | Female | Male |
| Legislators and senior officials | 5.53 | 5.45 | 5.75 | 5.53 | 5.04 | 4.61 | 3.75 | 3.05 | 4.98 | 5.13 |
| Corporate managers | 5.61 | 5.36 | 5.77 | 5.50 | 4.88 | 4.54 | 3.62 | 3.11 | 4.67 | 4.82 |
| Managers of small enterprises | 5.74 | 5.34 | 5.64 | 5.54 | 4.89 | 4.57 | 3.74 | 3.06 | 4.62 | 4.72 |
| Physical, mathematical and engineering science professionals | 5.50 | 5.37 | 5.53 | 5.37 | 4.66 | 4.26 | 3.85 | 3.34 | 4.68 | 4.93 |
| Life science and health professionals | 5.62 | 5.38 | 5.79 | 5.34 | 4.50 | 4.14 | 3.53 | 3.37 | 4.54 | 4.83 |
| Teaching professionals | 5.75 | 5.56 | 5.69 | 5.44 | 4.85 | 4.47 | 3.83 | 3.26 | 5.04 | 5.16 |
| Other professionals | 5.59 | 5.39 | 5.58 | 5.36 | 4.80 | 4.41 | 3.82 | 3.26 | 4.76 | 4.98 |
| Physical and engineering science associate professionals | 5.60 | 5.35 | 5.58 | 5.41 | 4.65 | 4.36 | 3.83 | 3.29 | 4.58 | 4.84 |
| Life science and health associate professionals | 5.79 | 5.52 | 5.71 | 5.39 | 4.76 | 4.40 | 3.66 | 3.23 | 4.57 | 4.98 |
| Other associate professionals | 5.69 | 5.39 | 5.68 | 5.39 | 4.83 | 4.60 | 3.73 | 3.27 | 4.74 | 4.95 |

**Note:** The table shows the mean of the Big Five traits by gender and occupation.

## 2.3. Correlation of personality, gender and occupation and wages

It has been argued that the unexplained gender pay gap might stem from differential rewards resulting from e.g., discrimination (Bertrand 2011; Blau and Kahn 2017). A 'personality penalty' by gender hence likely exists if there are inefficient rewards to personality.

Before turning to our main regression analysis that tests for differential personality rewards by gender this section focuses on descriptive statistic regressions in the tables below. They highlight how the association of personality traits and wage outcomes changes when including different controls and motivate the main analysis that follows. Specifically, Table 4 below

documents results from running a simple regression of wage (i.e. either log hourly wages or our main outcome variable top income quintile) on personality (i.e. either the standardised version of the Big Five personality traits or our main independent variable of the top tertile of personality) including all basic controls other than gender (i.e. age, age squared, an education dummy, wave fixed effects, region fixed effects and the logarithm of job hours) for white-collar occupations only. Agreeableness and neuroticism have a negative impact on wages across all four specifications. Conscientiousness is not statistically significant, which is consistent with other research using UKHLS data that find conscientiousness not to be significant for some specifications or only non-linearly related to labour market outcomes (Heineck and Anger 2010; Heineck 2011; Nandi and Nicoletti 2014; Collischon 2020). For extraversion we find insignificant results other than for the standardised personality variable. Openness is insignificant. These individual level wage regressions match the findings of the literature of small and varying effects of personality on wages on average (Nyhus and Pons 2005).[6]

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[6] Meta-studies point to conscientiousness as the overall most frequent positive predictor of income (Barrick et al., 2001; Almlund et al., 2011). Using the UKHLS data set, agreeableness and neuroticism have been found to negatively and openness to positively impact wages (Heineck, 2011; Nandi and Nicoletti, 2014; Collischon, 2020). The impact of extraversion varied across studies. Openness was largely insignificant.

**Table 4:** Individual level regression of wages on Big Five personality traits

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Outcome: | Log hourly wage | | Top income quintile | |
| Personality variable: | Standardised personality | Top tertile personality | Standardised personality | Top tertile personality |
| Agreeableness | -0.040** | -0.055** | -0.022** | -0.043** |
| | (0.004) | (0.008) | (0.003) | (0.005) |
| Conscientiousness | 0.000 | -0.003 | -0.002 | -0.014** |
| | (0.004) | (0.007) | (0.003) | (0.006) |
| Extraversion | -0.016** | -0.007 | -0.009** | -0.002 |
| | (0.004) | (0.008) | (0.003) | (0.006) |
| Neuroticism | -0.055** | -0.067** | -0.031** | -0.032** |
| | (0.004) | (0.008) | (0.003) | (0.006) |
| Openness | 0.004 | 0.004 | 0.001 | 0.001 |
| | (0.004) | (0.008) | (0.003) | (0.006) |
| Constant | 1.078** | 1.163** | -0.366** | -0.286** |
| | (0.065) | (0.068) | (0.036) | (0.036) |
| Observations | 86,924 | 86,924 | 86,924 | 86,924 |
| R-squared | 0.184 | 0.176 | 0.102 | 0.098 |

**Note:** The sample is restricted to individuals that work full-time (i.e. more than 30 hours a week) and have indicated their personality at least once across the panel. The sample includes individuals in white-collar occupations only. The outcome variables are the logarithm of monthly wages (regression (1) and (2) or the probability of being in the top income quintile (i.e., the top 20% of the income distribution) (regression (3) and (4)). The independent variable are the Big Five personality traits either standardised to have a mean of 0 and a standard deviation of one (regressions (1) and (3)) or a dummy variable that equals one if the individual is in the top tertile of the respective personality trait distribution (regression (2) and (4). Basic controls include age, age squared, education, wave fixed effects, region fixed effects and the logarithm of job hours. The regressions are clustered at the individual level. Robust standard errors are in parentheses. ** $p<0.01$, * $p<0.05$

When regressing wage on gender, in Table 5 below, specifications (5) and (6), we find a gender wage gap of 0.197 log points and that women are 11.13% percentage points less likely to be in the top quintile of the wage distribution. When adding personality to the regression the coefficient on gender decreases slightly to -0.183 (specification (7)). The association of agreeableness and neuroticism and wages outcomes remains negative when adding gender controls. Conscientiousness changes to have a significant and positive association with the log of wages. Being in the top tertile of extraversion also changes to have a positive and significant relation to wages overall. Standardised openness has a negative association with both wage outcomes.

**Table 5:** Individual level regression of wages on gender and Big Five traits

| | (5) Log hourly wage | (6) Top income quintile | (7) Log hourly wage | (8) | (9) Top income quintile | (10) |
|---|---|---|---|---|---|---|
| Outcome: | | | Log hourly wage | | Top income quintile | |
| Gender and personality variable: | Gender No personality | Gender No personality | Gender Standardised personality | Gender Top tertile personality | Gender Standardised personality | Gender Top tertile personality |
| Agreeableness | | | -0.029** | -0.040** | -0.015** | -0.035** |
| | | | (0.004) | (0.007) | (0.003) | (0.005) |
| Conscientiousness | | | 0.013* | 0.016* | 0.005 | -0.004 |
| | | | (0.004) | (0.007) | (0.003) | (0.005) |
| Extraversion | | | 0.001 | 0.019* | 0.000 | 0.013* |
| | | | (0.004) | (0.008) | (0.003) | (0.006) |
| Neuroticism | | | -0.032** | -0.035** | -0.018** | -0.014* |
| | | | (0.004) | (0.008) | (0.003) | (0.006) |
| Openness | | | -0.009* | -0.013 | -0.006* | -0.009 |
| | | | (0.004) | (0.008) | (0.003) | (0.006) |
| Female | -0.197** | -0.113** | -0.183** | -0.194** | -0.105** | -0.110** |
| | (0.00734) | (0.005) | (0.008) | (0.007) | (0.006) | (0.006) |
| | | -0.229** | 1.335** | 1.375** | -0.219** | -0.166** |
| Constant | 1.315** | (0.036) | (0.066) | (0.068) | (0.036) | (0.036) |
| | (0.0661) | | | | | |
| | | 86,937 | 86,924 | 86,924 | 86,924 | 86,924 |
| Observations | 86,937 | 0.113 | 0.209 | 0.206 | 0.116 | 0.115 |
| R-squared | 0.203 | -0.113** | -0.183** | -0.194** | -0.105** | -0.110** |

**Note:** The sample is restricted to individuals that work full-time (i.e. more than 30 hours a week) and have indicated their personality at least once across the panel. The sample includes individuals in white-collar occupations only. The outcome variables are the logarithm of monthly wages or the probability of being in the top income quintile (i.e. the top 20% of the income distribution). The independent variable are either being female and/or the Big Five personality traits either standardised to have a mean of 0 and a standard deviation of one or a dummy variable that equals one if the individual is in the top tertile of the respective personality trait distribution. Basic controls include age, age squared, education, wave fixed effects, region fixed effects and the logarithm of job hours. The regressions are clustered at the individual level. Robust standard errors are in parentheses. ** $p<0.01$, * $p<0.05$

In a next step we add occupation controls to the regression to see whether the within occupation rewards to gender and personality differ. Average effects of personality on wages do not account for the fact that occupational sorting occurs based on personality (Mueller and Plug 2006; Cobb-Clark and Tan 2011) and assume that personality is valued equally across occupations and person type (K. John and Thomsen 2014), which seems unlikely given that occupations vary significantly in tasks and requirements. Further, average effects of personality

on wages omit occupational sorting but there is evidence that, for example, risk preferences, which are more prevalent in women, impact selection into stable but lower paid occupations (Bertrand 2011). We hence add occupation controls for all two-digit code occupations in our baseline regressions. As per Table 6 below, the gender gap decreases when including occupation controls in the simple regression of wages on gender from -0.197 log points without occupation controls to -0.182, which is in line with previous literature that finds even larger decreases of the gender wage gap after adding occupation controls (Goldin 2014). Specifications (13) to (16) add either the standardised or the top tertile personality variables to the regression. We find supporting evidence that personality coefficients change once we include occupation controls, which supports the hypothesis that sorting occurs based on personality and that men and women with the same personality traits sort into occupations at different rates (Cobb-Clark and Tan 2011). The gender gap when running a regression of our main outcome variable the top income quintile including personality tertile controls and occupation is a -0.118 percentage points difference.

**Table 6:** Individual level regression of wages on gender and Big Five traits including occupation controls

| | (11) Log hourly wage | (12) Top income quintile | (13) Log hourly wage | (14) | (15) Top income quintile | (16) |
|---|---|---|---|---|---|---|
| Outcome: | | | | | | |
| Gender, personality variable and occupation: | Gender Occupation | | Gender Standardised personality Occupation | Gender Top tertile personality Occupation | Gender Standardised personality Occupation | Gender Top tertile personality Occupation |
| Agreeableness | | | -0.028** | -0.036* | -0.016** | -0.036** |
| | | | (0.005) | (0.012) | (0.003) | (0.006) |
| Conscientiousness | | | 0.008* | 0.012 | 0.005 | -0.004 |
| | | | (0.003) | (0.007) | (0.003) | (0.006) |
| Extraversion | | | 0.001 | 0.021* | 0.000 | 0.012* |
| | | | (0.004) | (0.009) | (0.002) | (0.007) |
| Neuroticism | | | -0.031** | -0.031* | -0.018** | -0.013* |
| | | | (0.005) | (0.011) | (0.002) | (0.005) |
| Openness | | | -0.005 | -0.008 | -0.004 | -0.006 |
| | | | (0.003) | (0.008) | (0.004) | (0.007) |
| Female | -0.182** | -0.121** | -0.168** | -0.177** | -0.113** | -0.118** |
| | (0.020) | (0.009) | (0.018) | (0.019) | (0.009) | (0.009) |
| 11: Legislators & Senior Officials | 0.176** | 0.016** | 0.170** | 0.165** | 0.013** | 0.012* |
| | (0.005) | (0.004) | (0.005) | (0.005) | (0.004) | (0.004) |
| 12: Corporate managers | 0.120** | 0.038** | 0.109** | 0.106** | 0.031** | 0.034** |
| | (0.012) | (0.007) | (0.011) | (0.011) | (0.007) | (0.007) |
| 13: Managers of small enterprises | -0.244** | 0.101** | -0.250** | -0.244** | 0.098** | 0.100** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | (0.016) | (0.007) | (0.016) | (0.015) | (0.007) | (0.007) |
| 21: Physical, mathematical and engineering science professionals | 0.143** | 0.011 | 0.139** | 0.140** | 0.008 | 0.009 |
| | (0.011) | (0.009) | (0.010) | (0.011) | (0.009) | (0.009) |
| 22: Life science and health professionals | 0.276** | 0.003 | 0.267** | 0.275** | -0.003 | 0.002 |
| | (0.008) | (0.005) | (0.008) | (0.007) | (0.006) | (0.006) |
| 24: Other professionals | 0.059** | 0.029** | 0.055** | 0.044** | 0.027** | 0.027** |
| | (0.007) | (0.004) | (0.007) | (0.007) | (0.004) | (0.004) |
| 31: Physical and engineering science associate professionals | -0.028* | 0.063** | -0.034* | -0.031* | 0.059** | 0.061** |
| | (0.012) | (0.007) | (0.012) | (0.012) | (0.007) | (0.007) |
| 32: Life science and health associate professionals | 0.041* | 0.097** | 0.036 | 0.043* | 0.094** | 0.096** |
| | (0.016) | (0.009) | (0.016) | (0.017) | (0.008) | (0.008) |
| 34: Other associate professionals | -0.058** | 0.088** | -0.063** | -0.069** | 0.085** | 0.086** |
| | (0.013) | (0.006) | (0.013) | (0.013) | (0.006) | (0.006) |
| Constant | 1.535** | -0.307* | 1.546** | 1.488** | -0.298* | -0.246 |
| | (0.169) | (0.126) | (0.170) | (0.158) | (0.124) | (0.119) |
| Observations | 86,937 | 86,937 | 86,924 | 86,924 | 86,924 | 86,924 |
| R-squared | 0.218 | 0.120 | 0.223 | 0.240 | 0.123 | 0.122 |

**Note:** The sample is restricted to individuals that work full-time (i.e. more than 30 hours a week) and have indicated their personality at least once across the panel. The sample includes individuals in white-collar occupations only. The outcome variables are the logarithm of monthly wages or the probability of being in the top income quintile (i.e. the top 20% of the income distribution). The independent variable are either being female and/or the Big Five personality traits either standardised to have a mean of 0 and a standard deviation of one or a dummy variable that equals one if the individual is in the top tertile of the respective personality trait distribution. Occupation controls are included that are dummies equal to one for each of the two-digit code occupations of white-collar occupations. Basic controls include age, age squared, education, wave fixed effects, region fixed effects and the logarithm of job hours. The regressions are clustered at the occupation level. Robust standard errors are in parentheses. *** $p<0.01$, * $p<0.05$

The findings from above associations match findings from previous studies that focused on the effect of personality at the individual level and also finds moderate but statistically significant effects of all of the Big Five personality traits on wages (Nyhus and Pons 2005; Heineck 2011; Nandi and Nicoletti 2014; Collischon 2020). It further highlights that personality coefficients change when including gender and/or occupation controls, which motivates running our subsequent analyses at the occupation level rather than on average. Individuals do receive different rewards depending on their personality but regressions at the individual level fail to

explain why that is the case. We hence test whether there are differential rewards to personality by gender across occupations.


## 3. Main specification

This study tests whether there are differential rewards to personality by gender. In the main regression, the dependent variable is a dummy of the top income quintile and the independent variable is an interaction between the dummy of the top tertile of one of the standardised Big Five traits, occupation fixed effects and gender. We run a linear regression rather than a nonlinear model as interpreting marginal effects for interactions in nonlinear models is problematic (Norton, Wang, and Ai 2004) and for the straightforward interpretability of the results. We further choose to analyse the top tertile of the standardised Big Five traits for its easier interpretability in the interaction term and because our study focuses on rewards to strong personality types. We focus on the following specification:

$$income\ quintile_{ijt} = \chi'P_{it} * O_{ijt} * F_i + \gamma'I_{ijt} + \alpha'BigFive_{ijt} + \beta'O_{ijt} + \delta'C_{it} + e_{jit} \quad (1)$$

where *income quintile* is a dummy variable that equals 1 if employee *i* in occupation *j* at time t is in the top income quintile of the logarithm of inflation-adjusted hourly wages and zero otherwise. $P_{it} * O_{it} * F_i$ is an interaction of one of the five binary personality indicators $P_{it}$ that equals one if an individual is in the top tertile of the respective personality trait and zero otherwise, occupation fixed effects $O_{it}$ and a female dummy $F_i$ that equals one if an individual is female and zero otherwise. $I_{ijt}$ is a vector of the different sub-interactions we control for: the interaction between female and occupation fixed effects, the interaction between female and the respective personality and the interaction between occupation fixed effects and the respective personality. We restrict the analysis to white-collar occupations only because there is on average a greater homogeneity in tasks across gender in those occupations. Equation (1) hence relates the likelihood of being in the top 20 per cent of the income bracket to one of the five personality binary indicators interacted with the individuals' own occupation fixed effects and gender. $BigFive_{it}$ is a vector all five personality binary indicators. $O_{ijt}$ are individual occupation fixed effects for each two-digit code occupation *j* at the individual level. $C_{it}$ is a vector of individual controls, namely female, age, age-squared, wave fixed effects, education, a logarithm of work hours, and region fixed effects. The standard error is $\varepsilon_{jit}$. Standard errors are clustered at the occupation level to control for within occupation autocorrelation and

heteroskedasticity. We run the regression five times, always controlling for all Big Five personality traits but interacting only one of these binary personality traits with occupation fixed effects and female in each regression to ensure sufficient degrees of freedom.

The interaction of the individual's personality trait with occupation fixed effects allows the relationship between that specific trait to differ for each occupation. The main coefficients of interest tell us whether an occupation rewards that particularly personality trait by gender. That is, they are a natural rank ordering of how each personality trait is rewarded in a particular occupation. We compare high and low intensity personality traits across men and women to ensure that we capture what is happening at the bottom of the personality variable distributions as well as at the top where high and low intensity by gender is a sum of the relevant coefficients resulting from the regression in (1) as explained in Table A-5 in the appendix.

## 4. Results

Figure 1 below illustrates the probability of making it to the top for each of the five personality traits of high and low intensity by gender for all two-digit occupations.[7] The larger the difference between high and low intensity across gender, the more one can say about differential rewards in an occupation. If, for example, high intensity agreeableness and low intensity agreeableness are on the same dot for men and for women (even if on a lower level), this means that while women are less likely to be in the top 20 income quintile overall, their level of agreeableness is still equally rewarded to that of men. The absolute difference between men and women then simply displays the gender wage gap. If low intensity agreeableness is more rewarded than high intensity agreeableness for men but the other way around for women, this points to systematic differences in rewards across gender.

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[7] The regression results can be found in Table A-6 in the appendix. The graphs are adjusted so that 'Male low intensity' becomes the reference category at zero by subtracting the 'Male low intensity' coefficient from all coefficients. This ensures comparability across data points. The reference occupation of the analysis is teachers. The choice of base category only shifts the data points but does not affect the interpretation of rewards that are relative to 'Male low intensity'. To remove the pure occupation difference between teachers and other occupations, we subtract the coefficient on occupation (i.e. the coefficient of male low intensity) from all coefficients.

**Figure 1:** Differential rewards to Big Five traits for men and women by occupation
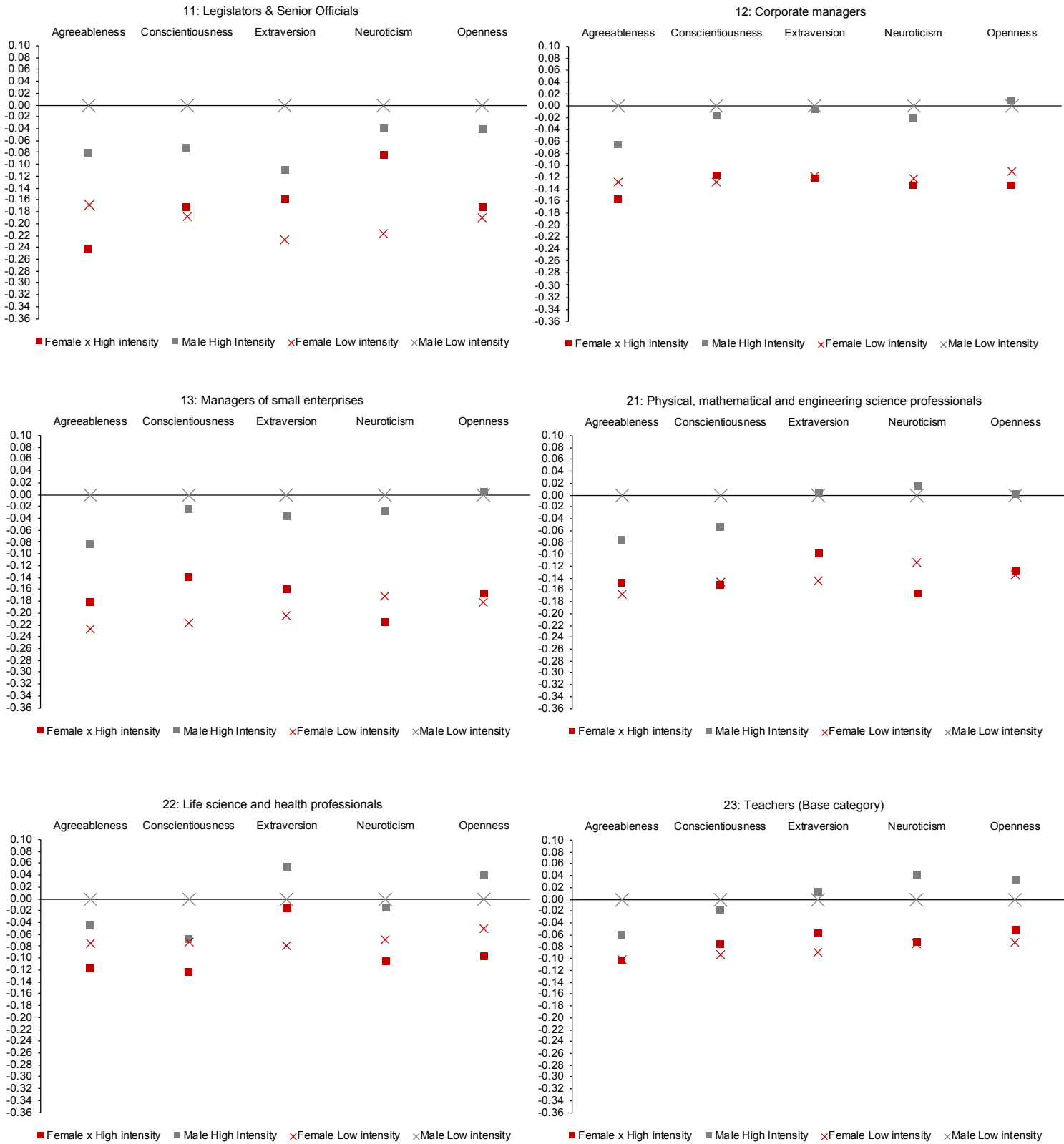
**24: Other professionals**
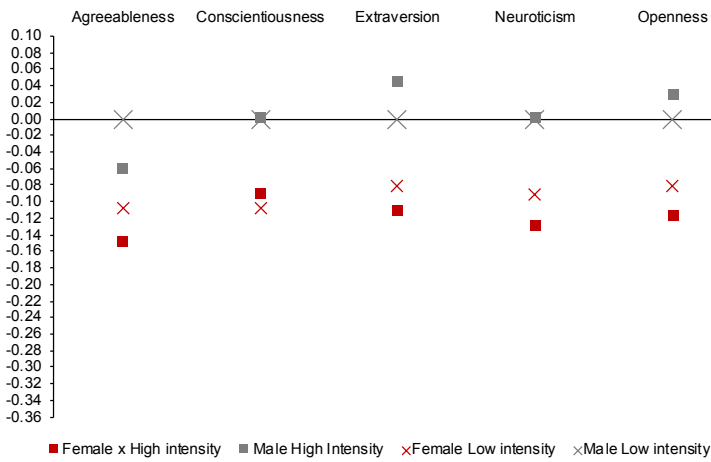
**31: Physical and engineering science associate professionals**

**32: Life science and health associate professionals**

**34: Other associate professionals**
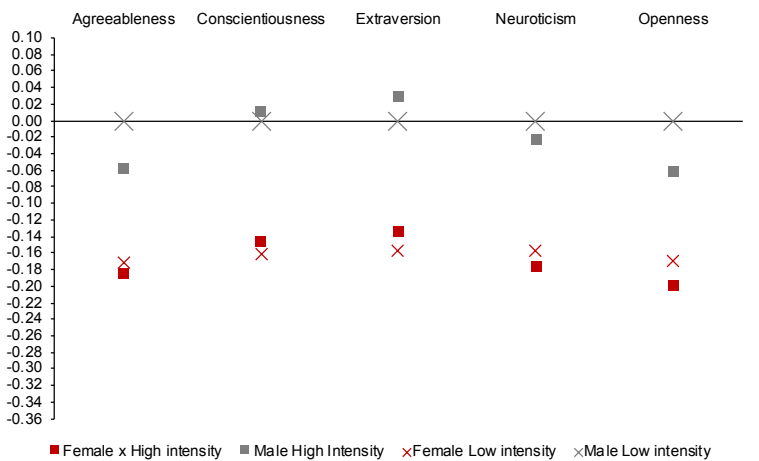
**Note:** Each graph displays one of ten two-digit code occupations. The graphs show the output of five regressions of equation (1); one for each Big Five trait. The grey dots di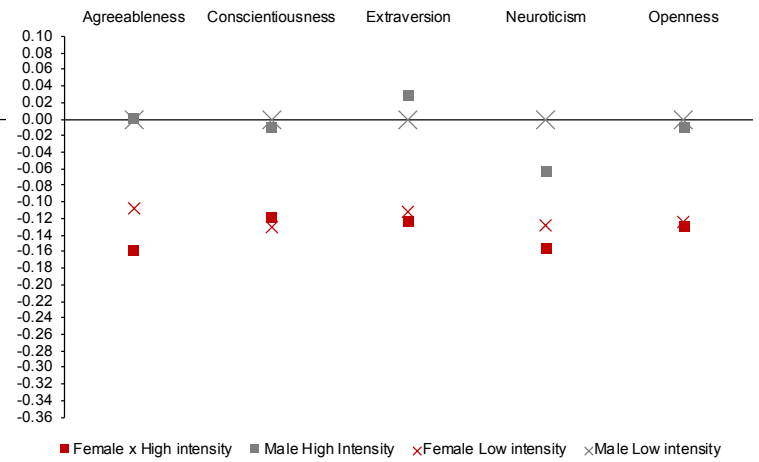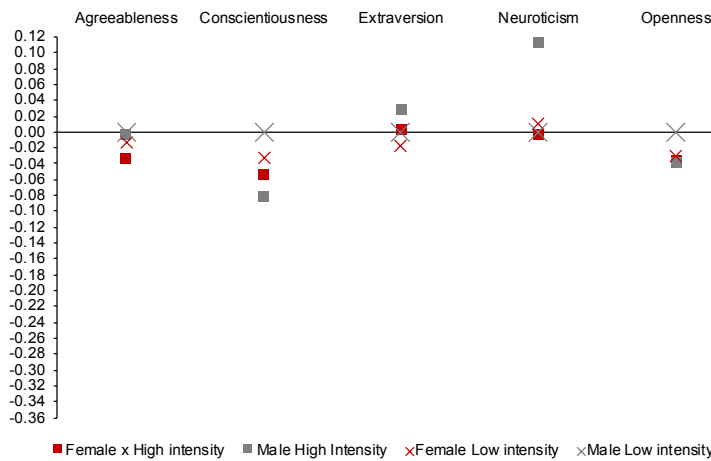splay male personality of high and low intensity and the red dots display female personality of high and low intensity. The regression coefficients show the impact of personality within an occupation and by gender on the probability of being in the top 20 per cent income quintile. The y-axis shows the size of the respective coefficient, namely the probability of being in the top income quintile. The data points have been adjusted by male low intensity to ensure comparability.

With the exception of the occupation 'Legislators and senior officials', the graphs of Figure 1 show that personality is largely unimportant for differential rewards across gender as regards to the likelihood of being in the top 20% income quintile with the only exception being agreeableness that is punished more for men on average.

As regards to men, the Male high intensity coefficients are often close to zero meaning that they are valued equally to the Male low intensity coefficients in the labour market. This means it does mostly not matter for men whether they score high or low in a respective personality

trait for the likelihood to be a top earner in a white-collar occupation. The exception is agreeableness that is largely punished for men but not so much for women. The punishment is as large as 0.08 percentage points for agreeable 'Managers of small enterprises' and on average 0.053 percentage points as compared to disagreeable men. Also, in the legislator occupation group, men are punished for scoring high in all five personality traits. For occupations with roughly similarly valued personality traits for men and women, the difference proxies the gender wage gap of between 0.11 and 0.18 percentage points in Table 6. An example is 'Corporate managers', where low levels of agreeableness seem to be valued in the occupation for men but there are no other large differences in the likelihood of making it to the top across gender.

For 'Managers of small enterprises' there is a small reward for women who are highly agreeable, conscientious and extroverted, and men are punished for being agreeable. This points to men and women being systematically treated differently in this specific occupation, albeit the differences are relatively small. Science professions exhibit marginally different personality rewards across gender: In the case of 'Physical, mathematical and engineering science professionals', men are punished for being agreeable and conscientious while women are rewarded for being extraverted and low on neuroticism. These effects do not seem to hold for science associates as 'Physical and engineering science associates', where women are punished for being agreeable but there are little differential rewards for other personality traits. In the occupation 'Life science and health professionals', men and women scoring low in agreeableness and conscientiousness and high in extraversion benefit. Men are further rewarded for being open for which women are punished. In the corresponding associate occupation group 'Life science and health associate professionals' extraversion is rewarded overall while agreeableness is punished for women as compared to men and neuroticism is highly rewarded for men as compared to women. Conscientiousness and openness are punished for men. In the base category 'Teachers', agreeableness is punished and neuroticism is rewarded for men. For the other personality traits, the rewards are similar across gender. In the 'Other professionals' occupation group, agreeableness is punished for both men and women and extraversion, neuroticism and openness are punished for women as compared to men. In the 'Other associate professionals' occupation, the only large difference in personality rewards is for men who are punished for being agreeable.

The most pronounced occupation in terms of differences in rewards is 'Legislators and senior officials'. This occupation is most equally distributed occupation in terms of gender balance with a close to 50 per cent female share. As per the graph for 'Legislators and senior officials' above, extraverted and neurotic females are relatively more likely to be among the top earners within this occupation group. These traits give women a wage advantage that narrows the gender pay gap. Conscientious and open men, however, are relatively less likely to be among the top earners within this occupation group.

## 5. Discussion and Conclusion

In the workplace personality could be rewarded because it enhances an individual's productivity and their wage bargaining power, which we call legitimate rewards. Personality could also be rewarded differently depending on a person's innate characteristics such as their gender, which we call inefficient rewards. Testing inefficient rewards is difficult, as it is hard to disentangle which effects influence rewards. Gender is easily observable, fixed over time and the gender wage gap has been studied extensively. Further, one can imagine that there are differential rewards for men and women based on personality because of e.g., taste-based discrimination or gender norms. We hence chose gender to look at inefficient personality rewards.

Using the UKHLS panel data set from the UK, we explore whether women with the same level of personality traits have a different likelihood of making it to the top as compared to men. We estimate the probability of being in the top income quintile for men and women and compare across high versus low levels of different personality traits. This study looks at the likelihood of being in the top income quintile as this is where the unexplained gender wage gap has been most persistent over time (Blau and Kahn 2017). We further focus on white-collar occupations as they are more homogeneous with respect to the tasks performed by men and women. We look at the Big Five personality trait as a measurement of personality, being in the top tertile of each of the Big Five personality traits compared to the middle and bottom tertile.

By examining whether men and women have different income premiums across five personality traits we are essentially asking whether the phenomenon of differential expectations of male and female personalities is observed in the labour market. The results of our study mainly suggest that personality traits are overall not inefficiently rewarded or

punished by gender. There are, however, some exceptions to this finding. First, we find that men are punished for being agreeable and often more than women while disagreeableness benefits men more than women. That is in line with previous research with similar findings (Mueller and Plug 2006; Judge, Livingston, and Hurst 2012). In particular, Judge, Livingston and Hurst (2012) explain that this finding reflects conventional gender roles. That is, men who are agreeable disconfirm the norm of men being, for example, more competitive or self-interested than women. Women in comparison are not punished as much for being agreeable but also do not share the same gains from being disagreeable as men. This shows that being disagreeable has a different signalling effect in men than in women rather than an intrinsic value in the labour market. Though overall, agreeableness has a negative association with wages.

Second, we find that female and male 'Legislators and senior officials' with the same personality trait intensity face a different likelihood of making it to the top, an occupation that consists of the three-digit code occupations of 'Legislators and senior government officials', 'Senior officials of special-interest organisations' and 'Directors and chief executives'. Our finding is that extraverted and neurotic females get inefficient rewards to personality by gender in this specific occupation. And conscientious and open males get inefficient punishment to personality. This finding is in line with our hypothesis at the start of this study that there could be inefficient rewards to personality due to, for example, discrimination in the labour market. The reason why we find differential rewards for men and women in the 'Legislators and senior officials' occupation specifically could be that the success of political leaders and senior officials often depends on electoral success (i.e., voters) and company shareholders rather than employers, who are bound under employment law in the UK. Personality traits have been shown to be particularly important in this specific occupation for success (Nai and Toros 2020). Also, this occupation also has the largest difference in mean hourly wages across gender. Eagly and Sczesny (2009) argue that while there is increasing gender parity in legislator occupations, women in those occupations are still concentrated at lower-level roles in management while men occupy positions in which they themselves can determine wages, which explains large gender pay gaps (Eagly and Sczesny 2009). This may explain why personality traits are rewarded differently for men and women. While both of those explanations require further analysis, it is important to highlight that our sample for this occupation is small with just 375 unique individual observations and our findings should hence be verified in a larger sample.

For the remaining two-digit code occupations we do not find clear patterns in differential rewards. A limitation to our study is that two-digit code occupations consist of a multitude of often very different three-digit code occupations. As example, the 'Associate professionals' occupation group consists of a mix of eight very different three-digit code occupations. Perhaps the tasks across those occupations are not as homogeneous as previously assumed and there may be sorting based on personality into three-digit code occupations. Unfortunately, our sample size is not sufficient to run the same analysis at the three-digit code occupation level to account for such measurement issues.

Overall, we find very small differentials across gender and the gender wage gap dominates our analysis. One reason why we only find small personality differentials across gender could be our choice of the personality variable. We chose to look at the top tertile of each of the Big Five personality traits as compared to the bottom distribution and the middle of the distribution as we were interested in the rewards to being highly agreeable, conscientious, extravert, neurotic or open. Past literature has, however, also argued that rewards to personality traits may stem from slightly above average personality traits rather than high (or low) levels of personality traits (Mueller and Plug 2006; Heineck 2011). To account for effects stemming from the middle of the personality variable distribution, we change our personality variable to above and below the mean of the respective personality variable. When running equation (1) using a dummy for personality that is equal to one if the individual scores above average levels of the respective trait and zero if they score below, a very similar picture to Figure 1 above arises with personality overall not being rewarded for men, differentials for women being small and the gender wage gap dominating.

This study finds that personality is not rewarded differently across occupations for men and women in terms of the likelihood of making it to the top income quintile except for agreeableness. Both high and low levels of the other four personality trait are punished for women as compared to men; a finding that reflects the gender wage gap irrespective of personality traits. Our finding is interesting, as it shows that while the underlying mechanisms of personality are difficult to identify, personality wage associations do not seem to result from differential rewards by gender. But agreeableness is punished more for men than women, which confirms our hypothesis that there are differential rewards to personality due to the expectation to adhere to one's social identity. Further research could explore whether this agreeableness gap is closing over time as gender norms become less prevalent and teamwork

and sociability (i.e., skills related to high agreeableness) are increasingly demanded in the labour market. Overall, our research complements the literature that analysed personality effects without looking into the mechanisms of such associations.

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# Appendix A

**Table A-1:** Average Big Five personality traits by white-collar occupations

|  | Agreeableness | Conscientiousness | Extraversion | Neuroticism | Openness |
|---|---|---|---|---|---|
| 11 Legislators and senior officials | 5.497 | 5.629 | 4.850 | 3.402 | 5.077 |
|  | (0.984) | (0.938) | (1.138) | (1.234) | (1.032) |
| 12 Corporate managers | 5.461 | 5.608 | 4.682 | 3.321 | 4.756 |
| 13 Managers of small enterprises | (0.979) | (0.957) | (1.252) | (1.290) | (1.099) |
|  | 5.495 | 5.573 | 4.692 | 3.324 | 4.679 |
|  | (1.059) | (1.001) | (1.246) | (1.330) | (1.243) |
| 21 Physical, mathematical and engineering science professionals | 5.388 | 5.394 | 4.316 | 3.415 | 4.895 |
|  | (0.982) | (0.939) | (1.258) | (1.289) | (1.092) |
| 22 Life science and health professionals | 5.506 | 5.576 | 4.334 | 3.456 | 4.673 |
|  | (1.012) | (0.954) | (1.327) | (1.319) | (1.097) |
| 23 Teaching professionals | 5.702 | 5.610 | 4.711 | 3.662 | 5.107 |
|  | (0.896) | (0.970) | (1.263) | (1.358) | (1.122) |
| 24 Other professionals | 5.505 | 5.480 | 4.625 | 3.571 | 4.856 |
|  | (0.999) | (0.972) | (1.319) | (1.305) | (1.129) |
| 31 Physical and engineering science associate professionals | 5.428 | 5.460 | 4.452 | 3.453 | 4.755 |
|  | (0.984) | (0.938) | (1.138) | (1.234) | (1.032) |
| 32 Life science and health associate professionals | 5.758 | 5.669 | 4.720 | 3.606 | 4.619 |
|  | (0.905) | (0.965) | (1.302) | (1.312) | (1.133) |
| 34 Other associate professionals | 5.568 | 5.529 | 4.758 | 3.544 | 4.824 |
|  | (0.985) | (1.009) | (1.272) | (1.351) | (1.190) |

**Note:** 1991-2018. White-collar occupations include the top 10 white-collar ISCO-88 two-digit occupations. Occupations with an ISCO-88 one-digit code of 1, 2 or 3 is regarded as high skilled white-collar (https://www.eurofound.europa.eu/surveys/ewcs/2005/classification). Occupation '33: Teaching associate professionals' has been merged with occupation '23: Teaching professionals' to ensure a sufficient sample size for later analyses.

**Table A-2:** Summary statistics

|  | Male | Female | Total |
|---|---|---|---|
| Labour Market Outcomes: | | | |
| Hourly wage - inflation adjusted | 18.04 | 14.87 | 16.37 |
|  | (16.66) | (11.37) | (14.21) |
| Log hourly wage – inflation adjusted | 2.749 | 2.579 | 2.659 |
|  | (0.552) | (0.498) | (0.531) |
| Big Five personality traits: | | | |
| Agreeableness | 5.391 | 5.687 | 5.541 |
|  | (1.008) | (0.926) | (0.979) |
| Conscientiousness | 5.436 | 5.679 | 5.558 |
|  | (0.982) | (0.956) | (0.977) |
| Extraversion | 4.466 | 4.826 | 4.647 |
|  | (1.264) | (1.268) | (1.279) |
| Neuroticism | 3.216 | 3.731 | 3.476 |
|  | (1.273) | (1.330) | (1.327) |
| Openness | 4.9 | 4.736 | 4.817 |
|  | (1.116) | (1.174) | (1.148) |
| Individual characteristics: | | | |
| Age | 43.35 | 41.91 | 42.62 |
|  | (11.78) | (11.30) | (11.56) |
| Female | 0.00 | 1.00 | 0.51 |
|  | 0.00 | 0.00 | (0.50) |
| Education: Higher/first degree | 0.446 | 0.476 | 0.461 |
|  | (0.497) | (0.499) | (0.498) |
| Job hours | 38.39 | 32.53 | 35.31 |
|  | (8.284) | (9.556) | (9.441) |
| Log of job hours | 3.614 | 3.417 | 3.51 |
|  | (0.312) | (0.419) | (0.385) |

**Note:** The sample is restricted to individuals that work full-time (i.e. more than 30 hours a week) and have indicated their personality at least once across the panel. The sample includes white-collar occupations only. The hourly wages are adjusted to the Consumer Price Index in the UK of 2015 as published by the ONS. The Big Five personality traits are the non-standardised version of the seven-point Likert scale. Education includes having a higher or first degree (1/0). Job hours include the hours worked regularly (including overtime work).

**Table A-3:** Big Five personality questions

| | Personality Questions UKHLS |
|---|---|
| | Respondent … |
| Conscientiousness | Does a thorough job |
| | Does things efficiently |
| | Tends to be lazy* |
| Extraversion | Is talkative |
| | Is reserved* |
| | Is outgoing, sociable |
| Agreeableness | Is sometimes rude to others* |
| | Has a forgiving nature |
| | Considerate and kind |
| Neuroticism | Worries a lot |
| | Gets nervous easily |
| | Is relaxed and handles stress well* |
| Openness | Is original, comes up with ideas |
| | Values artistic, aesthetic experience |
| | Has an active imagination |

**Note:** All questions were answered on a scale from 1=Strongly disagree to 7=Strongly agree.
* Indicates that the answer was reversely coded.

**Table A-4:** Occupation classification using ISCO-88 three-digit code occupations

| Two-digit occupations | Three-digit occupations |
| --- | --- |
| 11: Legislators and senior officials | |
| | 111: Legislators and senior government officials |
| | 114: Senior officials of special-interest organisations |
| | * 121: Directors and chief executives |
| 12: Corporate managers | |
| | 122: Production and operations managers |
| | 123: Other specialist managers |
| 13: Managers of small enterprises | |
| | 131: Managers of small enterprises |
| 21: Physical, mathematical and engineering science professionals | |
| | 211: Physicists, chemists and related professionals |
| | 212: Mathematicians, statisticians and related professionals |
| | 213: Computing professionals |
| | 214: Architects, engineers and related professionals |
| 22: Life science and health professionals | |
| | 221: Life science professionals |
| | 222: Health professionals (except nursing) |
| | 223: Nursing and midwifery professionals |
| 23: Teaching professionals | |
| | 231: College, university and higher education teaching professionals |
| | 232: Secondary education teaching professionals |
| | 233: Primary and pre-primary education teaching professionals |
| | 234: Special education teaching professionals |
| | 235: Other teaching professionals |
| | * 332: Pre-primary education teaching associate professionals |
| | * 333: Special education teaching associate professionals |
| | * 334: Other teaching associate professionals |
| 24: Other professionals | |
| | 241: Business professionals |
| | 242: Legal professionals |
| | 243: Archivists, librarians and related information professionals |
| | 244: Social science and related professionals |
| | 245: Writers and creative or performing artists |
| | 246: Religious professionals |

| | 247: Public service administrative professionals |
| --- | --- |
| 31: Physical and engineering science associate professionals | |
| | 311: Physical and engineering science technicians |
| | 312: Computer associate professionals |
| | 313: Optical and electronic equipment operators |
| | 314: Ship and aircraft controllers and technicians |
| | 315: Safety and quality inspectors |
| 32: Life science and health associate professionals | |
| | 321: Life science technicians and related associate professional |
| | 322: Health associate professionals (except nursing) |
| | 323: Nursing and midwifery associate professionals |
| | 331: Primary education teaching associate professionals |
| 34: Other associate professionals | |
| | 341: Finance and sales associate professionals |
| | 342: Business services agents and trade brokers |
| | 343: Administrative associate professionals |
| | 344: Customs, tax and related government associate professionals |
| | 345: Police inspectors and detectives |
| | 346: Social work associate professionals |
| | 347: Artistic, entertainment and sports associate professionals |
| | 348: Religious associate professionals |

**Note:** The data is from the Eurostat ISCO-88 classification. The list excludes Armed Forces (Three-digit code =100) and agriculture occupations (Three-digit codes: 611-615) as those have been dropped given the small sample size. Occupations indicated with a * have been recoded manually.

**Table A-5:** Definition of female and male high and low personality intensity

| Personality intensity | Coefficients on… |
|---|---|
| Female high intensity | (Personality x Occupation x Female) |
| | + (Personality x Occupation) |
| | + (Occupation x Female) |
| | + (Personality x Female) |
| | + Occupation fixed effects |
| | + Female |
| | + Personality |
| Male high intensity | (Personality x Occupation) |
| | + Personality |
| | + Occupation |
| Female low intensity | (Occupation x Female) |
| | + Occupation |
| | + Female |
| Male low intensity | Occupation |

**Note:** The table shows an overview of the relevant coefficients that fall out of regression (1) and how they are aggregated to show female versus male and high versus low intensity personality profiles.

**Table A-6:** Main regressions

| VARIABLES | Top 20% Highest Income earners | | | | |
|---|---|---|---|---|---|
| | Agreeableness | Conscientiousness | Extraversion | Neuroticism | Openness |
| 11: Legislators & Senior Officials x Personality x Female | -0.050*** | 0.063*** | 0.177*** | 0.224*** | 0.083*** |
| | (0.011) | (0.011) | (0.007) | (0.006) | (0.003) |
| 11: Legislators & Senior Officials x Personality | -0.023** | -0.060*** | -0.139*** | -0.086*** | -0.085*** |
| | (0.009) | (0.007) | (0.009) | (0.005) | (0.006) |
| 12: Corporate managers x Personality x Female | -0.023** | -0.008 | -0.017*** | 0.049*** | -0.020*** |
| | (0.009) | (0.012) | (0.004) | (0.010) | (0.003) |
| 12: Corporate managers x Personality | -0.005 | 0.002 | -0.017*** | -0.063*** | -0.024*** |
| | (0.009) | (0.011) | (0.003) | (0.009) | (0.004) |
| 13: Managers of small enterprises x Personality x Female | 0.070*** | 0.066*** | 0.063*** | 0.023** | 0.023*** |
| | (0.008) | (0.009) | (0.003) | (0.007) | (0.004) |
| 13: Managers of small enterprises x Personality | -0.025*** | -0.006 | -0.049*** | -0.070*** | -0.028*** |
| | (0.007) | (0.009) | (0.002) | (0.005) | (0.005) |
| 21: Physical, mathematical and engineering science professionals x Personality x Female | 0.037*** | 0.012 | 0.021*** | -0.027*** | 0.017*** |
| | (0.008) | (0.009) | (0.004) | (0.007) | (0.004) |
| 21: Physical, mathematical and engineering science professionals x Personality | -0.016* | -0.034*** | -0.009** | -0.028*** | -0.031*** |
| | (0.007) | (0.009) | (0.003) | (0.005) | (0.005) |
| 22: Life science and health professionals x Personality x Female | -0.056*** | -0.019* | -0.012 | 0.016 | -0.072*** |
| | (0.008) | (0.010) | (0.008) | (0.009) | (0.004) |
| 22: Life science and health professionals x Personality | 0.014* | -0.048*** | 0.041*** | -0.056*** | 0.005 |
| | (0.007) | (0.011) | (0.007) | (0.006) | (0.004) |
| 24: Other professionals x Personality x Female | -0.039*** | -0.021** | -0.094*** | -0.002 | -0.052*** |
| | (0.007) | (0.009) | (0.004) | (0.008) | (0.003) |
| 24: Other professionals x Personality | -0.001 | 0.022** | 0.032*** | -0.039*** | -0.005 |
| | (0.007) | (0.009) | (0.004) | (0.006) | (0.004) |

| | | | | | |
|---|---|---|---|---|---|
| 31: Physical and engineering science associate professionals x Personality x Female | -0.110*** | -0.015 | -0.062*** | 0.075*** | 0.018** |
| | (0.007) | (0.010) | (0.003) | (0.010) | (0.006) |
| 31: Physical and engineering science associate professionals x Personality | 0.060*** | 0.009 | 0.017*** | -0.106*** | -0.044*** |
| | (0.007) | (0.009) | (0.003) | (0.006) | (0.004) |
| 32: Life science and health associate professionals x Personality x Female | -0.078*** | 0.024** | -0.031*** | -0.089*** | 0.046*** |
| | (0.008) | (0.009) | (0.003) | (0.009) | (0.006) |
| 32: Life science and health associate professionals x Personality | 0.057*** | -0.062*** | 0.017*** | 0.071*** | -0.072*** |
| | (0.007) | (0.009) | (0.003) | (0.008) | (0.006) |
| 34: Other associate professionals x Personality x Female | -0.016** | -0.031*** | -0.025*** | 0.042*** | 0.043*** |
| | (0.007) | (0.009) | (0.004) | (0.007) | (0.004) |
| 34: Other associate professionals x Personality | 0.003 | 0.029** | 0.016*** | -0.065*** | -0.095*** |
| | (0.007) | (0.009) | (0.003) | (0.005) | (0.004) |
| Personality x Female | 0.060*** | 0.036*** | 0.020*** | -0.039*** | -0.013*** |
| | (0.007) | (0.010) | (0.002) | (0.007) | (0.003) |
| 11: Legislators & Senior Officials x Female | -0.070*** | -0.102*** | -0.148*** | -0.146*** | -0.126*** |
| | (0.011) | (0.008) | (0.007) | (0.008) | (0.008) |
| 12: Corporate managers x Female | -0.026* | -0.035** | -0.029*** | -0.047*** | -0.036*** |
| | (0.012) | (0.012) | (0.008) | (0.007) | (0.010) |
| 13: Managers of small enterprises x Female | -0.124*** | -0.124*** | -0.116*** | -0.097*** | -0.110*** |
| | (0.009) | (0.008) | (0.006) | (0.006) | (0.008) |
| 21: Physical, mathematical and engineering science professionals x Female | -0.066*** | -0.053*** | -0.055*** | -0.040*** | -0.061*** |
| | (0.011) | (0.011) | (0.008) | (0.007) | (0.009) |
| 22: Life science and health professionals x Female | 0.027** | 0.021* | 0.010 | 0.006 | 0.022** |
| | (0.010) | (0.010) | (0.007) | (0.006) | (0.008) |
| 24: Other professionals x Female | -0.007 | -0.015 | 0.008 | -0.017** | -0.009 |
| | (0.009) | (0.009) | (0.006) | (0.006) | (0.008) |
| 31: Physical and engineering science associate professionals x Female | -0.006 | -0.037*** | -0.022** | -0.054*** | -0.052*** |
| | (0.011) | (0.011) | (0.007) | (0.006) | (0.009) |
| 32: Life science and health associate professionals x Female | 0.089*** | 0.061*** | 0.073*** | 0.085*** | 0.042*** |

| | | | | | |
|---|---|---|---|---|---|
| | (0.009) | (0.009) | (0.006) | (0.005) | (0.009) |
| 34: Other associate professionals x Female | -0.070*** | -0.067*** | -0.068*** | -0.083*** | -0.096*** |
| | (0.009) | (0.009) | (0.006) | (0.006) | (0.008) |
| Agreeableness dummy | -0.060*** | -0.035*** | -0.035*** | -0.035*** | -0.034*** |
| | (0.009) | (0.006) | (0.006) | (0.006) | (0.006) |
| Conscientiousness dummy | -0.005 | -0.019* | -0.004 | -0.004 | -0.004 |
| | (0.006) | (0.010) | (0.006) | (0.006) | (0.006) |
| Extraversion dummy | 0.013* | 0.012* | 0.013** | 0.012 | 0.012 |
| | (0.007) | (0.007) | (0.005) | (0.007) | (0.007) |
| Neuroticism dummy | -0.012** | -0.012** | -0.012** | 0.042*** | -0.012** |
| | (0.005) | (0.005) | (0.005) | (0.006) | (0.005) |
| Openness dummy | -0.006 | -0.005 | -0.006 | -0.006 | 0.034*** |
| | (0.008) | (0.008) | (0.007) | (0.008) | (0.006) |
| 11: Legislators & Senior Officials | 0.063*** | 0.075*** | 0.102*** | 0.077*** | 0.100*** |
| | (0.010) | (0.008) | (0.006) | (0.007) | (0.007) |
| 12: Corporate managers | 0.059*** | 0.059*** | 0.063*** | 0.074*** | 0.074*** |
| | (0.012) | (0.012) | (0.009) | (0.008) | (0.011) |
| 13: Managers of small enterprises | 0.159*** | 0.154*** | 0.165*** | 0.167*** | 0.168*** |
| | (0.011) | (0.011) | (0.008) | (0.008) | (0.010) |
| 21: Physical, mathematical and engineering science professionals | 0.041*** | 0.045*** | 0.038*** | 0.044*** | 0.054*** |
| | (0.010) | (0.009) | (0.007) | (0.006) | (0.008) |
| 22: Life science and health professionals | -0.003 | 0.016 | -0.007 | 0.015* | 0.008 |
| | (0.010) | (0.010) | (0.008) | (0.007) | (0.009) |
| 24: Other professionals | 0.043*** | 0.037*** | 0.035*** | 0.052*** | 0.050*** |
| | (0.010) | (0.010) | (0.007) | (0.006) | (0.009) |
| 31: Physical and engineering science associate professionals | 0.070*** | 0.085*** | 0.083*** | 0.111*** | 0.109*** |
| | (0.012) | (0.012) | (0.009) | (0.009) | (0.011) |
| 32: Life science and health associate professionals | 0.013 | 0.048*** | 0.028** | 0.016* | 0.064*** |
| | (0.012) | (0.012) | (0.009) | (0.008) | (0.013) |
| 34: Other associate professionals | 0.133*** | 0.126*** | 0.129*** | 0.149*** | 0.174*** |
| | (0.011) | (0.011) | (0.008) | (0.008) | (0.011) |
| Female | -0.102*** | -0.094*** | -0.089*** | -0.074*** | -0.073*** |
| | (0.012) | (0.012) | (0.009) | (0.008) | (0.011) |
| Age | 0.029*** | 0.029*** | 0.029*** | 0.029*** | 0.029*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Age squared | -0.000*** | -0.000*** | -0.000*** | -0.000*** | -0.000*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Education dummy | 0.142*** | 0.141*** | 0.141*** | 0.142*** | 0.142*** |
| | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) |
| Log of job hours | -0.115*** | -0.114*** | -0.114*** | -0.114*** | -0.114*** |

|  | (0.028) | (0.028) | (0.028) | (0.028) | (0.028) |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| Constant | -0.264* | -0.265* | -0.274* | -0.284* | -0.295* |
|  | (0.126) | (0.128) | (0.127) | (0.127) | (0.132) |
|  |  |  |  |  |  |
| Observations | 86,924 | 86,924 | 86,924 | 86,924 | 86,924 |
| R-squared | 0.125 | 0.125 | 0.125 | 0.125 | 0.125 |

**Note:** Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The table shows the output of five regressions of equation (1); one for each of the Big Five personality traits. The regression coefficients show the impact of personality within an occupation and by gender on the probability of being in the top 20% income quintile. The regression includes controls age, age squared, an education dummy that is equal to one if the individual has a higher or first degree and zero otherwise, wave fixed effects, region fixed effects and the logarithm of hours worked on the job. We restrict the analysis to white-collar occupations (i.e. ISCO-88 codes 1-3).