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Does Personality Matter?
The Impact of the Big Five on the Migrant and Gender Wage Gaps

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Abstract

We investigate whether the Big Five Personality Dimensions contribute to explaining gender and migrant wage gaps by using a linked employer-employee dataset. We expand the scarce literature concerning personality traits and gender wage gaps in Germany and we provide first evidence for the relationship between the Big Five and the migrant wage gap. Our results reveal that the genders differ in their average personality traits, as do migrants and natives. Further, we find significant associations between the Big Five and wages. The magnitude of this relationship varies across the gender and the migratory status. The results of Oaxaca-Blinder wage decompositions suggest that the Big Five significantly contribute to explaining gender and migrant wage gaps.

Zusammenfassung

Anhand eines verknüpften Arbeitnehmer-Arbeitgeber Datensatzes wird untersucht, in wie weit die Big Five Persönlichkeitsmerkmale dazu beitragen die Lohnunterschiede zwischen Frauen und Männer ebenso wie zwischen Einheimischen und Migranten zu erklären. Wir erweiterten die bestehende Literatur hinsichtlich eines Lohnunterschieds zwischen Frauen und Männern und liefern erste Evidenz für einen Zusammenhang zwischen den Big Five und Lohnunterschiede zwischen Einheimi-schen und Migranten. Unsere Ergebnisse zeigen, dass sich beide Gruppen in ihren Durchschnittswerten in den Big Fives unterscheiden. Darüber hinaus lässt sich ein signifikanter Zusammenhang zwischen Persönlich-keitsmerkmalen und Löhnen fest-stellen. Der Einfluss variiert dabei zwischen den zwei Gruppen. Die Ergebnisse einer Oaxca-Blinder Lohnzerlegung deuten zusätzlich darauf hin, dass Persönlichkeitsmerkmale einen signifikanten Beitrag zur Erklärung des Lohnunterschieds zwischen den Geschlechtern als auch zwischen Migranten und Einheimischen liefern.

1 Introduction

We ask whether personality traits contribute towards explaining gender and migrant wage gaps. While, the traditional approach to determine wage differentials focuses on human capital and job-specific variables, it is also recognized that factors other than (cognitive) skills, experience and education are rewarded in the labor market. More recently, the idea that non-cognitive skills, and specifically personality traits, may play a role in wage determination and contribute to observable wage differentials has emerged in economics (Bowles, Gintis, and Osborne, 2001a, 2001b). Heckman, Stixrud, and Urzua (2006) go so far as to claim that some non-cognitive skills may be more important than cognitive skills for labor market outcomes of individuals. Furthermore, Blau and Kahn (2016) state that non-cognitive skills are regarded as one of the newer explanations for gender wage gaps and conclude that they account for a small to moderate amount of wage differentials. Accordingly, personality traits are regarded as a specific skill-set, which is remunerated in the labor market. We contribute to this new strand of wage differential explanations by swapping the Big Five Personality Dimensions into Bowles et al.'s framework. Few recent studies have done this, which is surprising as early research had already established a relationship between the Big Five and labor market outcomes (Barrick and Mount, 1991; Salgado, 1997).

The assumption that non-cognitive skills can explain wage gaps is an interesting approach, as wage differentials between employee groups remain persistent in industrialized economies, even when controlling for education and career choices, as well as occupations and industries. These wage differences are particularly pronounced for migrants and females, compared to natives and men respectively. For migrants, empirical findings suggest a wage gap between 8 percent and 20 percent in Germany, of which only a small part can be explained by differences in endowments (Aldashev, Almaty, and Thomsen, 2012; Constant and Massey, 2005; Lehmer and Ludsteck, 2011; Peters, 2008). In line with the gender wage gap research for Germany (Anger and Schmidt, 2010; Huffman, King, and Reichelt, 2016), the German Statistical Office reveals a 22 percent gender wage gap for 2010 (Destatis, 2015), however the adjusted wage gap is reduced to 7 percent (Destatis, 2013). The remaining part of the differential could indicate discrimination or simply still be unexplained by means of the standard covariates and including non-cognitive skills could alleviate the extent of observed wage gaps.

Thus far however, few economic studies have regarded non-cognitive traits as determinants of wages. These studies have commonly focused on locus of control, i.e. the extent to which an individual believes to have control over his life (Cebi, 2007; N. M. Fortin, 2008; Groves, 2005; Heckman et al., 2006; Semykina and Linz, 2007), in addition to risk aversion (Braakmann, 2009), self-esteem (N. M. Fortin, 2008; Heckman et al., 2006), aggression (Groves, 2005) or social skills and persistence (Lindqvist and Vestman, 2011). They support the assumption that non-cognitive skills are as important as cognitive abilities for labor market outcomes.

Even fewer economic studies have taken the 'Big Five Personality Traits' into account when regarding wage differentials. In psychology, the Big Five taxonomy of personality traits characterizes an individual's personality along five main factors: *Extroversion, neuroticism, conscientiousness, agreeableness* and *openness to experience*. We aim to expand the currently rather small body of economic literature for the gender wage gap with novel data. Thus far, no prior studies have regarded the implication of the Big Five for the migrant wage gap. We contribute to the literature by revealing first results concerning the relationship between these personality traits and the migrant wage gap in Germany. Further, by using a linked employer-employee dataset, we expand prior analyses to include both individual- and establishment-level data, whereas many previous studies are only based on individual-level data.

We reassess the extent of the wage gap and its possible explanations with a unique dataset, the Linked Personnel Panel (LPP) of the Institute for Employment Research (IAB) linked with the IAB-Establishment Panel Survey and individual-level administrative data. This dataset allows the explicit inclusion of previously intangible individual characteristics, the Big Five Personality Dimensions, as explanatory variables. Extending the traditional wage model to the behavioral approach developed by Bowles et al. (2001a) which includes non-cognitive skills, we look at different employee groups - migrants and natives, as well as men and women - to analyze the explanatory power of personality. In order to do this, we first investigate whether differences in personality traits exist between these groups and then analyze whether personality traits may contribute towards explaining wage differentials. We find that migrants and natives, as well as men and women, differ in some of their average personality scores. Furthermore, we show that the Big Five are associated with wages and that different traits play a role for each group. This result implies that some traits are rewarded or punished differently depending on the group regarded. Finally, we show that the Big Five contribute to explaining wage gaps in Germany and that controlling for personality traits in Oaxaca-Blinder decompositions can decrease the "unexplained" portion of wage differentials.

The paper is structured as follows: Section two presents a theoretical framework which integrates personality traits into the wage literature and gives an overview of the related literature. Section three describes the data and discusses methodological issues. Then, the results are presented and their implications are addressed. Section five reports robustness checks before section six concludes.

2   Theoretical Considerations and Related Empirical Literature

Traditionally studied in the field of psychology, non-cognitive skills and personality traits have received increased attention in economics in recent years. Thus far, one theoretical approach models non-cognitive traits in a wage framework. However, few studies exist that specifically regard the effects of personality traits on labor market outcomes.

2.1 Non-Cognitive Traits in a Wage Framework

Bowles et al. (2001a, 2001b) have created a theoretical wage framework that specifically includes non-cognitive traits. Their starting point is the empirical observation that factors other than human capital and skills are rewarded in the labor market. Therefore, they propose a behavioral model of earnings in which incentive-enhancing preferences, i.e. non-cognitive traits, are incorporated. The authors base their work on the existence of incentive problems similar to principal-agency theory, such that employers have to incentivize their employees in order to increase employee effort. This is where individual non-cognitive traits come into the framework. Bowles et al. (2001a, 2001b) assume that certain employee characteristics can facilitate incentive-setting schemes, as employees with different traits have different reactions to incentives. Through wage-setting, employers then reward favorable personality traits independently of traditional wage determinants such as human capital and job-specific factors.

In such a model, personality traits are included in a standard maximization problem. The employer chooses the wages and hours worked to maximize profits and, in line with efficiency-wage theory, it is assumed that higher wages elicit more effort. The employee then chooses his level of effort to maximize his utility. The model includes a parameter in the employee's utility function that captures personality traits and shifts the employee's response function. Thus, an increase in incentive-enhancing traits, or preferences, induces the employee to work harder at every wage rate. If otherwise identical employees have different levels of incentive-enhancing preferences and the employer is able to identify these differences, the employee with favorable traits is paid more. Bowles et al. (2001a, 2001b) use the degree of future orientation, personal efficacy and locus of control as examples for incentive-enhancing preferences which create differences between employee's marginal utility derived from work versus marginal disutility of effort.

Thus far, there are limited empirical tests of this behavioral approach. An overview of the early research on the consequences of personality traits can be found in Bowles et al. (2001a) and Nyhus and Pons (2005). In the recent literature, labor market outcomes of non-cognitive skills have been studied. Erez and Judge (2001), for example show that self-esteem, locus of control, generalized self-efficacy, and neuroticism are related to motivation and performance. Focusing on differences in cognitive and non-cognitive skills, Heckman et al. (2006) point out that locus of control and self-esteem impact labor market outcomes such as wages, schooling, work experience and occupational choice. Similarly, Krueger and Schkade (2008) find that personality traits influence occupational sorting, i.e. more gregarious workers prefer jobs with higher degrees of social interaction and are more satisfied when they are employed in jobs with high degrees of social interactions. Using the German Socio-Economic Panel Study (GSOEP) for 2007, Fietze et al. (2009; 2010)

additionally investigate the role of personality traits on career chances. While personality traits influence the probability of being in a leadership position[1], they also account for gender differences in career opportunities, as different personality traits are found to be important for the two genders concerning their advancement into leadership positions. Furthermore, S. Fietze (2011) also shows that personality traits influence job satisfaction. Finally, direct wage effects can for example be found for U.S. and UK females, for whom locus of control, aggression and withdrawal all have a significant negative effect on wages (Groves, 2005).

2.2 The Big Five and Migratory Status

There is some evidence that migrants and natives might differ in their average personality traits. This evidence corresponds to the assumption that migrants are self-selected and differ in their personality traits from people who stayed in their home country. Jokela (2009), for example, examines the influence of personality on migration patterns in the United States. His findings suggest that some personality traits such as openness to experience, low agreeableness and high extroversion are related to the migration probability within and between U.S. states, while conscientiousness and neuroticism do not influence the migration pattern. Silventoinen et al. (2008) find evidence for the self-selection of people who migrated. Their findings confirm that people with high extroversion were more likely to migrate but in contrast to Jokela (2009), they also determine an influence of neuroticism on migration patterns. B. Boneva et al. (1998) support the findings for agreeableness in an indirect way by analyzing the relationship between affiliation and migration probability. High affiliation motives, which are related to high agreeableness (Jokela, 2009) show a correlation with low desire to move to another country. Furthermore, higher achievement and power motivation also influence the probability to migrate (B. Boneva et al., 1998; B. S. Boneva and Frieze, 2001).

Robert R. McCrae et al. (1999) examine cultural differences in personality traits. They compare the Big Five for Germany, Italy, Portugal, Croatia and South Korea and show significant differences between these countries. Accordingly, Europeans and Americans generally score higher in extroversion than Asians or Africans (Robert R. McCrae and Terracciano, 2005). According to these findings, we assume that migrants differ in their personality traits compared to natives.

2.3 The Big Five and Gender

Reviews on gender differences in preferences and psychological attributes can be found in Croson and Gneezy (2009) and Bertrand (2011). The literature seems to suggest that women are both more agreeable and more neurotic than men. Further

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[1] The probability of being in a leadership position is higher for individuals with higher emotional stability, greater openness to experience and higher levels of conscientiousness, while no significant effects for agreeableness and extroversion are indicated.

differences can be found in competitive attributes, risk aversion, negotiation skills and social preferences such as altruism, inequality aversion and reciprocity.

Costa Jr, Terracciano, and McCrae (2001) demonstrate that across nations, women tend to score higher in neuroticism, extroversion, agreeableness and conscientiousness; with the highest difference found in neuroticism. Furthermore, gender differences are more pronounced in gender-egalitarian cultures. A possible explanation for these differences could be found in Social Role Theory, which predicts that gender roles are slow to change and men and women still occupy different roles (Eagly, 1987). Thus, gender differences in personality could reflect traditional gender roles in society. This idea is supported by Croson and Gneezy's (2009) conclusion that evidence exists for both the nature and nurture hypothesis of gender differences.

As the literature delivers some indication that employee groups differ in their personality traits, the next question to be asked is whether these differences matter for wages. As no prior literature exists for the relationship between the migrant wage gap and personality traits, the following section focuses on the gender wage gap only.

2.4 Prior Literature for the Relationship between the Big Five and Wages

For the US, Mueller and Plug (2006), as well as N. M. Fortin (2008) demonstrate that non-cognitive traits play a significant role in explaining gender wage gaps. N. M. Fortin (2008) does not examine the Big Five, however Mueller and Plug (2006) document that differences in the Big Five can explain 5 percent to 16 percent of the gender wage gap. In this study, men who were antagonistic, open and emotionally stable had earnings advantages over otherwise equal men. Women attained advantages for being conscientious and open. While the returns to agreeableness were different, positive returns to openness were similar across the genders.

Nyhus and Pons (2005) use Dutch data to find that emotional stability is positively associated with wages for both genders and that agreeableness is related to significantly lower wages for women. While the returns of the Big Five could vary between educational groups, it seems that the patterns of rewards for personality traits hold across all occupations (Nyhus and Pons, 2005). Viinikainen, Kokko, Pulkkinen, and Pehkonen (2010), find no gender differences, however, their results are based on few observations for Finland. Using the 2005 wave of the British Household Panel Study, Heineck (2011) examines the extent to which the Big Five affect wages. He finds a positive relationship between openness to experience and wages and a negative relationship between agreeableness and wages. For women, neuroticism is negatively associated with wages. The author determines no relationship for extroversion and earnings; however he finds a nonlinear association for conscientiousness. Using Australian data, D.A. Cobb-Clark and Tan (2011) examine whether differences in non-cognitive skills – locus of control, self-efficacy and the Big Five – influence occupational attainment and whether they contribute to explaining gender

wage differentials. They find that men and women with similar non-cognitive skills enter occupations at different rates, but that women's non-cognitive skills give them a slight wage advantage. Additionally, they report different results for the Big Five for each occupation.

Two[2] studies regard gender wage differentials and personality traits for Germany using the GSOEP. Heineck and Anger (2010) examine scores for the IQ, locus of control, reciprocity and the Big Five for the year 2006. Their results indicate that personality is an important predictor of earnings and they seem to affect men and women differently. For both men and women, an external locus of control leads to wage penalties. However, openness to experience seems to have positive effects for women in Mincer wage equations and negative effects for men, while the opposite holds for extroversion. Agreeableness is not associated with male wages, but has negative effects on female wages. Conscientiousness is always positive for men; however it is negative or insignificant for women. Neuroticism shows no statistical relation to wages for both genders. Also using the GSOEP for 2005, Braakmann (2009) looks at the Big Five for Germans between 25 and 55 years of age. His findings show that higher levels of conscientiousness and reciprocity are associated with a higher probability of being full-time employed for both genders, while high levels of agreeableness, neuroticism and external locus of control have the opposite effect. In a sample of full-time workers, higher levels of openness to experience are only associated with higher wages for men, while extroversion has no significant effect for either gender. Conscientiousness and agreeableness are both negatively related to wages; however the negative effects of the latter are stronger for women, while the opposite holds for conscientiousness.

In summary, the prior literature comes to mixed results. It seems that the personality dimensions are subject to heterogeneous mechanisms, which may explain the inconclusive results of the literature.

2.5 Heterogeneous Effects of the Big Five on Labor Market Outcomes

Adapting Bowles' et al. (2001a, 2001b) framework, the Big Five can be seen as behavioral characteristics which may be rewarded or punished in the labor market. Conceptually, each trait can affect labor market outcomes differently: Individuals prone *to neuroticism* may be less suited for complex and stressful jobs and be overall less productive than emotionally stable individuals. Both Salgado (1997) and Barrick and Mount (1991) find a positive effect of emotional stability on job perfor-

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[2] Also using the SOEP and analyzing the relationship between locus of control and low-wage mobility, the Big Five are used to control for possible correlations between locus of control and other non-cognitive skills in another study (Schnitzlein & Stephani, 2016). While the authors concentrate their analysis on locus of control, they do indicate that conscientiousness and agreeableness are positively related to the probability of being low-paid. Additionally, observed state dependence in low-wage employment can partly be explained by the Big Five.

mance. *Extroverted* individuals may be well suited to leadership roles, or in jobs with high levels of social interactions, thus the effects of extroversion could be dependent on occupation (Nyhus and Pons, 2005). *Conscientious* individuals are hard-working, thus conscientiousness is positively associated with job performance (Barrick and Mount, 1991; Judge, Higgins, Thoresen, and R., 1999; Salgado, 1997) as well as positively associated with wages, especially at the beginning of an employment relationship (Nyhus and Pons, 2005). However, extreme levels of conscientiousness or its opposite can be damaging (Heineck, 2011). *Openness to experience*, on the one hand, can be related to autonomy and non-conformity, which could be deterrent in the labor market. At the same time, it is related to intellect, flexibility and creativeness, which can be favorable labor market characteristics. Nyhus and Pons (2005), additionally find that autonomy, which is closely related to openness to experience, has a positive effect on wages as tenure increases. *Agreeable* individuals are well suited for teamwork and occupations with higher degrees of social interaction, thus agreeableness is generally considered an incentive-enhancing characteristic (Nyhus and Pons, 2005). However, agreeable individuals are at a disadvantage in wage negotiations.

2.6 Research Questions and Derived Hypothesis

Thus having reviewed the literature, we formulate three research questions and according hypothesis. First, we ask whether differences in personality traits exist between employee groups (Q1) and hypothesize that men and women, as well as migrants and natives differ in their average personality scores:

> *H1: Men and women differ in their average personality traits, as do migrants and natives.*

Second, we ask whether personality traits contribute towards explaining wages (Q2). We assume that personality traits have a direct, as well as an indirect wage effect. Concerning the direct wage effect, personality can be regarded as a bundle of productive traits or skills that are valued in the labor market. Accordingly, wages depend on the nature and the magnitude of the trait possessed, as well the return for each separate trait. Thus, the Big Five can result in productivity and job performance differences that are rewarded in the labor market.

Indirect wage effects can work through different channels: First, when we allow that the five traits are not equally productive across occupations and that individuals choose occupations that offer the highest rewards for their trait set, indirect wage effects can manifest through occupational sorting. Similarly, indirect wage effects can occur through education, as for example being open to experience increases the intent to attend a university (Peter and Storck, 2015) and personality traits can interact with family backgrounds to determine educational attainment (Lundberg, 2013). Third, wage bargaining effects can influence wage levels, as for example agreeable individuals generally do not demand high wages in wage negotiations. Finally, employer learning could play a role in so far as there is evidence that em-

ployers initially use observable characteristics, such as self-esteem and schooling, to determine wages and only learn about cognitive skills and motivation over time (Petre, 2014). Finally, coming from the employer's, customer's or co-worker's side, (taste-based) discrimination is possible.

We assume that personality traits are rewarded differently for different groups in the labor market. In combination with the employer learning theory, personality traits could have a large effect on wages specifically for migrants, due to the higher information insecurity and asymmetry. Thus, we hypothesize that for migrants, some traits such as openness to experience could be considered more important than for natives and that this could impact the observable wage differentials.

Condensing the heterogeneous evidence, we expect:

> *H2: Extroversion, conscientiousness and openness to experience have a positive relationship with wages, though the effects could vary across groups.*

> *H3: Neuroticism is punished, irrespective of migratory status or gender.*

> *H4: Following the wage negotiation arguments, being agreeable is not favorable to wages, also irrespective of the groups.*

Under the assumptions that employee groups differ in their average traits and that traits are not rewarded equally across employee groups in the labor market, we further ask whether controlling for personality traits contributes to explaining the migrant or the gender wage gaps in Germany (Q3) and anticipate that they do:

> *H5: The Big Five contribute to explaining the gender and migrant wage gaps.*

3 Data and Methods

3.1 Sample Description

The following analyses are based on novel linked employer-employee data of the IAB called the 'Linked Personnel Panel' (LPP). This dataset is a supplement to the renowned IAB-Establishment Panel Survey (BP), in which BP establishments are surveyed about additional topics.

The BP is a representative panel survey of Germany's labor demand (Fischer et al., 2008, 2009). Approximately 16,000 German establishments, representing all federal states, industries and sizes, have been surveyed annually since 1993 in West and 1996 in East Germany. The sample is drawn from all German establishments with at least one employee subject to social security.

The first wave of the LPP was carried out in 2012/2013 and consists of two parts: an employer and an employee survey (Broszeit and Wolter, 2015). The employer survey is a representative sample of 1,219 establishments who participated in the 2011

and 2012 waves of the BP and have more than 50 employees subject to social security. These establishments were surveyed about their human resources management, remuneration structure, values and corporate culture.

Additionally, a sample of employees of the participating establishments was drawn and 7,508 employees were surveyed about their personal characteristics, employment, work conditions, workloads and remuneration. The respondents were also surveyed on their gender, migration background, and personality. In addition, we are able to draw information from the Integrated Employment Biographies (IEB) of the IAB to further enrich the dataset with individual-level information on tenure and duration of unemployment, for those individuals who consented to linkage.

The data therefore provides unique opportunities for the analysis of the association between the Big Five and wages, which other data cannot provide. We are able to draw on establishment and individual information from different data sources. Consequently, we do not rely on only regarding one side of the coin, i.e. either the individual side or the employer side, as previous studies had to do.

We mainly use the employee part of the LPP in addition to structural establishment variables from the BP and the employer part of the LPP, as well as additional information from the IEB. After restricting our sample to those observations that have matches in all datasets and excluding marginally employed individuals from our sample, 5,693 individual observations working in 820 different establishments remain for our analyses. 13.4 percent of all individuals did not report their wages. Therefore, we draw on a regression technique and impute the missing cases separately for each of the two samples .

According to our research questions, two different samples are constructed. First, only male individuals living in West Germany are included in the migration sample. This is due to the small number of female migrants and migrants living in East Germany. Migrants are defined as individuals born outside of Germany . Overall, 349 male migrants and 2,705 male natives are included in our multivariate analysis. Second, in the gender sample, we exclude all migrants in order to gain a clear effect of the gender wage gap without convoluted migrant effects. In contrast to the migration sample, we do not exclude employees living in East Germany. However, we do exclude the individuals who have indicated having no or "other" schooling, as their number is negligible and they may confound the analysis. Therefore 3,596 men and 1,252 women are available for the gender analyses.

3.2 The Models and Methods

In a first step, we regard an extended Mincer Earnings Equation following Bowles et al. (2001a, 2001b):

$$\ln w_i = \beta_0 + \beta_1 M_i + \beta_2 P_i + \beta_3 X_i + \beta_4 F_i + \mu_i \qquad (1)$$

where $\ln w_i$ is the logarithm of the hourly wage, computed via the contractual[3] hours worked and the gross monthly wages[4]. M_i contains the traditional Mincer variables education, age and age squared. P_i consists of the Big Five Personality traits. Furthermore, X_i is a vector of control variables, such as individual and establishment characteristics. We regard the migration status and gender in two separate estimations, therefore the focal variables F_i are respectively a dummy indicating whether an employee is a native of Germany or a migrant; or a dummy indicating whether the individual is female or male. μ_i represents the error term.

In the second step, we use an Oaxaca-Blinder decomposition to break down the overall mean of the migrant or gender wage gap respectively (Blinder, 1973; Oaxaca, 1973). The decomposition has the following form:

$$\underbrace{\ln \overline{w^1} - \ln \overline{w^2}}_{\text{mean wage gap}} = \underbrace{(\overline{X^1} - \overline{X^2})\beta^1}_{\substack{\text{explained by} \\ \text{means of regres-} \\ \text{sors}}} + \underbrace{(\beta^1 - \beta^2)\overline{X^2}}_{\substack{\text{unexplained} \\ \text{"discrimination"}}} \tag{2}$$

where w denotes the hourly wages, X contains the variables of the wage equations, $\text{\ss}$ are the estimated coefficients and the superscripts 1 and 2 describe the status migrant/native, or male/female respectively. The main advantage of this method is to estimate the contribution in explaining the wage gap for each variable separately. The mean wage gap between the two respective groups can be decomposed in a part that is explained by the regressors and a part that remains unexplained and is often coined as "discrimination".

The Oaxaca-Blinder decomposition is subject to some limitations: Results vary with the base category chosen for categorical variables[5], decomposing differences in other statistics than the mean is not possible and it demands the assumption of a

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[3] If the contractual working hours were not reported, the missing values were replaced by the actual hours worked.

[4] Bonus payments are included.

[5] This phenomenon is also known as the "omitted group" or identification problem and leads to two main problems (Fortin et al. 2010): First, the reference point of the variable has to be chosen arbitrarily, which may lead to interpretation problems. Second, the overall effect of differences in the returns to the categories of the variable are affected due to the fact that different parts of the effect are found in the intercept. This means that in the "unexplained" part, the part assigned to group membership cannot be distinguished from the part attributed to differences in the coefficient of the base category. However, as Fortin et al. (2010) state, the overall wage structure effect is the same irrespective of the omitted category. Regardless of these issues, we chose to run Oaxaca-Blinder Decompositions for several reasons: First, as Fortin et al. (2010) summarize, "tentative solutions" have been proposed for the omitted group problem, however they come with their own set of problems, such as for example problems of comparability with other studies. Second, we are mainly interested in the overall wage effect and not the effects of the individual categories of variables. Our main focus lies on the contribution of the Big Five to the explanation of wage differentials. Thus, we do not aim to interpret the individual categories of explanatory variables, as they mainly serve as control variables.

linear relationship between the outcome variable and the explanatory variables (N. Fortin, Lemieux, and Firpo, 2010). Decomposing the mean differences thus only provides a representative description of the differences if the coefficients do not vary across the wage distribution. If, for example, different effects at the upper and lower parts of the wage distribution exist, the overall mean effect might be misleading. To check for this problem and to take possible differential effects across the wage distribution into account, we use an unconditional quantile regression approach by applying the Recentered Influence Function[6] (RIF) (Firpo, Fortin, and Lemieux, 2009). Thereby, we are able to compute coefficients for distributional statistics besides the mean (N. Fortin et al., 2010) and we can observe whether the Big Five's impact is different across the wage distribution.

Formally, we first compute the sample quantile $\hat{Q}_\tau$ and apply kernel methods to estimate the density at that point ($\hat{f}(\hat{Q}_\tau)$). As the RIF of a quantile Q_τ is given by

$$RIF(y; Q_\tau) = Q_\tau + \frac{\tau - I\{y \leq Q_\tau\}}{f_y(Q_\tau)} \qquad (3)$$

we have to plug in the sample estimates for Q_τ to obtain the Recentered Influence Function of each quantile. Term $I(.)$ in equation 3 is an indication function that takes the value one if the outcome variable is smaller or equal to the respective quantile (N. Fortin et al., 2010). Then, the RIF becomes the new dependent variable of the regressions. Thus, the main idea of this procedure is to estimate the effect of being a migrant or a female, as well as the effects of the Big Five and further controls on the percentiles of the RIF of the log hourly wages. Then, the impact of the variables of interest on the unconditional percentiles of the log hourly wage distribution is estimated using the prior regression (N. Fortin et al., 2010), i.e. the RIF of the log hourly wage distribution for the τth percentile is regressed on the explanatory variables by OLS. The advantage of this method over a standard quantile regression is that the unconditional percentiles of the wage distribution can be estimated, as opposed to the percentiles conditioned on every other explanatory variable. This means that we can estimate the impact of changing the distribution of the focal explanatory variables - migrant, female and Big Five - on the marginal distribution/quantiles of log hourly wages.

3.3 Mitigating Endogeneity Concerns

In all of the models described above, concerns of reverse causality could arise, as the labor market outcome is measured at the same time as the personality traits. These concerns can, however, be mitigated by research indicating that personality traits are predominantly stable throughout an individual's lifespan (Costa, Herbst, McCrae, and Siegler, 2000). More importantly for this study, the Big Five are con-

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[6] For a detailed description of the recentered influence function and its properties see Firpo et al. (2009). We also use their do-files for the RIF regressions found at: http://faculty.arts.ubc.ca/nfortin/datahead.html.

sidered to be stable after they have developed in childhood. The plaster hypothesis goes as far as to claim that all personality traits stop changing completely after 30 (Srivastava, John, Gosling, and Potter, 2003). While there is some evidence of slight changes in personality across the life span (Srivastava et al., 2003), personality traits are generally considered to be stable for working-age individuals (D. Cobb-Clark and Schurer, 2011). Moreover, rank-orders of individual personality are stable as well (Roberts and DelVeccio, 2000). Additionally, it has been shown that a large portion of 40%-60% of the personality dimensions is hereditary with a recent twin study claiming up to two thirds of the traits being hereditary (Bouchard and Loehlin, 2001; Jang, Llvesley, and Vemon, 1996; Kandler, Riemann, Spinath, and Angleitner, 2010). This finding furthermore emphasizes the stability of personality traits.

There is little evidence that adverse life events have an impact on the Big Five, and while labor market outcomes are found to be associated with personality changes, the individuals have to experience more than five adverse employment or income events for these events to have an effect (Deborah A. Cobb-Clark and Schurer, 2012). Overall, the largest accumulative effects of intensive employment- and income-related shocks across all Big Five amount to $1 for men and even less for women. Thus overall, Cobb-Clark and Schurer (2011; 2012) judge personality traits to be stable for working adults.

Taking into account this evidence, endogeneity issues could emerge when personality is altered by success or failure in the labor market. In this case, the estimated effects could be overstated and would have to be interpreted as upper bounds of the true personality effects. However, we assume that the problem of reverse causality can be regarded as negligible, as at least large parts of the examined personality traits are hereditary and thus relatively constant for adults. Our sample is restricted to the group of working adults with rather long tenure (compare Table 1 of the Appendix), therefore we can exclude recent personality altering labor market events. Furthermore, in our context, the act of migration itself could be considered as an adverse life event. However, there are few recent migrants in our sample and most importantly, we are interested in the effects of personality on wages after migration. Thus, for our analysis it is not important whether a migrant experienced a personality change upon migration, as we are only interested in the personality trait present when the job is acquired.

3.4 Descriptive Statistics

To gain an overview about the wages and Mincer variables that are included in our estimations, Table 1 provides summary statistics separately for the gender and migration sample[7]. The overall hourly wage means indicate supporting evidence of a wage gap between the different groups. As expected, West German native men earn the most. With around 22 Euros per hour, foreign men earn less than native

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[7]   Table 1 of the Appendix shows the full sample statistics.

men but still more than native women. With regard to the age structure, no major differences are visible between men and women. Only immigrant men are slightly younger than their native counterparts. The shares of education are almost equally distributed among migrant and native men. Some differences are observable between native men and women. Women have a higher share of secondary education of almost 50%, whereas, the share of women with a lower secondary education is far below of the men's share.

While these statistics do not indicate large differences between migrants and natives, a closer look at the migration sample is necessary to correctly evaluate the results of the analyses. Half of the migrants immigrated to Germany between 1990 and 1999. 25 percent came during the years 1980 and 1989, around 20 percent before the 1980s and recent migrants are represented scarcely in the dataset. Language barriers in the interviews should thus not be of concern. Additionally, more than half of the migrants are from Europe. Hence, as we are faced with a positive selection of migrants, we acknowledge that the wage gap observed in the data might be underestimated.

Table 1
Summary Statistic of Main Variables

| | Migration Sample | | | | Gender Sample | | | |
| | Migrants* | | Natives | | Women | | Men | |
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Hourly wage	22.06	9.59	28.01	14.51	19.12	10.99	25.72	14.47
Log hourly wage	3.02	0.39	3.23	0.45	2.84	0.46	3.12	0.50
Age	40.99	10.60	43.92	10.46	43.54	10.72	44.03	10.63
Education**								
Lower Secondary	0.35	0.48	0.35	0.48	0.17	0.38	0.31	0.46
Secondary School	0.36	0.48	0.31	0.46	0.49	0.50	0.38	0.48
Higher education	0.23	0.42	0.34	0.47	0.34	0.47	0.31	0.46
Region of origin***								
Europe	0.57	0.50						
Asia	0.41	0.49						
Date of migration****								
1970 - 1979	0.16	0.37						
1980 - 1989	0.25	0.43						
1990 - 1999	0.51	0.50						
Observations	349		2,705		1,252		3,596	

* *Note:* Only male migrants living in West Germany are regarded.
** *Note:* Observations with no education and other type of education were excluded for the sample of native men and women. Means and standard deviations for the categories "no education" and "other education" for the migration sample are not shown due to data security reasons.
*** *Note:* The country of origin is not available in more detail. Means and standard deviations for the category "rest" are not shown due to data security reasons.
**** *Note*: Means and standard deviations for the categories "before 1970" and "after 2000" for the migration sample are not shown due to data security reasons.
Source: Own computations. Results are weighted.

3.5 Description of the Big Five Personality Dimensions

The Big Five Personality Dimensions, also referred to as five factor model, is a concept from the field of psychology which postulates that human personality can be categorized into five global traits, each of which has underlying clusters of more specific factors. Table 2 shows the five traits and the characteristics commonly associated with the traits (Barrick and Mount, 1991).

Table 2
The Big Five Personality Dimensions

Trait	Characteristics associated with the trait
Extroversion - Intraversion	<u>sociable</u>, gregarious (vs. <u>reserved</u>), assertive, <u>talkative</u>, active
Neuroticism - Emotional Stability	anxious/<u>nervous</u> (vs. <u>relaxed</u>), depressed, angry, embarrassed, emotional, <u>worried</u>, insecure
Agreeableness - Antagonism	courteous/<u>considerate/kind</u> (vs. <u>rude</u>), flexible, trusting, good-natured, cooperative, <u>forgiving</u>, soft-hearted, tolerant
Conscientiousness - Lack of Direction	dependability: careful, <u>thorough</u>, responsible, organized, planful
	volitional aspects: hardworking (vs. <u>lazy</u>), achievement-oriented/<u>effective</u>, persevering
Open to Experience - Closed to Experience	<u>imaginative</u>, cultured, curious/<u>eager for knowledge</u>, <u>original</u>, broad-minded, intelligent, <u>artistically sensitive</u>

Notes: Underlined are the characteristics that were itemized in the LPP questionnaire and on which the analyses are based.
Source: Barrick and Mount (1991).

The Big Five were inquired about in a battery of items with answer options taken from a 5-point Likert scale[8]. Each personality dimension was covered with 3 items, with the exception of openness to experience, which was covered with 4 items. For each dimension, we created an index. We furthermore standardized[9] the trait to have a mean of zero and a standard deviation of one to make interpretations easier. Negative values of a trait, for example agreeableness, mean that the opposite of the trait, i.e. antagonism, is more distinct.

Before regarding descriptive statistics, it is important to check whether the variability in personality dimensions may arise from measurement error. Therefore, for each personality dimension, Cronbach's Alpha is calculated, which measures internal consistency of items, as well as the amount of interrelatedness between them. The values for Cronbach's Alpha are relatively low[10], however the size is directly related to the small number of items per personality trait (Gosling, Rentfrow, and Swann,

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[8]   See Table 2 of the Appendix for the individual items.

[9]   When creating the Big Five variables with a double standardization instead of a simple standardization, the regression and decomposition results do not change.

[10] Cronbach's Alphas in our estimation sample have the following values: agreeableness: 0.48; openness to experience: 0.55; conscientiousness: 0.58; extroversion: 0.61; neuroticism: 0.54. These are comparable to those found in the SOEP (Kampkötter, Mohrenweiser, Sliwka, Steffes, & Wolter, 2015) and similar Cronbach's Alphas can be found in Braakmann (2009); Heineck and Anger (2010); Mueller and Plug (2006).

2003). To further evaluate whether the items describe the desired traits, a factor analysis was run and the respective items loaded on the desired personality dimensions. Following these results, we are confident that the personality traits we created can be used for the analyses.

Next, we turn to the analysis for our first research question. Figures 1 and 2 of the Appendix show the personality trait distributions for migrant and native men as well as for male and female natives and the corresponding Tables 3 and 4 show the average Big Five scores.

Table 3
Average Big Five Scores by Continent of Origin

Land of Origin	Big Five				
	Extroversion	Neuroti-cism	Conscientious-ness	Agreeable-ness	Open-ness
Europe	-0.065	0.075	-0.018	0.016	0.03
Asia	-0.334	0.140	-0.271	-0.039	-0.202
Germany	-0.015	-0.128	-0.084	-0.063	-0.012

Source: Own computations.

For the migration sample, extroversion, neuroticism and conscientiousness are slightly differently distributed, whereas the distribution of agreeableness and openness do not differ. Testing for equality of distribution by running a Kolmogorov-Smirnov-Test supports these observations. The results from t-tests shown in Appendix Table 3 also demonstrate lower scores in extroversion and higher scores in neuroticism for foreign men. However according to the t-test results, foreign men do not significantly differ from native men in the remaining three traits. No large positive values of conscientiousness were observed for either sample, which might impact the estimation results.

According to the literature, migrants should not only differ from natives with respect to their personality traits; but personality traits should also vary according to nationalities. Table 3 presents the average Big Five for the continent of origin[11] and shows that migrants not only differ from Germans in general, but that non-German Europeans also differ from Asians.

A slightly different picture occurs for the gender sample. The distribution of extroversion, neuroticism, conscientiousness and agreeableness differ across genders as shown in Appendix Figure 2. Table 4 shows the average Big Five Scores for the genders. Women score significantly higher in extroversion, neuroticism, conscientiousness and agreeableness than men. Only the scores of openness are not significantly different according to t-tests (see Appendix Table 4). These means contribute to the conclusion that the genders differ in their average personality.

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[11] As the data is not more detailed, we cannot look deeper into average country of origin personality traits.

Table 4
Average Big Five Scores by Gender

Gender	Big Five				
	Extroversion	Neuroti-cism	Conscientious-ness	Agreeable-ness	Open-ness
Male	-0.001	-0.104	-0.046	-0.059	0.009
Female	0.093	0.144	0.175	0.144	0.013

Source: Own computations.

Taking the evidence for the densities and average Big Five scores by migratory status and gender into consideration, we conclude that our first hypothesis cannot be rejected, i.e. the employee groups differ in some of their average personality traits.

4   Results

4.1   Baseline Mincer Equations

After having presented the distribution of key variables in our samples, we now turn to the multivariate analysis. Drawing on Ordinary Least Squares (OLS), we test the relationship of migratory status and gender with the log hourly wage. In a first step, we estimate three consecutive regressions. First, a simple Mincer wage equation with a gender and migrant dummy is analyzed. In the second regression, main control variables are included. In our third model, we extend the Mincer wage equation by the personality trait indices.

Table 5 presents the results for the variables of interest. In all three regressions, foreign men and native women earn less than native men. If only the Mincer variables are included, women earn almost 30 percent less than native men, foreign men around 3 percent. Controlling for establishment-specific characteristics such as the log establishment size, economic sector, dummies for collective bargaining agreements and works councils, the share of female employees, and person-specific characteristics such as working time, worker status and the unemployment history etc., strongly decreases the gender wage difference to around 25 percent. In contrast, the wage gap between migrants and natives almost doubles.

In the third column, our main variables of interest are included, i.e. information about the personality traits of the respective individual. This reduces the negative coefficient both for the migrant and female dummies compared to the second model. At the same time, the (adjusted) goodness of fit of the model increases which implies that personality traits increase the explanatory power of the wage model. All but conscientiousness are statistically significant. Extroversion and openness to experience have a positive effect on the log hourly wage, whereas neuroticism and agreeableness negatively influence wages.

The insignificant effect of conscientiousness might be due to ambiguous mechanisms at work. Heineck (2011) finds for example, that both a lack of direction and extreme conscientiousness are harmful[12]. In line with our results, Nyhus and Pons (2005) also do not find a significant relationship between wages and conscientiousness. Concerning our third hypothesis, we therefore reject the assumption that conscientiousness has a positive relationship with wages, while the reverse is true for extroversion and openness to experience.

Table 5
OLS Results for the Overall Sample

	Model 1	Model 2	Model 3
Migrant	-0.027	-0.061***	-0.053***
	(0.026)	(0.020)	(0.020)
Female	-0.291***	-0.251***	-0.240***
	(0.019)	(0.015)	(0.015)
Big Five			
Extroversion			0.014***
			(0.005)
Neuroticism			-0.031***
			(0.005)
Conscientiousness			-0.008
			(0.005)
Agreeableness			-0.019***
			(0.005)
Openness			0.011**
			(0.005)
Controls	age, age squared, education	age, age squared, education, hours worked, blue-collar worker, collective agreement, works council, size of establishment, exports, share of female employees, tenure, unemployment, regions, sectors	
Observations	5,248	5,248	5,248
R-squared	0.235	0.578	0.584
Adjusted R-squared	0.234	0.576	0.582

Note: Clustered robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: Own computations.

Unfortunately, comparisons of our results to other papers are difficult, due to the lack of references for a full sample, as prior papers only report differences for men and women. Nevertheless, the effects seem quite similar compared to those found by Nyhus and Pons (2005), with the exception of extroversion where a negative relationship is observed. The results reported by Heineck and Anger (2010) vary but the effect of agreeableness and conscientiousness are similar.

Regarding the effect size, the Big Five make a meaningful contribution to explaining the variance in wages. For example, a one standard deviation increase in neuroticism is associated with an hourly wage penalty of approximately 3 percent. Thus,

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[12] However, our analysis does not reveal an inverse u-shaped relationship for conscientiousness. This may be partly due to the distribution of this personality trait (compare Figures 1 and 2 of the Appendix).

the effects are not only statistically significant, but also economically important[13]. It should be pointed out, that we do not claim causality, rather following N. M. Fortin (2008) we are interested in personality traits as possible omitted variables that might create biases in the estimated wage differentials of the groups. The estimated coefficients can be perceived as upper bounds (Mueller and Plug, 2006).

4.2 Wage differences between the groups

Comparing our findings of the two wage gaps with those reported by the Federal Bureau of Statistics and the migration literature, we observe a relatively high gender wage gap and a relatively low migrant wage gap. A first explanation for the low migrant wage gap can be found in the fact that our sample contains a positive selection of migrants (compare Table 1). The migrants in our sample are relatively similar in terms of their age and education, as well as hours worked compared to natives. Furthermore, few migrants in the sample have recently come to Germany and over half of them are from Europe. Thus, we can assume that they are rather well assimilated, which could explain the rather low wage gap.

An explanation for the gender wage gap is harder to come by, as the females in our sample are well-educated and the gap does not change much when we only estimate the regressions for a full-time sample[14]. Equally, when we additionally include occupational segments ("Berufssegemente" according to Matthes et al. (2015)) in order to control for occupational effects, the wage gaps do not change[15]. When further looking at interactions between the five occupational segments and gender, the results seems to be driven by production and mercantile occupations, which are also the only two occupation segments in which males and females are roughly equitably distributed.

We further assume that the sample design of the survey influences the wage gaps. The sample is selective to the degree that establishments with fewer than 50 employees and those in the public sector are excluded, as well as civil servants and the self-employed. Furthermore, the number of observations is restricted. This means that the distribution of women and migrants in the sample compared to the whole distribution in Germany is not representative.

Digging deeper and applying the idea that wages may differ according to establishment structures, we construct a variable indicating whether an establishment is male-dominated, i.e. less than 30 percent of the employees are female, versus female-dominated, i.e. less than 30 percent of the employees are male. The third category is called mixed-establishments and defines establishments that lie in-between

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[13] For a graphic depiction of the magnitude of the effect see Figure 3 of the Appendix.

[14] The same is true for a full-time migration sample.

[15] All estimations were additionally run with the occupational segments as additional controls. As the results do not change substantially and migrants and females are not distributed equally across the segments, we decided not to report the results.

the extremes. We borrow these cut-offs from the occupation literature which defines a task as a female-task (or male-task, respectively) according to a 30 percent/70 percent threshold. Put simply, we suppose that the gender wage gap is much more pronounced within male-dominated establishments and less within female-dominated establishments.

The migrant wage gap however is relatively small, because migrants are mainly employed in male-dominated establishments, in which the characteristic of being male is more important than the attribute of being a migrant. An additional explanation can be found in the social psychology literature for cultural and gender stereotyping (compare for example Koenig et al. (2011)). As certain characteristics are usually attributed to a gender, these perceptions also lead to the ascription to specific gender roles, such as for example the "think manager – think male paradigm". These stereotypes may unconsciously be more salient in male-dominated establishments, thus leading to male migrants having the more desirable "work role" attribute ascribed to them, as opposed to female natives being perceived less so, thereby leading to a higher gender wage gap and a lower migrant wage gap than expected.

Table 6
OLS Results Differentiated Between Types of Establishment

	Male-dominated establishments	Mixed establishments	Female-dominated establishments[16]
Migrant	-0.035	-0.133***	-0.281*
	(0.022)	(0.046)	(0.145)
Female	-0.275***	-0.233***	-0.166***
	(0.019)	(0.022)	(0.055)
Big Five			
Extroversion	0.013**	0.015	0.022
	(0.006)	(0.009)	(0.018)
Neuroticism	-0.027***	-0.043***	-0.005
	(0.005)	(0.010)	(0.015)
Conscientiousness	-0.013	0.006	-0.005
	(0.006)	(0.010)	(0.019)
Agreeableness	-0.017***	-0.027***	-0.001
	(0.005)	(0.010)	(0.023)
Openness	0.015**	0.007	-0.010
	(0.006)	(0.009)	(0.019)
Controls	✓	✓	✓
Observations	3,493	1,482	273
R-squared	0.573	0.584	0.561
Adjusted R-squared	0.570	0.576	0.511

Note: Clustered robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Controls: age, age squared, education, hours worked, blue-collar worker, collective agreement, works council, log size of establishment, exports, share of female employees, tenure, unemployment, regions, sectors.

Source: Own computations.

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[16] The results for the sample of female-dominated establishments have to be treated with some caution as the model F-statistic is not reported. The model still has a good R-squared statistic and the results are reported for their economic salience.

In order to test our hypotheses, we rerun the third regression separately for male-dominated, female-dominated and mixed establishments (see Table 6). Indeed, we find salient differences of the wage gaps among the establishment groups. Gender wage inequality is much higher in male-dominated establishments than in mixed or female-dominated establishments. At the same time, the wage inequality between migrants and natives is more pronounced in mixed and female-dominated establishments.

From the Mincer wage equations we learn that, first, personality is an important predictor of earnings and second, native women and migrant men earn less than native men, but the differences decrease when personality traits are included in a Mincer-type wage equation. To detect whether heterogeneous effects are observable for the different groups, separate wage equations are estimated next.

4.3 Split Samples

Regarding the migrant and native regression results of Table 7[17], it is first noticeable that the coefficients' signs are identical for both groups (with the exception of extroversion). However, there are differences with respect to the coefficients' significance and magnitude[18]. Consequently, different traits seem to be important for the two employee groups. Most strikingly, openness to experience seems to play an important role for a migrant's wage, while the coefficient is insignificant and small for a native. An interpretation for this result could be that the underlying characteristics associated with being open for experience, such as originality, intelligence and broad-mindedness, are more important for migrants than for natives. This seems reasonable insofar as employer learning or stereotyping, as well as the idea that a migrant has to prove himself due to asymmetric information, play a role in the wage determination of migrant men.

Similar to the migration sample, all coefficients of the personality variables have the same signs in the gender sample. Most worth mentioning are the coefficients for neuroticism and agreeableness[19]. Men seem to be punished more for being neurotic than women. One could cautiously interpret, that women are stereotyped as being neurotic and due to the stereotype are less punished for this trait. Additionally, men are also punished for being agreeable, whereas this trait does not play a role in the female wage determination[20]. A possible explanation for this could be that agreeable men are less aggressive in wage negotiations and that this is reflected in the magnitude and significance of the coefficient.

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[17] For a graphic rendition of the coefficients for the Big Five in each subsample see Figures 4 and 5 of the Appendix.

[18] In the migration sample, the coefficients for extroversion are significantly different from each other on the 10% level.

[19] In the gender sample, the coefficients for neuroticism and agreeableness are significantly different from each other on the 10% level.

[20] Similar results occur when only estimating the gender regressions for West Germany.

Table 7
OLS Results for the Subsamples

	Migration		Gender	
	Migrants	Natives	Female	Male
Extroversion	-0.004	0.025***	0.016*	0.017***
	(0.016)	(0.007)	(0.009)	(0.006)
Neuroticism	-0.048***	-0.037***	-0.018**	-0.035***
	(0.016)	(0.007)	(0.008)	(0.006)
Conscientiousness	-0.004	-0.009	-0.016	-0.008
	(0.017)	(0.007)	(0.011)	(0.006)
Agreeableness	-0.024	-0.027***	-0.005	-0.026***
	(0.017)	(0.007)	(0.009)	(0.006)
Openness	0.026*	0.009	0.003	0.012*
	(0.015)	(0.008)	(0.008)	(0.006)
Controls	✓	✓	✓	✓
Observations	349	2,705	1,252	3,596
R-squared	0.504	0.493	0.546	0.588
Adjusted R-squared	0.451	0.488	0.537	0.585

Note: Clustered robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Controls: age, age squared, education, hours worked, blue-collar worker, collective agreement, works council, log size of establishment, exports, share of female employees, tenure, unemployment, regions, sectors. Further controls for the migration sample are years since migration and country of origin.

Source: Own computations

In summary, we conclude that the answer to our second research question is in the affirmative. Extroversion has a positive relationship with wages for natives, men and women, but not for migrants (H2), while openness to experience only seems important for men and migrants (H2). Conscientiousness does not have significant results for any of the samples (H2). However, we find that neuroticism is always punished in the labor market, irrespective of an individual's migratory status (H3), while agreeableness only seems to matter for males and natives (H4).

4.3.1 Unconditional Quantile Regressions

As the literature points to possible differences in wage gaps in different percentiles of the wage distribution (Arulampalam, Booth, and Bryan, 2007; Barrett, McGuinness, and O'Brien, 2012; Boudarbat and Lemieux, 2014; Huffman et al., 2016; Lehmer and Ludsteck, 2011), we estimate unconditional quantile regressions for the overall model, i.e. model 3 defined in Table 5. When we plot the results of the unconditional quantile regression, we see clear negative effects across the wage distribution for migrants and females (Figure 1). Up to the 40th percentile, the results for the migrant dummy are not significant; therefore, the positive wage effect in the lower percentiles has to be interpreted with caution. However, as we move along the wage distribution, the negative wage effect of being a migrant increases. At the same time, no matter where they are located in the wage distribution, being a woman always has a significant negative impact. This effect is especially pronounced in the upper percentiles past the median (with a small exception of the highest percen-

tiles). Thus, the negative wage effects of being a migrant or a female are corroborated by the quantile regressions. Furthermore, we learn that in upper percentiles of the wage distribution, this negative effect is more pronounced for both migrants and women.

It is possible that the influence of the Big Five is not the same across the wage distribution. To test this assumption, we additionally report unconditional quantile regression results for the Big Five coefficients. The results are shown in Figure 6 of the Appendix, as well as Table 5 of the Appendix. While Figure 6 of the Appendix hints at u-shaped effects for the wage quantiles, the coefficients for the three quantiles computed are not significantly different from each other. This indicates that the effects of the Big Five remain constant across the wage distribution. Nevertheless, the Big Five coefficients for the individual quantile regressions are significant by themselves, with the exception of conscientiousness (see Table 5 of the Appendix). Thus, an interesting insight is that the overall OLS effect of extroversion and agreeableness are each driven by the 50th and 75th quantile, while the effect for openness to experience is driven by the 25th quantile. Neuroticism reveals significant coefficients for all quantiles.

Figure 1
Unconditional Quantile Plot for Migrant and Female Dummies
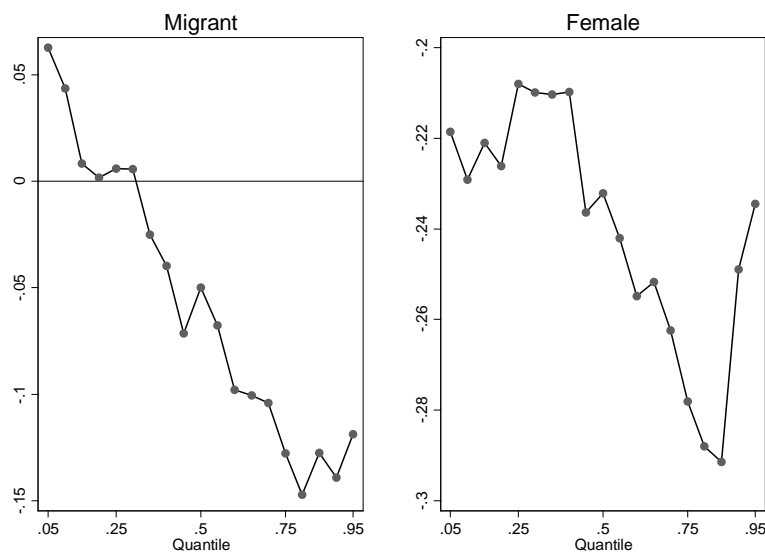
Source: Own computations.

Since the results of the unconditional quantile regressions indicate that the effects of the Big Five do not vary across the wage distribution, and interactions of migrant and female dummies with the Big Five do not show significant results, we believe that the effect of the Big Five for migrants and females does not vary over the wage distribution. Therefore, we do not delve deeper into the investigation of separate migration or gender samples in terms of unconditional quantile regressions.

4.4 Oaxaca-Blinder Decomposition

To further enhance our understanding of the relationship between the Big Five and wages, we look at Oaxaca-Blinder wage decompositions. Table 8 presents the main results for the migration sample[21], whereby the models are defined as in Table 5. We consecutively add controls to the basic Mincer-type equation in order to illustrate the contribution of the controls to the explanation of the migrant wage gap.

Table 8 shows that natives earn more than migrants with a predicted difference of almost 20 percent. The Mincer equation variables of model 1 explain 3 percent of this wage gap. Adding the additional controls, this percentage increases to approximately 70 percent. Finally, when including the Big Five, 75 percent of the gap can be explained by the means of our controls.

Table 8
Oaxaca-Blinder Decomposition for the Migration Sample

	Model 1	Model 2	Model 3
Predicted Difference	0.194***	0.194***	0.194***
	(0.026)	(0.026)	(0.026)
Explained	0.073***	0.136***	0.146***
	(0.015)	(0.021)	(0.021)
	38%	70%	75%
Unexplained	0.122***	0.058***	0.048**
	(0.028)	(0.022)	(0.022)
	62%	30%	25%
Controls	age, age squared, education	age, age squared, education, hours worked, blue-collar worker, collective agreement, works council, size of establishment, exports, share of female employees, tenure, unemployment, regions, sectors	Big Five, age, age squared, education, hours worked, blue-collar worker, collective agreement, works council, size of establishment, exports, share of female employees, tenure, unemployment, regions, sectors
Observations	3,057	3,057	3,057

Note: Clustered robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Reference group is "Natives". When "Migrant" is the reference group, the main results shown here do not change substantially.

Source: Own computations.

Looking at the decomposition in more detail, the results indicate that mainly the number of months in unemployment, the blue-collar status and age significantly contribute to the explained part of the gap. This insight is in line with the summary statistics of Table 1 of the Appendix, showing that migrants are younger, more often in

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[21] For the full model refer to Table 6 of the Appendix.

blue-collar employment and have higher unemployment periods compared to natives. Concerning the Big Five, the result is mainly driven by extroversion and neuroticism, which are also the two personality traits which significantly differed between the groups (see Table 3 of the Appendix).

In summary, we can therefore ascertain that the Big Five personality traits contribute significantly to explaining the migrant wage gap. If migrants displayed the same personality endowments as natives, the wage gap would be smaller. Hence, non-cognitive skills seem to play an important role in wage determination and should not be disregarded when analyzing migrant wage differentials.

Turning to the gender sample, the results are not as clear cut; however, they are in support of hypothesis five. Table 9 reports the main results for the gender sample[22] and shows a significant gender wage difference of almost 29 percent.

The unexplained part of the gender wage gap is highly significant and decreases with the inclusion of the controls in model 2 and again with the inclusion of the Big Five in model 3. This result indicates that the controls, and specifically the Big Five, help to decrease the unexplained part of the wage gap. However, the explained part of the decomposition is not significant for any of the three models. This could be due to the fact that some of the variables cancel each other out.

Looking closer at the decomposition in model 3, among others weekly working time, blue-collar status, months in unemployment and the share of women in the establishment contribute significantly to explaining the wage gap. Furthermore, extroversion, neuroticism and agreeableness significantly contribute to the explained part of the gender wage gap. Hence, the inclusion of the Big Five also plays a role in the determination of the gender wage gap.

In summary, our third research question can also be answered in the affirmative. The decomposition exercises show that non-cognitive traits should not be overlooked when regarding wage differentials. This supports the results of the OLS analyses, which showed that the Big Five are significantly associated with wages. For both the migrant and gender wage gaps the Big Five personality traits significantly contribute to explaining wage gaps. Therefore, we conclude that excluding the Big Five in the analyses of wages may bias the results due to omitted variable biases.

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[22] For detailed results refer to Table 7 of the Appendix.

Table 9
Oaxaca-Blinder Decomposition for the Gender Sample

	Model 1	Model 2	Model 3
Predicted Difference	0.289***	0.289***	0.289***
	(0.020)	(0.021)	(0.021)
Explained	-0.003	0.030	0.043
	(0.008)	(0.026)	(0.026)
	-1%	10%	15%
Unexplained	0.292***	0.259***	0.246***
	(0.019)	(0.019)	(0.020)
	101%	90%	85%
Controls	age, age squared, education	age, age squared, education, hours worked, blue-collar worker, collective agreement, works council, size of establishment, exports, share of female employees, tenure, unemployment, regions, sectors	Big Five, age, age squared, education, hours worked, blue-collar worker, collective agreement, works council, size of establishment, exports, share of female employees, tenure, unemployment, regions, sectors
Observations	4,848	4,848	4,848

Note: Clustered robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Reference group is "Men". When "Women" is the reference group, the main results shown here do not change substantially.
Source: Own computations.

5   Robustness Checks

To ensure the robustness of our results and to discuss several endogeneity issues, we conduct a series of alternative analyses, considering different measurement definitions and sample restrictions to reproduce the results obtained in chapter IV.

One concern of the analysis is reverse causality, since labor market outcomes of individuals are measured at the same time as the personality traits. To mitigate these concerns, several age-related robustness checks are done. According to the existing literature, personality can change throughout the life span, however, these changes are most pronounced in young and old ages (Specht, Egloff, and Schmukle, 2011). The plaster hypothesis states that past a threshold of 30 years changes in personality traits rarely occur (Srivastava et al., 2003). To check this assumption, we split our sample into a group aged above 30 and one below. As a small fraction (12%) of the individuals in our sample is below 30 we can only re-estimate with the latter group and the results barely change in this relatively homogenous age group Another way to control for age effects is by regressing each trait on age and age squared (Groves, 2005; Nyhus and Pons, 2005). The obtained residuals, which are now free of age effects, can be then used for more reliable estimates. Recalculating the analyses with the residualized personality effect does not change our results substantially. We conclude that age effects do not play a large role for our estimations.

Personality changes owing to life-changing experiences, such as long-term unemployment, might also influence our results. One way to address this issue is by testing the robustness of our results for individuals with unemployment periods under one year[23] and comparing the results with the ones obtained by all individuals. Again, for both samples – all individuals and only individuals with short-term unemployment periods – we obtain the same results. Based on this rather homogenous group with respect to unemployment, we believe that personality changes due to life-changing unemployment experiences should not have occurred in our sample.

Indirect effects through education are another issue discussed in the personality literature. According to Peter and Storck (2015), indirect wage effects can occur through education, as for example being open to experience increases the intent to attend a university. To address this selectivity issue, we calculate personality measures free of education effects. Again, no big differences are observable in the obtained results, indicating that education does not include indirect personality effects in our base sample.

To check whether non-linearity for the Big Five exists, we include each trait as squared terms and recalculate the base specification. Except for agreeableness, non-linearity does not occur. Only extreme scores of agreeableness are punished in the native men sample, which could be interpreted insofar that agreeableness weakens wage bargaining power. At the same time, being highly antagonistic influences wages negatively as well. Nevertheless, this is only true for native men and only affects extreme high scores. We therefore can conclude that nonlinearity does not play a big role in our analyses.

In an additional investigation of non-linearity, we include dummy variables indicating whether an individual is in the top 25 percent or bottom 25 percent of the personality trait distribution. Overall, agreeableness and neuroticism indicate an inverse linear relationship, whereas extroversion and openness to experience show an inverse u-shaped relationship. However, few of the coefficients are significant. Concerning the split samples, a few observations are worth mentioning: Only migrants are punished for being in the bottom 25% of the distribution of openness, while this relationship is not visible for natives. In the gender sample, being in the bottom 25 percent of the distribution of neuroticism is rewarded, however only men are punished for being in the top 25 percent of the distribution. Regarding openness to experience, only women are punished for being in the top 25 percent percent of the distribution. These two latter results might indicate gender stereotyping.

We further reassess whether employer learning effects occur by interacting tenure and the personality traits. Assuming that employers are not omniscient and initially have imperfect information about a prospective worker's productivity, they conse-

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[23] One year is the current threshold for long-term unemployment. However, observations with long-term unemployment periods are scarce in our sample.

quently rely more on observable characteristics (Petre, 2014). With increasing tenure, employers learn the true value of the worker's productivity and reward them accordingly. As a consequence, rewards of personality traits may change with tenure. Additionally, assuming that imperfect information about a foreign worker's productivity is higher than about a native worker's, the employer learning effect should be stronger and more visible in the migration sample. According to Nyhus and Pons (2005) it could also be that the personality of the new employee becomes evident to the employer only over time, which should result in stronger effects with tenure. However, no such phenomenon, either one way or the other, is observable in any of our samples. Thus, neither an overall employer learning effect, nor a stronger effect for foreign men occurs. This result is in line with Heineck (2011), who also does not find employer learning effects for men or women.

As a last robustness check, we regard time variance. Under the assumption that personality does not change over time, the second wave of the LPP does not inquire about the Big Five again. Therefore, we cannot estimate a fixed effects model. However, we are able to estimate a lagged model. Due to panel attrition and a lack of consent for information linkage, our number of observations is strongly reduced[24]. Nevertheless, the Big Five coefficients remain robust providing evidence for a causal relationship.

6   Concluding Remarks

This paper investigates the impact of the Big Five personality traits on wages, as well as on wage disparities among different employee groups. To the best of our knowledge, it is the first expanding the Big Five research to migrants and consequently provides first evidence for the importance of including personality traits in the analysis of the migrant wage gap. Research on non-cognitive skills has mainly been done in the context of psychology, whereas in economics, the importance of personality traits on labor market outcomes has been neglected. Therefore, we contribute to the smaller body of economic literature that includes the Big Five in their analyses and associates personality with wages. Moreover, using data from the Linked Personnel Panel, the IAB-Establishment Panel, as well as administrative data from the IAB, we are able to include individual- and establishment-level information in our analyses, which has not been done to this extent previously.

In summary, we first provide evidence that migrants and natives, as well as women and men, differ in some of their average personality traits (Q1). Moreover, we find significant associations between the Big Five - with the exception of conscientiousness - and wages (Q2), whereby our results suggest that extroversion and openness to experience are rewarded in the labor market, while neuroticism and agreea-

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[24]   For the overall sample, only 38% of all observations remain. The remaining share of migrants and natives is 32% and 38% respectively. 39% of women and men respectively remain.

bleness are punished. Applying augmented Mincer-type earning regressions for the different employee groups, our estimates indicate varying rewards of personality traits among employee groups. Looking at the gender sample, results show higher penalties for neuroticism for males than for females. Moreover, females are not punished for agreeableness, whereas males are. The comparison of migrants and natives shows a slightly different picture: We find varying rewards for extroversion and openness to experience, while agreeableness is only punished for natives.

Regarding the wage gaps of the selected employee groups, a relatively high differential is obtained for males and females but a relatively low one is found for migrants and natives, compared to those reported by the Federal Bureau of Statistics and the migration literature. Using information about the establishment structure in terms of the share of women, these deviations can be attenuated. According to our results, the gender wage gap is more pronounced within male-dominated establishments and less within female-dominated establishments. The relatively small migrant wage gap is driven by the high share of migrants working in male-dominated establishments, in which the trait of being male seems to be more important than the trait of being a migrant and by a positive selection of the migrant sample.

The contribution of personality traits to explain the wage gap of our groups is mainly driven by neuroticism, extroversion and agreeableness. For both samples, the Big Five increases the explained part by around 5 percentage points (Q3). Our results suggest that personality matters for the labor market and has a significant relationship with wages. The Big Five can explain parts of the variation in log hourly wages across individuals and employee groups. Consequently, the Big Five could be regarded as omitted variables that might induce a bias upon non-inclusion in earning equations.

To conclude, we find that the association between the Big Five and wages is not universal, rather it differs by employee groups. Numerous tests indicate that the relationship between the Big Five and wages is robust. Furthermore, the Big Five contribute significantly to explaining wage differentials and should therefore not be ignored in the economic literature. In terms of economic significance, our results are non-negligible: While the effect size may seem small at first, we look at log hourly wages so that the effect on monthly income is not slight. Thus, we believe that our results further our understanding of the importance of non-cognitive skills in the labor market.

Some questions remain that warrant future investigation: First, there are further ways to differentiate between employee groups and one possible avenue for future research is to analyze the effects of the Big Five on blue- and white-collar workers. Second, our results indicated that the establishment structure seems to play an important role in the determination of wages. Hence, an investigation of interaction between establishment characteristics, such as the establishment's share of wom-

en, and personality traits might further our understanding of the wage setting mechanisms.

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Appendix

Appendix Table 1
Sample Summary Statistics

	Migration Sample				Gender Sample			
	Migrants*		Natives		Women		Men	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Individual Characteristics								
Tenure (in months)	133.20	99.73	171.66	126.34	137.69	104.96	161.28	121.01
Unemployment (in months)	11.82	16.92	6.18	13.33	12.03	22.41	7.84	15.63
Hours worked (per week)	37.72	4.07	38.09	4.26	34.13	7.53	38.48	4.35
Blue-collar worker	0.66	0.48	0.41	0.49	0.24	0.43	0.45	0.50
Establishment Characteristics								
Collective bargaining	0.65	0.48	0.66	0.47	0.59	0.49	0.64	0.48
Log size	5.17	0.98	5.35	0.97	5.24	0.92	5.29	0.96
Industry								
Manufacturing	0.25	0.43	0.27	0.45	0.20	0.40	0.29	0.45
Metal, electronics, automotive	0.39	0.49	0.33	0.47	0.17	0.37	0.32	0.47
Trade, traffic, news	0.21	0.41	0.19	0.39	0.22	0.42	0.19	0.39
Business and financial services	0.11	0.31	0.14	0.34	0.27	0.45	0.15	0.36
Information, communication, other services	0.05	0.21	0.06	0.24	0.14	0.34	0.06	0.23
Works council	0.71	0.45	0.74	0.44	0.65	0.48	0.70	0.46
Exports	0.70	0.46	0.63	0.48	0.47	0.50	0.59	0.49
Share of females	0.21	0.16	0.22	0.17	0.48	0.25	0.22	0.18
Region								
North	0.10	0.30	0.17	0.38	0.17	0.37	0.14	0.35
East	0.00	0.00	0.00	0.00	0.23	0.42	0.16	0.37
South	0.37	0.48	0.39	0.49	0.28	0.45	0.32	0.47
West	0.53	0.50	0.44	0.50	0.32	0.47	0.37	0.48
Observations	349		2,705		1,252		3,596	

* Note: Only male migrants living in West Germany are regarded for the migration sample. No migrants are included in the gender sample.

Source: Own computations. Results are weighted.

Appendix Table 2
Big Five Questionnaire Items

I am…
A: a thorough worker
B: communicative, talkative
C: sometimes a bit rude to others
D: original, someone who comes up with new ideas
E: a worrier
F: forgiving
G: somewhat lazy
H: outgoing, sociable
I: someone who values artistic, aesthetic experiences
J: somewhat nervous
K: effective and efficient in completing tasks
L: reserved
M: considerate and kind to others
N: imaginative
O: relaxed, able to deal with stress
P: eager for knowledge

Scale
1: Fully applies
2: Largely applies
3: Neutral
4: Does rather not apply
5: Does not apply at all
7: Refuse
8: Do not know

Source: LPP Questionnaire[25]

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[25] For the questionnaire refer to
http://fdz.iab.de/de/Integrated_Establishment_and_Individual_Data/lpp/Working_Tools.aspx

Appendix Table 3
T-test of the Big Five: Migrants and Natives

Extroversion

Group	Observation	Mean	Std. Error	Std. Deviation	[95% Conf. Interval]	
Natives	2705	-0.0146	0.0189	0.9819	-0.0516	0.0224
Migrants	349	-0.1741	0.0536	1.0008	-0.2794	-0.0687
Combined	3054	-0.0328	0.0178	0.9852	-0.0678	0.0021
diff	0.1594	0.0560	0.0497	0.2692		

diff=mean(0)-mean(1)					t = 0.9033
Ho: dif f= 0				degrees of freedom = 56033	
Ha: diff < 0			Ha: diff !=0		Ha: diff > 0
Pr(T<t) =0.998			Pr(T<t) =0.004		Pr(T<t)=0.002

Neuroticism

Group	Observation	Mean	Std. Error	Std. Deviation	[95% Conf. Interval]	
Natives	2705	-0.1278	0.0182	0.9483	-0.1635	-0.0920
Migrants	349	0.0962	0.0540	1.0086	-0.0099	0.2024
Combined	3054	-0.1022	0.0173	0.9579	-0.1362	-0.0682
diff	-0.2240	0.0543	-0.3306	-0.1175		

diff=mean(0)-mean(1)					t = 0.9033
Ho: dif f= 0				degrees of freedom = 56033	
Ha: diff < 0			Ha: diff !=0		Ha: diff > 0
Pr(T<t) =0.000			Pr(T<t) =0.000		Pr(T<t) =1.000

Conscientiousness

Group	Observation	Mean	Std. Error	Std. Deviation	[95% Conf. Interval]	
Natives	2705	-0.0838	0.0193	1.0046	-0.1217	-0.0459
Migrants	349	-0.1321	0.0625	1.1675	-0.2550	-0.0091
Combined	3054	-0.0893	0.0185	1.0244	-0.1257	-0.0530
diff	0.0483	0.0583	-0.0660	0.1625		

diff=mean(0)-mean(1)					t = 0.9033
Ho: dif f= 0				degrees of freedom = 56033	
Ha: diff < 0			Ha: diff !=0		Ha: diff > 0
Pr(T<t) =0.796			Pr(T<t) =0.407		Pr(T<t) =0.204

Agreeableness

Group	Observation	Mean	Std. Error	Std. Deviation	[95% Conf. Interval]	
Natives	2705	-0.0631	0.0186	0.9697	-0.0997	-0.0265
Migrants	349	-0.0186	0.0597	1.1146	-0.1360	0.0987
Combined	3054	-0.0580	0.0179	0.9873	-0.0931	-0.0230
diff	-0.0445	0.0562	-0.1546	0.0656		

diff=mean(0)-mean(1)					t = 0.9033
Ho: dif f= 0				degrees of freedom = 56033	
Ha: diff < 0			Ha: diff !=0		Ha: diff > 0
Pr(T<t) =0.214			Pr(T<t) =0.428		Pr(T<t) =0.786

Openness

Group	Observation	Mean	Std. Error	Std. Deviation	[95% Conf. Interval]	
Natives	2705	-0.0122	0.0185	0.9603	-0.0484	0.0240
Migrants	349	-0.0719	0.0580	1.0837	-0.1860	0.0422
Combined	3054	-0.0190	0.0176	0.9752	-0.0536	0.0156
diff	0.0597	0.0555	-0.0491	0.1684		

diff=mean(0)-mean(1)					t = 0.9033
Ho: dif f= 0				degrees of freedom = 56033	
Ha: diff < 0			Ha: diff !=0		Ha: diff > 0
Pr(T<t) =0.859			Pr(T<t) =0.282		Pr(T<t) =0.141

Source: Own computations

Appendix Table 4
T-test of the Big Five: Men and Women

Extroversion

Group	Observation	Mean	Std. Error	Std. Deviation	[95% Conf. Interval]	
Men	3596	-0.0011	0.0164	0.9814	-0.0332	0.0310
Women	1252	0.0925	0.0286	1.0103	0.0365	0.1485
Combined	4848	0.0231	0.0142	0.9897	-0.0048	0.0510
diff	-0.0936	0.0325	-0.1572	-0.0300		

diff=mean(0)-mean(1)				t = 0.9033
Ho: dif f= 0				degrees of freedom = 56033
Ha: diff < 0		Ha: diff !=0		Ha: diff > 0
Pr(T<t) =0.002		Pr(T<t) =0.0039		Pr(T<t) =0.998

Neuroticism

Group	Observation	Mean	Std. Error	Std. Deviation	[95% Conf. Interval]	
Men	3596	-0.1036	0.0159	0.9524	-0.1348	-0.0725
Women	1252	0.1441	0.0296	1.0468	0.0861	0.2022
Combined	4848	-0.0396	0.0141	0.9835	-0.0673	-0.0119
diff	-0.2477	0.0321	-0.3106	-0.1848		

diff=mean(0)-mean(1)				t = 0.9033
Ho: dif f= 0				degrees of freedom = 56033
Ha: diff < 0		Ha: diff !=0		Ha: diff > 0
Pr(T<t) =0.000		Pr(T<t) =0.000		Pr(T<t) =1.000

Conscientiousness

Group	Observation	Mean	Std. Error	Std. Deviation	[95% Conf. Interval]	
Men	3596	-0.0462	0.0166	0.9935	-0.0787	-0.0137
Women	1252	0.1754	0.0253	0.8959	0.1257	0.2250
Combined	4848	0.0110	0.0140	0.9740	-0.0164	0.0384
diff	-0.2215	0.0318	-0.2839	-0.1592		

diff=mean(0)-mean(1)				t = 0.9033
Ho: dif f= 0				degrees of freedom = 56033
Ha: diff < 0		Ha: diff !=0		Ha: diff > 0
Pr(T<t) =0.000		Pr(T<t) =0.000		Pr(T<t) =1.000

Agreeableness

Group	Observation	Mean	Std. Error	Std. Deviation	[95% Conf. Interval]	
Men	3596	-0.0586	0.0163	0.9786	-0.0906	-0.0266
Women	1252	0.1435	0.0286	1.0118	0.0874	0.1996
Combined	4848	-0.0064	0.0142	0.9912	-0.0343	0.0215
diff	-0.2022	0.0324	-0.2657	-0.1387		

diff=mean(0)-mean(1)				t = 0.9033
Ho: dif f= 0				degrees of freedom = 56033
Ha: diff < 0		Ha: diff !=0		Ha: diff > 0
Pr(T<t) =0.000		Pr(T<t) =0.000		Pr(T<t) =1.000

Openness

Group	Observation	Mean	Std. Error	Std. Deviation	[95% Conf. Interval]	
Men	3596	0.0095	0.0160	0.9576	-0.0218	0.0408
Women	1252	0.0129	0.0293	1.0364	-0.0445	0.0704
Combined	4848	0.0104	0.0141	0.9784	-0.0172	0.0379
diff	-0.0035	0.0321	-0.0664	0.0595		

diff=mean(0)-mean(1)				t = 0.9033
Ho: dif f= 0				degrees of freedom = 56033
Ha: diff < 0		Ha: diff !=0		Ha: diff > 0
Pr(T<t) =0.457		Pr(T<t) =0.914		Pr(T<t) =0.543

Source: Own computations

Appendix Table 5
Unconditional Quantile Regression for the Overall Sample

Quantiles	25	50	75
Migrant	0.006	-0.050*	-0.128***
	(0.030)	(0.029)	(0.031)
Female	-0.208***	-0.232***	-0.278***
	(0.022)	(0.018)	(0.020)
Big Five			
Extroversion	0.009	0.017**	0.017**
	(0.008)	(0.007)	(0.008)
Neuroticism	-0.025***	-0.032***	-0.024***
	(0.008)	(0.007)	(0.008)
Conscientiousness	-0.009	-0.008	-0.012
	(0.008)	(0.007)	(0.008)
Agreeableness	-0.012	-0.024***	-0.020**
	(0.008)	(0.007)	(0.008)
Openness	0.022***	0.006	0.012
	(0.008)	(0.007)	(0.008)
Observations	5,248	5,248	5,248
R-squared	0.409	0.427	0.342
Adjusted R-squared	0.406	0.424	0.339

Note: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Controls: age, age squared, education, hours worked, blue-collar worker, collective agreement, works council, log size of establishment, exports, share of female employees, tenure, unemployment, regions, sectors.

Source: Own computations.

Appendix Table 6
Full Oaxaca-Blinder Decomposition for the Migration Sample

Native		3.168***	(0.015)	
Migrant		2.974***	(0.027)	
Difference		0.194***	(0.026)	
Explained		0.146***	(0.021)	
Unexplained		0.048**	(0.022)	

Big Five	**Explained**		**Unexplained**	
Extroversion	0.004**	(0.002)	-0.003	(0.003)
Neuroticism	0.008***	(0.003)	0.001	(0.002)
Conscientiousness	-0.000	(0.001)	0.001	(0.002)
Agreeableness	0.001	(0.002)	0.000	(0.000)
Openness	0.000	(0.001)	0.001	(0.002)
Controls				
Age	0.194***	(0.036)	1.071**	(0.510)
Age squared	-0.149***	(0.030)	-0.435	(0.273)
Education				
Lower Secondary	0.004	(0.004)	0.040	(0.048)
Secondary School	-0.015*	(0.008)	0.108*	(0.061)
Higher education	0.029***	(0.011)	0.081**	(0.039)
Other	-0.007	(0.009)	0.014	(0.012)
Hours worked (per week)	-0.000	(0.002)	0.516**	(0.213)
Blue-collar worker	0.056***	(0.008)	0.005	(0.025)
Collective bargaining	0.001	(0.001)	0.004	(0.034)
Works council	0.003	(0.003)	0.033	(0.047)
Log establishment size	0.002	(0.004)	0.039	(0.104)
Industry sectors				
Metal, electronics, automotive	-0.004	(0.003)	-0.035*	(0.021)
Trade, traffic, news	-0.003	(0.003)	-0.012*	(0.007)
Business and financial services	-0.003	(0.003)	0.001	(0.007)
Information, communication, other services	0.000	(0.001)	-0.004	(0.002)
Regions				
North	-0.007**	(0.003)	-0.019**	(0.009)
West	0.006**	(0.003)	-0.085***	(0.025)
Exports	-0.002	(0.002)	-0.036	(0.041)
Tenure (in months)	0.004	(0.003)	-0.012	(0.026)
Unemployment (in months)	0.030***	(0.006)	-0.033***	(0.012)
Share of females	-0.005**	(0.003)	0.058**	(0.029)
Observations		3.057		

Note: Clustered robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Reference group is "Natives". When "Migrant" is the reference group, the main results shown here do not change substantially.
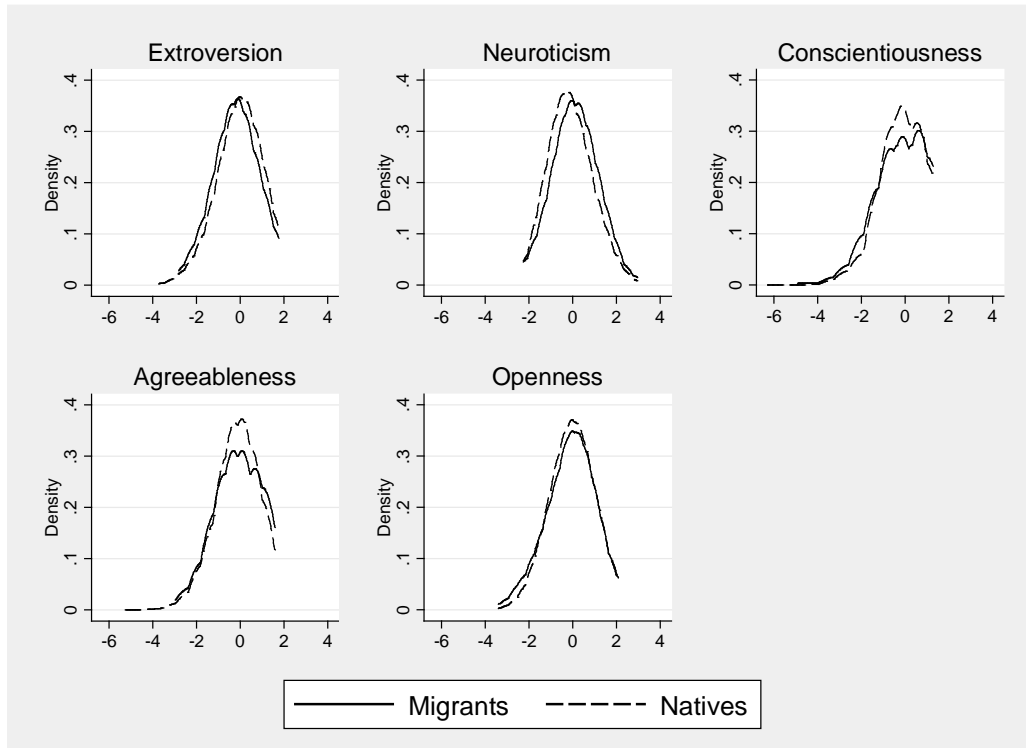
Source: Own computations.

Appendix Table 7
Full Oaxaca-Blinder Decomposition for the Gender Sample

Men		3.040***	(0.017)	
Women		2.751***	(0.020)	
Difference		0.289***	(0.021)	
Explained		0.043	(0.026)	
Unexplained		0.246***	(0.020)	
Big Five	**Explained**		**Unexplained**	
Extroversion	-0.002**	(0.001)	0.000	(0.001)
Neuroticism	0.009***	(0.002)	-0.002*	(0.002)
Conscientiousness	0.002	(0.001)	0.002	(0.002)
Agreeableness	0.005***	(0.001)	-0.003*	(0.002)
Openness	-0.000	(0.000)	0.000	(0.000)
Controls				
Age	0.009	(0.021)	1.221***	(0.351)
Age squared	-0.009	(0.017)	-0.588***	(0.192)
Education				
Secondary School	-0.013***	(0.003)	0.029*	(0.015)
Higher education	-0.004	(0.005)	0.012	(0.010)
Hours worked (per week)	-0.051***	(0.013)	-0.194**	(0.099)
Blue-collar worker	-0.047***	(0.005)	0.007	(0.007)
Collective bargaining	0.004**	(0.002)	-0.012	(0.018)
Works council	0.007**	(0.003)	-0.041*	(0.023)
Log establishment size	0.005*	(0.003)	0.024	(0.066)
Industry sectors				
Metal, electronics, automotive	0.007*	(0.003)	0.011	(0.007)
Trade, traffic, news	0.005*	(0.003)	-0.012*	(0.006)
Business and financial services	0.012**	(0.005)	-0.014	(0.011)
Information, communication, other services	-0.002	(0.002)	0.003	(0.006)
Regions				
North	0.002	(0.002)	-0.010	(0.007)
East	0.027***	(0.009)	-0.062***	(0.013)
West	-0.003*	(0.002)	-0.015*	(0.008)
Exports	0.003	(0.003)	-0.011	(0.020)
Tenure (in months)	0.004**	(0.002)	-0.044***	(0.016)
Unemployment (in months)	0.029***	(0.005)	-0.038***	(0.009)
Share of females	0.045***	(0.012)	0.001	(0.030)
Observations		4.848		

Note: Clustered robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Reference group is "Men". When "Women" is the reference group, the main results shown here do not change substantially.
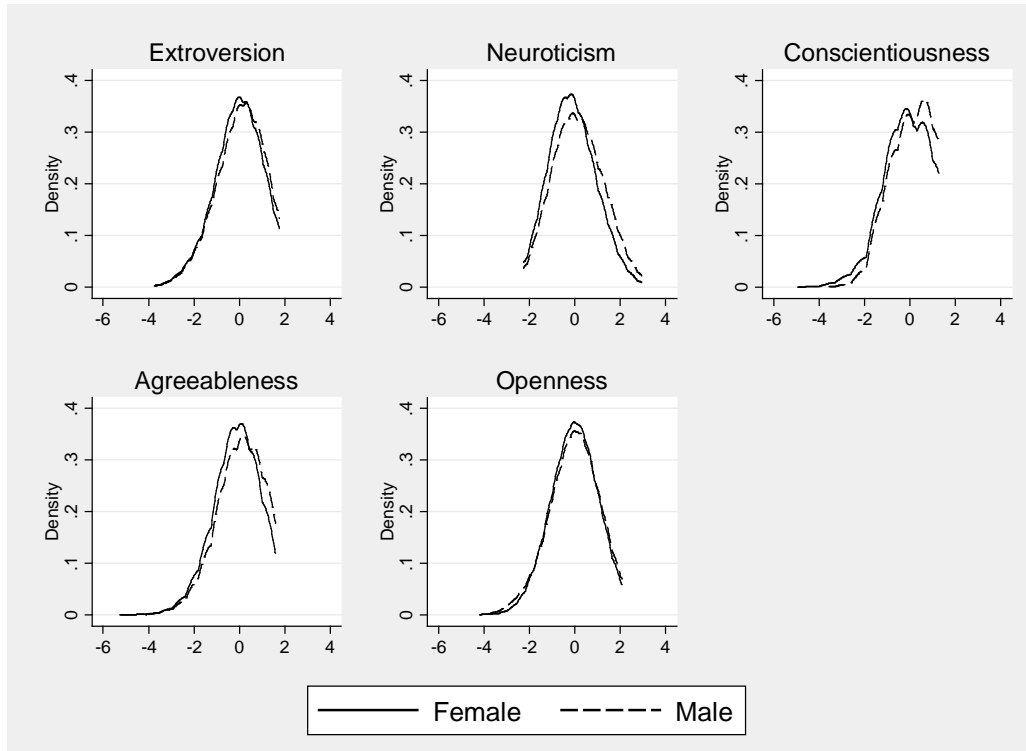
Source: Own computations.

Appendix Figure 1
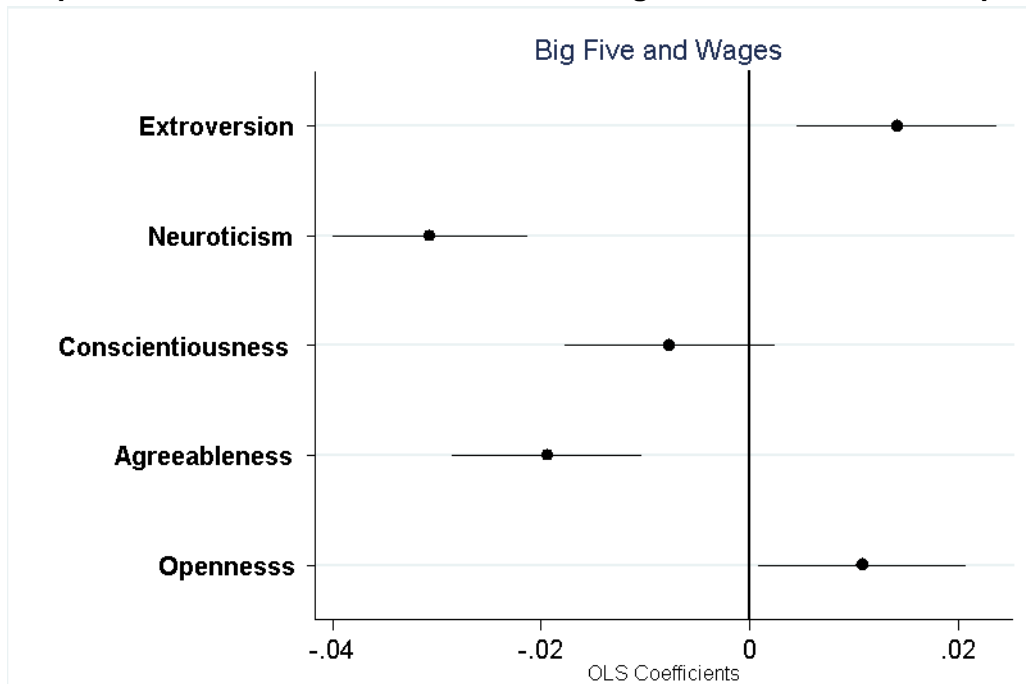**Personality Traits by Migratory Status**
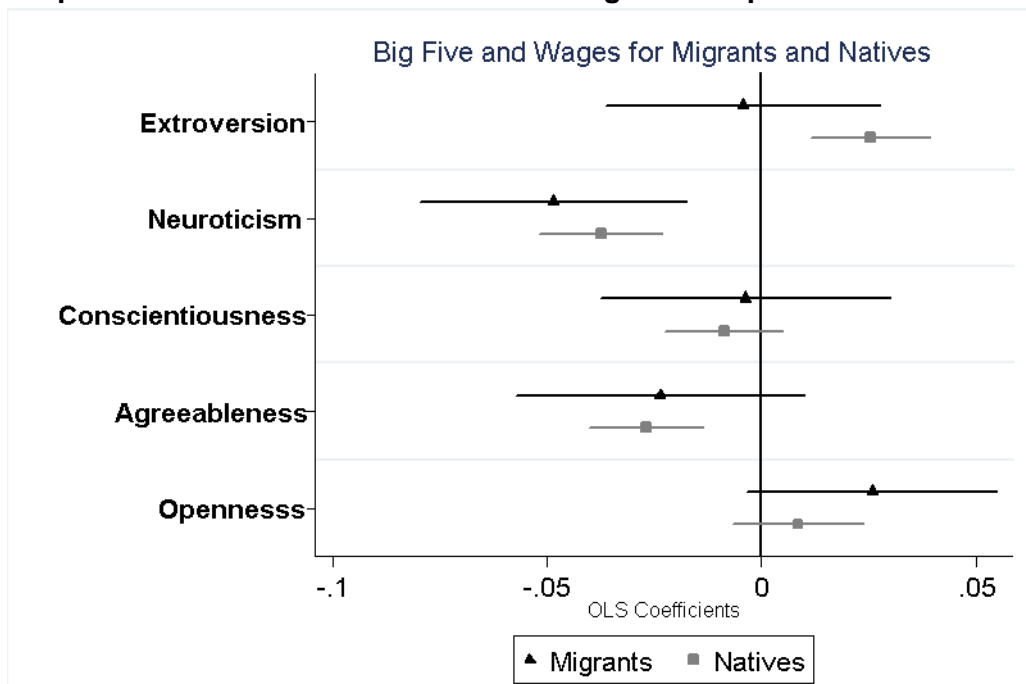
Appendix Figure 2
Personality Traits by Gender

Appendix Figure 3
Graphic Rendition of the Effect Size of the Big Five in the Overall Sample
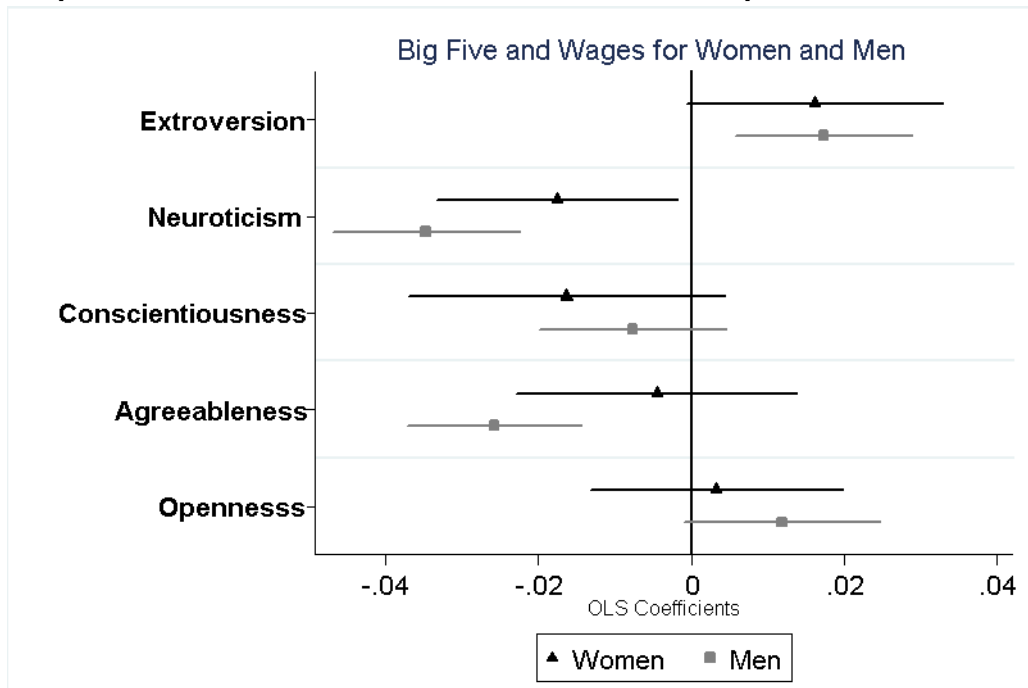

Note: Average Marginal Effects with 95% Confidence Interval.
Source: Own computations.

Appendix Figure 4
**Graphic Rendition of the Results for the Migrant Sample**

Note: Average Marginal Effects with 95% Confidence Interval.
Source: Own computations.

Appendix Figure 5
Graphic Rendition of the Results for the Gender Sample

Note: Average Marginal Effects with 95% Confidence Interval.
Source: Own computations.

Appendix Figure 6
Quantile Plots for the Big Five in the Overall Sample
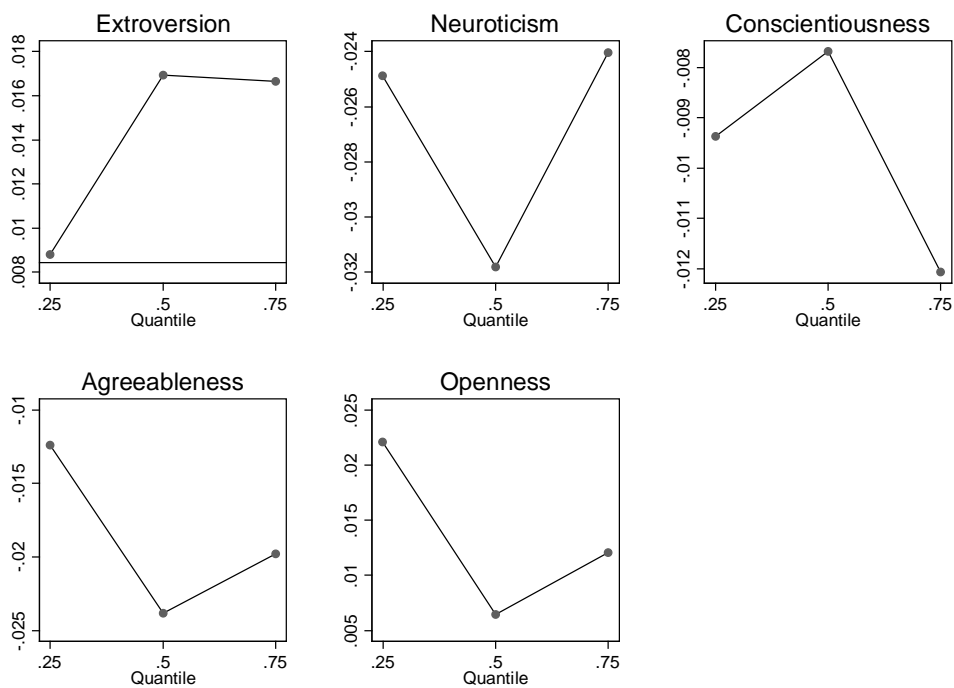
Source: Own computations.

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