

DISCUSSION PAPER SERIES

IZA DP No. 11414

**Is Personality Endogenous?  
Evidence from Ireland**

Irene Mosca  
Robert E. Wright

MARCH 2018

## DISCUSSION PAPER SERIES

IZA DP No. 11414

# Is Personality Endogenous? Evidence from Ireland

**Irene Mosca**

*TILDA, Trinity College Dublin and IZA*

**Robert E. Wright**

*University of Strathclyde and IZA*

MARCH 2018

Any opinions expressed in this paper are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but IZA takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The IZA Institute of Labor Economics is an independent economic research institute that conducts research in labor economics and offers evidence-based policy advice on labor market issues. Supported by the Deutsche Post Foundation, IZA runs the world's largest network of economists, whose research aims to provide answers to the global labor market challenges of our time. Our key objective is to build bridges between academic research, policymakers and society.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

## ABSTRACT

---

# Is Personality Endogenous? Evidence from Ireland

There is a growing interest in economics in the role played by personality in explaining labour market behaviour. Research to date points to the Big-5 personality traits being a possible determinant of wages and employment. However, most of this research is based on the assumption that personality is exogenous. This paper examines the potential endogeneity of personality in the context of employment behaviour amongst Irish women. A quasi-experimental design, generated by implementation and abolition of the so-called “Marriage Bar”, is employed. The Marriage Bar was the legal requirement that women leave paid employment upon getting married in Ireland. Because this law was abolished only in the 1970s, many of the women affected are still alive and are among the respondents in *The Irish Longitudinal Study on Ageing*. The identification strategy is based on the comparison of two groups of women affected by the Marriage Bar. The comparison is between those who returned to employment after being forced to leave the labour market and those who did not. The analysis supports the view that researchers interested in the relationship between the Big-5 and labour market outcomes should not view the potential problem of “the endogeneity of personality” as a problem.

**JEL Classification:** J2, J4, J7

**Keywords:** Big-5 personality traits, labour market success, endogeneity, discrimination

**Corresponding author:**

Irene Mosca  
The Irish Longitudinal Study of Ageing (TILDA)  
Lincoln Gate, Trinity College  
Dublin 2  
Republic of Ireland  
E-mail: MOSCAI@tcd.ie

# Is Personality Endogenous? Evidence from Ireland

## 1. Introduction

There is a growing interest in economics in the role played by personality in explaining labour market behaviour. Research to date points to the *Big-5* personality traits being a possible determinant of wages and employment (Nyhus and Pons, 2005; Muller and Plug, 2006; Heineck and Anger, 2010; Heineck, 2011; Fletcher, 2013, Prevoe and ter Weel, 2015 and Gensowski, 2018). However, most of this research is based on the assumption that personality is exogenous. That is, the direction of causation is the impact of personality on the outcome of interest (such as earnings) and not the other way round. If personality is endogenous, then statistical modelling (such a multiple regression) will lead to biased estimates of the effects of these traits as well as biased estimates of the other included factors.

This paper examines the potential endogeneity of the *Big-5* in the context of employment behaviour amongst Irish women. We do not adopt the approach of instrumental variable estimation, which to date is the most popular approach used by economists to address potential endogeneity. Instead, we employ a quasi-experimental design, generated by implementation and abolition of the so-called “Marriage Bar”. This design generates a sample of women who were forced to leave employment because of a policy of legally-binding gender discrimination.

Between the 1920s and the 1970s in Ireland, women working in the public sector and in many semi-state and private organisations were required to leave paid employment upon getting married. Only around one third of the women affected by this “Marriage Bar” subsequently returned to full-time employment. Because the Marriage Bar was abolished only in the 1970s, many of the women affected are still alive and are among the respondents in *The Irish Longitudinal Study on Ageing*. Our identification strategy to address the potential

endogeneity of personality is based on the comparison of two groups of women affected by the Marriage Bar. The comparison is between those who returned to employment after being forced to leave the labour market and those who did not.

We believe that this comparison forms a good test of the relationship between personality and labour market success not contaminated by the potential endogeneity of personality for two reasons. The first is that all the women in the sample were exposed to the same exogenous event, which is compulsory labour market exit at marriage due to the Marriage Bar, with almost all women marrying in Ireland. Since labour market exit was not a “choice” for these women, it is unlikely to be affected by personality. The second is that TILDA is rich in information and it is possible to control for a large number of individual characteristics that are likely to be correlated with personality and labour market success.

The remainder of the paper is organised as follows. Section 2 briefly reviews previous research that examines the effect of the *Big-5* personality traits on labour market outcomes. Particular attention is paid to those studies that have attempted to address the potential endogeneity of personality. Section 3 is a description of the Irish Marriage Bar. It is not widely recognised that its abolition only occurred in the 1970s, implying that there are still many women who are alive who were forced to leave work upon getting married. While other countries had similar Marriage Bars, they were abolished much earlier, and in these countries there are few—if any—affected women still living. The statistical approach is outlined in Section 4. Results are presented in Section 5. Conclusions follow in Section 6.

## **2. Previous literature**

The association between the *Big-5* personality traits and wages across men and women has been studied by Nyhus and Pons (2005), Muller and Plug (2006), Heineck and Anger (2010), Heineck (2011), Fletcher (2013), Prevoo and ter Weel (2015) and Gensowski

(2018). In these papers, OLS wage regressions are estimated that include a variable for each of the *Big-5* personality traits: (1) Agreeableness, (2) Neuroticism, (3) Conscientiousness, (4) Extraversion and (5) Openness. Briefly, Agreeableness reflects traits including trust, altruism, and compliance; Neuroticism reflects traits including anxiety, hostility and heightened sensitivity to stress; Conscientiousness reflects traits including self-discipline, orderliness, competence and planning; Openness reflects traits including intellectual curiosity, imagination and enjoyment of novelty; and Extraversion indexes a number of traits that are associated with positive emotionality including warmth, sociability, activity and optimism.

The findings of these paper are mixed. For example, Nyhus and Pons (2005), using data from the Dutch Household Survey, find that Emotional Stability (the inverse of Neuroticism) is associated with higher wages among men and women, and that Agreeableness is associated with lower wages only among women. No association is found between Extraversion or Conscientiousness and wages. Likewise, Mueller and Plug (2006), using data from the Wisconsin Longitudinal Study, find that Emotional Stability and Antagonism (the inverse of Agreeableness) are associated with higher wages among men, but not among women. Conscientiousness by contrast is associated with higher wages among women, but not among men. Openness to Experience is associated with significantly higher earnings for both men and women.

Using longitudinal data from the German Socio-Economic Panel, and employing pooled OLS regression models, Heineck and Anger (2010) find evidence of a wage premium for Openness among women and of a wage penalty for the same trait among men. Conscientiousness is associated with higher wages among men, but not among women. Agreeableness is not associated with wages among men but is negatively related to wages among women. Using longitudinal data from the British Household Panel Survey, Heineck

(2011) finds evidence of a wage penalty for both Agreeableness and Neuroticism for women. Agreeableness is also penalised among men but Neuroticism is not.

Using several waves from the 1970 British Cohort Study, Prevo and ter Weel (2015) find a significant and sizeable correlation between Conscientiousness measured at age 16 and employment and wages measured at age 34. Mothers' reports on their children's personality and behaviour at age 16 are used. Statistically significant differences by sex are not found. Using data from a high-IQ sample of men and women born around 1910 in the US, Gensowski (2018) find that male lifetime earnings are positively associated with Conscientiousness and Extraversion and negatively correlated with Agreeableness. The analysis for women is more challenging as the women in the sample belonged to a generation in which the main role for a woman was that of a homemaker, wife and mother. Indeed, half of the women in the sample are home makers. Gensowski (2018) finds that, with the exception of Conscientiousness, the associations of personality traits with lifetime earnings for women are much weaker for women than for men. However, women's Extraversion is found to be positively associated with family earnings.

Nyhus and Pons (2005), Heineck and Anger (2010) and Heineck (2011) attempt to control for the potential endogeneity of personality by employing regressions that are free from age effects. The aim of the approach is to remove the effects that individuals are exposed to over their life course, including possible effects of the job environment on their personality. This is achieved by regressing each personality trait on a polynomial in age and including the residual of this regression as the relevant measure of personality. However, as Heineck and Anger (2010, p. 540) state, this approach is "far from perfect".

In an attempt to control for individual specific heterogeneity, Heineck and Anger (2010) and Heineck (2011) estimate random effects regressions. Random effects regressions account for individual specific heterogeneity that is uncorrelated with cognition, personality, and the

other control variables. However, this is unlikely to be true, implying that fixed effects estimation is preferred since this assumption is relaxed. However, since personality is measured only at one wave of the panel data that they use, it is not possible to apply standard fixed effects estimation. Hausman and Taylor (1981) suggest a fixed effects estimator that can be used for variables that are potentially endogenous but time invariant. Heineck and Anger (2010) and Heineck (2011) apply this estimator. While Heineck (2011) finds that most of the results of the baseline model are reinforced when this estimator is used, Heineck and Anger (2010) find that, with the exception of a wage penalty for Agreeableness among women, the *Big-5* personality traits become statistically insignificant.

Fletcher (2013) is the first and only study to estimate what can be termed “sibling fixed-effect models” to study the associations between the *Big-5* personality traits, wages and employment status (i.e. working or not). Data from a sibling subsample of the National Longitudinal Study of Adolescent Health (Add Health) are used to control for shared family environment that may be associated with personality and future adult outcomes. The primary advantage of using sibling comparisons is to control for family background factors that are shared by siblings but often unavailable in surveys. Examples are parental ability, parental labour market connections and parental personality. Fletcher (2013) compares the results of the sibling fixed effects models to the results of the baseline model that does not control for sibling fixed effects and based on the entire Add Health sample. He finds that only the negative relationship between Neuroticism and wages for men remains statistically significant in the sibling fixed effects model.

To our knowledge, the study by Cubel et al. (2016) is the only study that has conducted a laboratory experiment to examine the relationship between the *Big-5* and a specific indicator of labour market success: individual productivity. The subjects of the experiment are 359 Australian university students. Cubel et al. (2016) find that productivity is negatively correlated

with Neuroticism and positively correlated with Conscientiousness. They argue that these experimental findings mean that at least part of the effect of Neuroticism and Conscientiousness on earnings found in some of the studies based on survey data (like those discussed above) operates through individual productivity. They also find a very weak negative effect of Openness and Agreeableness on productivity. They speculate that the strong correlation of Openness and Agreeableness with labour market outcomes found in the literature is mostly driven by occupational choices made, wage bargaining, and by cooperative behaviour being penalised in the labour market, rather than by individual productivity.

In summary, the results of the studies to date that have investigated the relationship of the *Big-5* personality traits and labour market outcomes are mixed. This inconclusive evidence seems to depend on at least three factors. The first factor is the methodology employed and the extent to which the endogeneity of the *Big-5* to labour market success is taken into account. For example, the results of the baseline OLS models of Fletcher (2013) and Heineck and Anger (2011) are not replicated when sibling fixed effects and instrumental variable regressions are used. The second factor is the outcome under investigation. For example, Agreeableness is found to be highly correlated with wages (Nyhus and Pons, 2005; Heineck, 2011; Heineck and Anger, 2010) but not correlated with productivity (Cubel et al., 2016). The third factor is heterogeneity by gender. With the exception of Prevo and ter Weel (2015), all of these studies find evidence that personality traits are rewarded or penalized differently across men and women.

### **3. Background to the Irish Marriage Bar**

The Marriage Bar was the requirement that women working in certain sectors leave paid employment upon marriage. The first legislation to curb female employment in the Irish Civil Service was introduced in the 1920s. In 1933, a ban on the employment of married women

as primary teachers was implemented, followed by a complete Marriage Bar for women employed in pensionable posts in the Civil Service in 1956 (Cullen Owens, 2005). Although not legally obliged to do so, many semi-state and private organisations, including banks, utility companies and large manufacturers dismissed women when they married. Private sector employers dismissed women working primarily in clerical and skilled occupations. Examples of such occupations are clerical officers, accounts clerks, typists, book keepers and secretaries. At times, private sector employers also dismissed unskilled workers (Kiely and Leane, 2012, p.91).

The Marriage Bar was eventually repealed because of the demand for equality and the potential effects of labour shortages on the economy. The bar was lifted for primary schooling teaching in 1958 and in the Civil Service in 1973. Discrimination in employment on the grounds of sex or marital status was made illegal in 1977. More details on the Irish Marriage Bar can be found in Connolly (2003), Cullen Owens (2005), Russell et al. (2017), Mosca and Wright (2018) and Mosca et al. (2017).

Ireland is not the only country where women were dismissed at marriage. For example, Marriage Bars survived up to the 1950s in the United States (Goldin 1990), England (Smith 1986), the Netherlands (Boeri and Van Ours 2013) and Germany (Kolinsky 1989). Ireland is, however, unique in the duration of the enforcement of the Marriage Bar. Many Irish women who were affected are still alive and are in the TILDA sample. Most of the women affected by the Marriage Bar in the other countries are likely to have died or to be very old.

## **4. Methodology**

### **4.1 Data**

*The Irish Longitudinal Study of Ageing*, or TILDA for short, is a nationally representative sample of community dwelling individuals aged 50+ resident in Ireland. The

survey collects information on the economic, health and social aspects of the respondents' lives. It is modelled closely on the US *Health and Retirement Study*, the *English Longitudinal Study on Ageing* and the *Survey of Health, Retirement and Ageing in Europe*. Crucially for our study design, TILDA is the first large-scale longitudinal study on ageing to include specific questions on the Marriage Bar.

To date, four waves of data have been collected. At each wave, respondents first complete a computer-assisted personal interview (CAPI) in their own home. At the end of the CAPI interview, each respondent is asked to fill in a self-completion questionnaire (SCQ) and return it by post (in a prepaid envelope) to the TILDA study. This questionnaire asks a range of potentially sensitive questions, including questions on quality of life, emotional well-being and health behaviours. At every second wave, respondents are also invited to travel to a dedicated health centre for a comprehensive health assessment. If unable or unwilling to travel to the health centre, respondents are offered a modified assessment in their own home. All assessments are carried out by qualified and trained research nurses. More detail about TILDA can be found in Kearney et al. (2011), Whelan and Savva (2013), and Cronin et al. (2013).

The analysis of this paper is restricted to women who fulfill three criteria. First, they answer the personality questions at Wave 2 SCQ interview. Second, they report to have been affected by the Marriage Bar at Wave 3 CAPI interview. Third, they have valid observations for all the control variables employed in the empirical model. As explained in detail below, early-life cognitive ability is one of the controls included in the analysis. In TILDA, early-life cognitive ability is measured through a cognitive test carried out at Wave 3 health assessment. In a nutshell, only women who answer the personality questions at Wave 2 SCQ interview, report to have been affected by the Marriage Bar at Wave 3 CAPI interview, and undertake the health assessment at Wave 3, either in the dedicated health assessment centre or in their own home, are included in the analysis. The final sample includes 276 women.

One important note of caution is needed. The aim of this paper is to investigate the effects of the *Big-5* personality traits on labour market success using data from older Irish women. All the women in the final sample were affected by the Marriage Bar and had to leave employment at marriage. We argue that a comparison of the two groups of women, those affected by the Marriage Bar who never returned to full-time employment and those affected by the Marriage Bar who subsequently returned to full-time employment, forms a good test of the relationship between personality and labour market success. However, the validity of the personality effects on labour market success also depends on whether being affected by the Marriage Bar is endogenous to personality traits. This could happen for at least two reasons.

First, women who never engaged into paid work and never married are excluded from the analysis. This is because, by definition, this group of women was not affected by the Marriage Bar. However, one might argue that marrying and engaging into paid work are endogenous to personality traits. For example, it could be that women who are less agreeable did not marry as they did not want to leave employment at marriage. Second, one might argue that occupational choices at labour market entry are also endogenous to personality traits. As explained above, the Marriage Bar was enforced by law in the public sector and mimicked by many, but not all, semi-state and private organisations, including banks, utility companies, and large manufacturers. It could be that women who are less extroverted opted jobs in the public sector, as retiring at marriage was enforced by law in this sector, and that women who are more extroverted opted for jobs in the private sector, as not all private sector employers enforced the Marriage Bar.

Reassuringly, Mosca and Wright (2018) and Mosca et al. (2017) have shown that the social and economic circumstances of Ireland before the 1980s were such that there was significantly less self-selection into marriage, employment and occupations than there would be today. For the generation of women included in the TILDA sample, almost all women

married. These cultural norms were largely an outcome of the importance of the Catholic Church in Irish society. The availability of contraception was legalized in stages after the abolition of the Marriage Bar, from the late 1970s to the early 1990s. There was a social stigma attached to motherhood outside of marriage. For example, under Irish law until the 1990s, children were classified as either legitimate or illegitimate. Divorce was legalised in 1995. Most women worked for a period after leaving school.

Prior to the 1970s, and to a lesser extent during the 1970s, in Ireland, women, and indeed men, could not easily choose for whom and where they worked. Economic growth averaged just 1.8% from the foundation of the state in the 1920s to the start of the 1970s (Bolt and van Zanden, 2014). Ireland did not share the post-War boom experienced by Western European countries. Despite starting from a lower level of output, Irish growth rates did not begin to rise above those of its Western European neighbours until the 1970s. Put simply, for the women in the TILDA sample, “marriage was the norm and job opportunities were scarce”.

## 4.2 Model

The first outcome studied is whether or not the woman re-entered employment after being affected by the Marriage Bar. Since the indicator of employment is a binary variable, a probit model of the following form is estimated:

$$P(Emp_i = 1) = \Phi (\alpha + \sum_j \beta_j P_{ij} + \sum_k \gamma_k X_{ik} ) \quad [\text{Eq. 1}]$$

where  $Emp = 1$  if the woman  $i$  re-entered full-time employment, zero otherwise;  $P_j$  is a vector of the *Big-5* personality traits and  $X_k$  is a vector of other variables thought to impact on employment probabilities.  $\Phi$  is the standard normal cumulative distribution.

The second outcome studied is the occupational status (prestige) of the job the woman returned to. As explained below, this variable is equal to zero for the women who did not re-

enter employment and is continuously distributed over positive values for women who re-entered employment. A Tobit model of the following form is employed:

$$OccupStatus_i^* = \begin{cases} OccupStatus_i & \text{if } OccupStatus_i > 0 \\ 0 & \text{if } OccupStatus_i = 0 \end{cases} \quad [\text{Eq. 2}]$$

where  $OccupStatus_i = \alpha + \sum_j \beta_j P_{ij} + \sum_k \gamma_k X_{ik} + u_i$  is the latent regression model.

### 4.3 Variables

#### Labour market success

Two measures of labour market success are employed: probability of re-entering full-time employment and occupational status of the job the woman returned to. Women in the TILDA sample reporting that they “had to leave a job because of the Marriage Bar” are first asked the following question: “Did you ever return to full-time employment after leaving this job?”. If the answer is “yes”, then they are asked to report the occupation of the job they returned to.

Respondents’ occupations are recoded into the International Socio-Economic Index (ISEI), which is a continuous and internationally comparable measure of occupational status developed based on information on income, education, and occupation (Ganzeboom et al., 1992). The latest version of the scale is used. This is the so-called ISEI-08. This scale was constructed by Ganzeboom and Treiman (2011) using a large cross-national database of men and women. The ISEI-08 score ranges between 10 and 89, with higher scores indicating higher occupational status. To illustrate, medical doctors get the highest score and kitchen helpers get the lowest score. Primary school teachers get a score of 61, clerical support workers get a score of 41, receptionists get a score of 37, shop assistants get a score of 31 and factory workers a score of 21. In the analysis of this paper, women who did not return to employment get a score of zero. The ISEI scale has been widely used in empirical research to measure occupational

status. For example, see Kanas et al. (2012), de Vroome et al. (2011), Smith (2012), van Hoorn and Maseland (2010), Vandenberghe and Robin (2004) and Kassenboehmer and Schatz (2017).

### **Personality traits**

In TILDA, personality traits are measured using the NEO Five-Factor Inventory-3 (Costa and McCrae, 2004). It is a 60-item self-report instrument that yields scores for each of the *Big-5* personality traits. Each scale comprises 12 items and respondents are required to indicate the extent to which they agree with each statement on a 5 point likert-scale ranging from strongly agree through neutral to strongly disagree. Examples of statements included in the measures are: “*I like to be where the action is*”, “*I often feel tense and jittery*”, “*When I make a commitment, I can always be counted on to follow through*”, “*I generally try to be thoughtful and considerate*” and “*I often enjoy playing with theories or abstract ideas*”. Responses to each item are scored 0–4 so that the total score for each scale ranges from 0 to 48 with higher scores indicating higher levels of the trait. Scale scores are pro-rated if the respondent is missing three or fewer items on each dimension of the questionnaire. The complete list of items included in the five traits is included in Appendix 1.

A concern is that personality can change in old age as a consequence of the ageing process itself (Cobb-Clark and Schruer, 2012; Heineck and Anger, 2010). As the mean age in the sample is 73.8 years, this concern has to be addressed. In order to mitigate against the potential problem of life-cycle effects influencing personality traits and the subsequent measurement error this might induce, each personality trait is conditioned on a second-order polynomial in age. This approach has been used in several economics-based empirical papers, including Brown & Taylor (2014), Nyhus & Pons (2005), Osborne Groves (2005), Heineck and Anger (2010), Heineck (2011) and Mosca and McCrory (2016). The resulting residuals are then standardised so that they have a mean of zero and a standard deviation of one. The standardised residuals are used as indicators of personality net of life-cycle influences.

## Controls

The variables of the “ $X_k$ ” vector are added incrementally to the model. First, only age, educational attainment and a set of variables aimed at capturing childhood characteristics as well and early-life cognitive ability are included. The inclusion of these variables is important as one cannot exclude that the same process, such as parental investments in their children, early-life cognitive ability or education, jointly determine personality and labour market success. If this is the case and these “processes” are not controlled for, then the estimated coefficients of the personality traits are likely to be biased.

Educational attainment is measured by the number of years of schooling completed. Childhood circumstances are measured by a set of dummy variables based on the woman’s self-reporting of childhood conditions before the age of 14. These capture whether the respondent recalls her family being “poor” during her own childhood; whether she recalls there not being “at least ten books” in her childhood home; whether she grew up in a “rural area”; and whether she recalls not being any “feature” in her childhood home. The features listed to the respondent are as follows: fixed bath; cold running (piped) water supply; hot running (piped) water supply; inside toilet; central heating and electricity.

Early-life cognitive ability is measured through a test which is novel in the context of other large scale, nationally-representative studies on ageing. This is the National Adult Reading Test (Nart) test (Nelson, 1982; Nelson & Willison, 1991). The Nart is a 50-item single-word reading test of graded difficulty. All the 50 words are irregular, that is, they violate grapheme-phoneme correspondence rules (e.g. ache, thyme, topiary). The supposition is that the test makes minimal demands on current cognitive ability, and depends instead on prior ability. It makes minimal demands on current cognitive ability because the words the respondent is asked to read orally are short and single, although of graded difficulty. It depends on prior cognitive ability because the respondent must have prior knowledge of a word's

pronunciation in order to read it correctly. The hypothesis that the Nart is a test of prior intellectual functioning has been validated in the literature. For example, Crawford et al. (2001) have shown that the Nart performance at age 77 is highly correlated with IQ age 11 ( $r = 0.73$ ;  $p\text{-value} < 0.001$ ).

In TILDA, the 50 words are presented to the respondent by a nurse during the health assessment, whether this takes place in the dedicated health centre or in the respondent's home. The words are written on cards. After the respondent reads a word, the nurse turns over the card to the next word. All respondents are warned that there are many words that they probably will not recognise and are encouraged to guess in such cases. One point is given for each correctly pronounced word, with a maximum of 50 points. If the respondent scores more than five words incorrect within the first 25 words, the test can be discontinued after 25 words. Respondents who are illiterate or blind are excluded from the test.

Second, measures of work experience before labour market exit at marriage are included. These include age at labour market entry and occupational status of the first job. The ISEI-08 scale is used to measure occupational status of the first job. As explained above, the Marriage Bar affected women working primarily in clerical and skilled occupations, such as clerical officers, accounts clerks, typists, book keepers and secretaries, but not only. At times, unskilled workers were also dismissed (Kiely and Leane, 2012, p.91). Third, a variable capturing number of children is included as one can argue that women who had more children were less likely to return to work or to return to more prestigious jobs.

## **5. Results**

Definitions of all variables, along with summary statistics, are shown in Table 1. The probit regression estimates for return to full-time employment are summarised in Table 2. The estimates are marginal effects with the ratio of the estimate to its standard error in parentheses. In the specification shown in Column (1), only the *Big-5* personality traits are included as

explanatory variables and are expressed as standardised residuals. Controls for age, educational attainment and early-life conditions are added in the specification of Column (2). Controls for work experience are included in the specification of Column (3) and a measure of the woman's fertility over the life-course is added in the specification of Column (4).

Five key results emerge from Table (2). First, all regressions show that women scoring higher on the *Agreeableness* trait were less likely to return to employment. To illustrate, the regression of Column (4) indicate that a one standard deviation increase in *Agreeableness* is associated with a 8.1% point lower probability of re-entering employment. Second, women scoring higher on the *Extraversion* trait were more likely to return to employment. However, the marginal effect of Extraversion is significant at the 10% level only in the regression of Column (4), which is the regression including the most controls. Third, women who are older at the time of the interview and who were older when they entered the labour market were less likely to return to employment. Fourth, early-life cognitive ability is positively associated with return to work. An increase in the Nart score by one point increases the probability of returning to work by 0.7 percentage points. Fifth, fertility is negatively associated with return to employment. An additional child is associated with a 6.7 percentage point lower probability of returning to employment.

Columns (1) to (4) in Table 3 show the tobit regression estimates for occupational status. The ISEI-08 scale is used to measure occupational status. The scale ranges between 10 and 89, with higher scores indicating higher occupational status. Women who did not return to employment get a score of zero. The estimates are marginal effects for the unconditional expected value of occupational status with the ratio of the estimate to its standard error in parentheses. Once again, four specifications are included. The estimates of Table 3 are in line with the estimates of Table 2. Focusing first on the *Big-5* personality traits, occupational status is negatively associated with Agreeableness and positively associated Extraversion. The

estimates of Table 3, Column (4) show that, on average, an increase of one standard deviation in Agreeableness decreases occupational status by 3.05 points. An increase of one standard deviation in Extraversion increases occupational status by 3.45 points. Both estimates are significant at the 5% level. Early-life cognitive ability and fertility are also important determinants of occupational status. On average, an additional point in the Nart test score increases occupational status by 0.31 points. An additional child decreases occupational status by 2.8 points.

Table 4 presents the results of the so-called McDonald and Moffitt decomposition (McDonald and Moffitt, 1980). The marginal effects presented in Table 3 measure the total change in the unconditional expected value of occupational status following a unit change in the explanatory variables. This total change can be decomposed into two intuitive parts. The first part is the change in the probability of returning to employment times its conditional mean. The second part is the change in the magnitude of occupational status given that it is positive times its probability. The results of the McDonald and Moffitt decomposition for the *Big-5* personality traits based on the tobit regression estimates of Table 3, Column (1) and (4) are presented in Table 4. The total change is labelled as (a). The change stemming from employment is labelled as (b). The change stemming from occupational status is labelled as (c). To illustrate, the estimates of Column (4a) show that a one standard deviation increase in Agreeableness is associated with a decrease of 3.05 points in the unconditional expected value of occupational status. Of this 3.05 point decrease, 2.07 points (68%) are generated by a decrease in the probability of going back to employment at all, and the remaining 0.98 points (32%) are generated by a decrease in the value of occupational status of those who returned to work.

A final note of caution is needed. Ideally, an indicator of a woman's family socioeconomic status should be added to the list of explanatory variables in Equations [1] and

[2] as this can be an important predictor of a woman's decision to return to employment. For example, the life-time income of the woman's husband is likely to be a good proxy of family socioeconomic status. Unfortunately, information on the husband's life-time income is not collected in the TILDA data. However, the TILDA survey collects information on the number of years the husband spent in education for a subsample of women. This subsample includes women whose husband is also participating in the TILDA survey and women who are currently married. Information on (former/late) husband's educational attainment is not collected for women who are widows, separated or divorced at the time of the interview. In regressions not reported in the paper but available on request, probit and tobit regressions were also estimated for the subsample of women for whom this information is available (N=174). A control for husband's educational attainment was added. The estimates of the *Big-5* personality traits were largely unchanged.

## **6. Conclusion**

There is a growing interest in economics in the role played by personality in explaining labour market behaviour. Research to date points to the *Big-5* personality traits being a possible determinant of wages and employment. However, most of this research is based on the assumption that personality is exogenous and therefore the potential of reverse causation is assumed away. This is problematic since it is not unreasonable to hypothesise that labour market behaviour impacts on personality. For example, an increase in earnings, and in particular a large increase in earnings, may have an impact on personality traits. Clearly much more research needs to be carried out that addresses this issue.

The most popular approach to addressing potential endogeneity in the economics literature is instrumental variable estimation. However, it is our view that this approach will not be fruitful in the context of personality and labour market success. At the minimum, the approach requires a variable for each potentially endogenous variable that is highly correlated

with personality but not correlated (or at least having a low correlation) with the labour market variable of interest. We have had no success in finding such a variable and research to date does not point to any obvious or convincing candidates.

The approach that we use compared two groups of Irish women who left employment because they were legally required to do so when they married. It is important to note that for the cohorts of women from which our sample is drawn, almost all of them married, since this was the cultural norm at the time. Since this is the case, differences in personality cannot be the factor explaining marriage since there is no variance in marriage. Most importantly, it suggests that personality cannot be a factor in explaining why they left employment when they married—they simply had to do this by law. We believe that this generates a homogenous sample that allows a clear test of the impact of personality on employment decisions. Some of these women returned to work while others did not. Our analysis indicates that personality traits, particularly Agreeableness and Extraversion, are important in the understanding of employment decisions. Negative returns of Agreeableness to labour market success have also been found in previous studies. These include both studies that did not control (Nyhus and Pons, 2005) and did control (Heineck, 2011; Heineck and Anger, 2010) for the endogeneity of personality to labour market success.

Given that our analysis employs five personality measures, by default we also find that three of them, Neuroticism, Conscientiousness and Openness, are not important. It is our view that researchers should not assume that all *Big-5* personality traits are correlated with all possible labour market outcomes. Our analysis is unique as it focuses on a group of women who have been discriminated against in the labour market. While Marriage Bars do not exist anymore, gender discrimination still does exist in many forms. Therefore, our main finding of a sizable and causal effect of Agreeableness and Extraversion on employment is not an historical artefact of no current relevance.

## References

Boeri, T. and J. van Ours (2013), *The economics of imperfect labor markets*. Princeton University Press

Bolt, J. and J. Luiten van Zanden, (2014), “The Maddison project: collaborative research on historical national accounts”, *The Economic History Review*, 67(3): 627–651

Brown, S., and K. Taylor (2014), “Household finances and the “Big Five” personality traits”, *Journal of Economic Psychology*, 45: 197–212

Cobb-Clark, D.A. and S. Schurer (2012), “The stability of big-five personality traits”, *Economics Letters*, 115: 11-15

Connolly, E. (2003), “Durability and change in State gender systems. Ireland in the 1950s”, *The European Journal of Women’s Studies*, 10(1): 65-86

Costa, P.T. and R.R. McCrae (2004), “A contemplated revision of the NEO five factor inventory”, *Personality and Individual Differences*, 36(3): 587-596

Crawford, J.R., I.J. Deary, J. Starr and L.J. Whalley (2001), “The NART as an index of prior intellectual functioning: a retrospective validity study covering a 66-year interval”, *Psychological Medicine*, 31: 451–458

Cronin, H. C. O'Regan, P. Kearney, C. Finucane and R.A. Kenny (2013), "Health and ageing: development of the TILDA health assessment", *Journal of American Geriatrics Society*, 61 (s2): S269-S278

Cubel, M., A. Nuevo-Chiquero, S. Sanchez-Pages and M. Vidal-Fernandez (2016), "Do personality traits affect productivity? Evidence from the laboratory", *The Economic Journal*, 126: 654-681

Cullen Owens, R. (2005), *A Social History of Women in Ireland*. Dublin: Gill & Macmillan

Fletcher, J.M. (2013), "The effects of personality traits on adult labor market outcomes: Evidence from siblings", *Journal of Economic Behavior & Organization*, 89:122-135

Ganzeboom, H.B.G., P.M. De Graaf and D.J. Treiman, (1992), "A standard international socio-economic index of occupational status", *Social Science Research*, 21:1-56

Ganzeboom, H.B.G. and D.J. Treiman, (2011), "International stratification and mobility file: Conversion tools", Amsterdam: Department of Social Research Methodology. <http://www.harryganzeboom.nl/ismf/index.htm>

Gensowski, M. (2018), "Personality, IQ, and lifetime earnings", *Labour Economics*, 51:170-183

Goldin, C. (1990), “Why did change take so long?”, In: Goldin, C. and C. Dale (Eds.), *Understanding the gender gap: an economic history of American women*, Oxford University Press, pp. 159-184

Hausman, J. and W. Taylor (1981), “Panel data and unobservable individual effects”, *Econometrica*, 49(6): 1377-1398

Heineck, G. (2011), “Does it be pay to be nice? Personality and earnings in the United Kingdom”, *Industrial and Labor Relations Review*, 64(5): 1020-1038

Heineck, G. and S. Anger (2010), “The returns to cognitive abilities and personality traits in Germany”, *Labour Economics*, 17: 535-546

van Hoorn, A. and R. Maseland (2010), “Cultural differences between East and West Germany after 1991: Communist values versus economic performance?”, *Journal of Economic Behavior & Organization*, 76: 791–804

Kanas, A., B.R. Chiswick, T. van der Lippe and F. van Tubergen (2012), “Social contacts and the economic performance of immigrants: a panel study of immigrants in Germany”, *International Migration Review*, 46(3):680-709

Kassenboehmer, S.J. and S.G. Schatz (2017), “Re-employment expectations and realisations: Prediction errors and behavioural responses”, *Labour Economics*, 44:161–176

Kearney P., H. Cronin, C. O'Regan, Y. Kamiya, G. Savva et al. (2011), "Cohort profile: The Irish Longitudinal Study on Ageing", *International Journal of Epidemiology* 40 (4): 877-884

Kiely, E. and M. Leane (2012), *Irish Women at Work, 1930-1960: an Oral History*. Irish Academic Press

Kolinsky, E. (1989), *Women in West Germany: life, work and politics*. Oxford and Providence, RI: Berg

McDonald, J.F. and R.A. Moffitt (1980), "The uses of Tobit analysis", *The Review of Economics and Statistics*, 62(2): 318-321

Mosca, I. and C. McCrory (2016), "Personality and wealth accumulation among older couples: do dispositional characteristics pay dividends?" *Journal of Economic Psychology*, 56: 1-19

Mosca, I., V. O'Sullivan and R.E. Wright (2017), "Maternal employment and child outcomes: evidence from the Irish Marriage Bar", IZA Discussion Paper No. 11085

Mosca, I, and R.E. Wright (2018), "Effect of retirement on cognition: evidence from the Irish Marriage Bar", *Demography* (in press)

Mueller, G. and E. Plug (2006), "Estimating the effects of personality on male and female earnings", *Industrial and Labor Relations Review*, 60(1): 3-22

Nelson, H.E. (1982). *National Adult Reading Test (NART): Test Manual*. NFER-Nelson: Windsor

Nelson, H.E. and Willison, J. (1991). *National Adult Reading Test Manual (2nd Ed.)*. NFER-Nelson: Windsor

Nyhus, E.K. and E. Pons (2005), “The effects of personality on earnings”, *Journal of Economic Psychology*, 26: 363–384

Osborne Groves, M. (2005), “How important is your personality? Labor market returns to personality for women in the US and UK”, *Journal of Economic Psychology*, 26, 827–841

Prevoo, T. and B. ter Weel (2015), “The importance of early conscientiousness for socio-economic outcomes. Evidence from the British cohort study”, *Oxford Economic Papers*, 67(4): 918-948

Russell, H., F. McGinnity and P. O’Connell, P. (2017), “Gender equality in the Irish labour market 1966-2016: unfinished business?”, *The Economic and Social Review*, 48(4): 393-418

Smith, H.L. (1986), *War and social change: British society in the Second World War*, Manchester University Press

Smith, I. (2012), “Reinterpreting the economics of extramarital affairs”, *Review of Economics of the Household*, 10:319-343

Vandenberghe, V. and S. Robin (2004), “Evaluating the effectiveness of private education across countries: a comparison of methods”, *Labour Economics*, 11: 487– 506

de Vroome, T., M. Coenders, F. van Tubergen and M. Verkuyten (2011), “Economic participation and national self-identification of refugees in the Netherlands”, *International Migration Review*, 45(3): 615-638

Whelan, B. and G.Savva (2013), “Design and methodology of the TILDA study.” *Journal of American Geriatrics Society*, 61 (s2): S265-S268

**Table 1: Descriptive Statistics for Regression Variables**

<i>Mnemonic</i>	<i>Definition/Measurement</i>	<i>Mean</i>	<i>St. Dev.</i>
<b>Dependent Variables</b>			
Emp	Dummy: 1 for re-entered full-time employment after compulsory labour market exit at marriage; 0 otherwise	39.9%	--
OccStauts	ISEI-08 of job returned to Score for women with Emp=0: 0 Score range for women with Emp=1: 10-89	41.6*	14.1*
<b>Explanatory Variables</b>			
<b>Personality traits</b>			
Extraversion	Reflects traits including warmth, sociability, activity and optimism Score range: 0-48, based on 12 items	28.1	5.8
Neuroticism	Reflects traits including anxiety, hostility and heightened sensitivity to stress. It is also known as emotional instability Score range: 0-48, based on 12 items	18.9	7.1
Conscientiousness	Reflects traits including self-discipline, orderliness, competence and planning Score range: 0-48, based on 12 items	33.5	5.1
Agreeableness	Reflects traits including trust, altruism, and compliance Score range: 0-48, based on 12 items	35.4	4.2
Openness	Reflects traits including intellectual curiosity, imagination and enjoyment of novelty. It is the trait most correlated with intelligence. Score range: 0-48, based on 12 items	28.0	5.8
Age	Years	72.6	7.2
<b>Early-life Conditions</b>			
PoorFam	Dummy: 1 for self-reported poor socioeconomic position in childhood; 0 for average/well-off	11.2%	--
NoBooks	Dummy: 1 for 0-10 books in the accommodation respondent lived in childhood; 0 for 11+ books	33.7%	--
NoFeature	Dummy: 1 for no features in the accommodation respondent lived in childhood; 0 for 1+ feature (e.g. inside toilet, central heating, electricity)	13.4%	--
Rural	Dummy: 1 for rural household; 0 for urban household	56.2%	--
Nart	National Adult Reading Test is a measure of early-life cognitive ability Score range: 0-50	28.6	11.0
<b>Educational Attainment</b>			
School	Years completed	12.3	2.3
<b>Work Experience</b>			
AgeEntry	Age at labour market entry in years	17.7	2.0
OccStautsEntry	ISEI-08 of first job	41.4	11.4
<b>Fertility</b>			
NumChild	Number of children	3.9	1.9

\*: Mean and standard deviation are reported for women with Emp=1

**Table 2: Probit Regression Results, Return to Full-time Employment**

Specification:	(1)	(2)	(3)	(4)
	Big-5	+ Age + Education + Early-life Conditions	+ Work Experience	+ Number of Children
Extraversion	0.036 (1.0)	0.061 (1.6)	0.056 (1.4)	0.073* (1.9)
Neuroticism	0.002 (0.1)	0.006 (0.2)	0.006 (0.2)	0.017 (0.5)
Conscientiousness	0.042 (1.2)	0.039 (1.1)	0.041 (1.1)	0.034 (0.9)
Agreeableness	-0.076** (-2.3)	-0.091*** (-2.7)	-0.087** (-2.5)	-0.081** (-2.2)
Openness	-0.013 (-0.4)	-0.032 (-0.9)	-0.031 (-0.9)	-0.028 (-0.8)
Age		-0.019*** (-4.0)	-0.019*** (-4.0)	-0.018*** (-3.8)
PoorFam		-0.043 (-0.4)	-0.070 (-0.7)	-0.024 (-0.2)
NoBooks		0.068 (0.9)	0.085 (1.1)	0.086 (1.1)
NoFeature		0.162 (1.6)	0.165 (1.6)	0.195* (1.9)
Rural		-0.116* (-1.7)	-0.109 (-1.6)	-0.067 (-1.0)
Nart		0.007** (2.2)	0.007** (2.0)	0.007** (2.1)
School		-0.015 (-1.0)	0.008 (0.4)	0.005 (0.2)
AgeEntry			-0.046* (-1.9)	-0.041* (-1.6)
OccStautsEntry			0.002 (0.6)	0.002 (0.6)
NumChild				-0.067*** (-3.6)
Log likelihood	-182.14	-170.44	-167.32	-160.52
Likelihood ratio (LR) $\chi^2$	6.9	30.3	32.7	46.3
p-value LR test	.23	<0.01	<0.01	<0.01
McFadden's pseudo R <sup>2</sup> (%)	1.9	8.2	8.9	12.6
N	276	276	276	276

Notes: regression results are marginal effects. t-statistics are reported in parentheses. The Big-5 are expressed as standardised residuals (see text for explanation).

\* p<.10, \*\* p<.05, \*\*\* p<.01.

**Table 3: Tobit Regression Results, Occupational Status**

Specification:	(1)	(2)	(3)	(4)
	Big-5	+ Age + Education + Early-life Conditions	+ Work Experience	+ Number of Children
Extraversion	2.185 (1.3)	3.037* (1.8)	2.875* (1.7)	3.450** (2.1)
Neuroticism	-0.391 (-0.2)	0.033 (0.0)	0.005 (0.0)	0.353 (0.2)
Conscientiousness	1.645 (1.0)	1.351 (0.8)	1.301 (0.8)	1.014 (0.7)
Agreeableness	-3.660** (-2.4)	-3.881*** (-2.6)	-3.351** (-2.2)	-3.050** (-2.1)
Openness	0.217 (0.1)	-0.966 (-0.6)	-0.929 (-0.6)	-0.879 (-0.6)
Age		-0.727*** (-3.6)	-0.728*** (-3.6)	-0.686*** (-3.5)
School		-0.108 (-0.2)	0.397 (0.5)	0.270 (0.3)
PoorFam		-0.224 (-0.1)	-0.945 (-0.2)	1.055 (0.2)
NoBooks		1.951 (0.6)	2.601 (0.8)	2.534 (0.8)
NoFeature		7.088 (1.4)	7.672 (1.5)	8.662 (1.6)
Rural		-5.734* (-1.9)	-5.247* (-1.7)	-3.542 (-1.2)
Nart		0.362** (2.5)	0.309** (2.1)	0.306** (2.1)
AgeEntry			-1.709 (-1.6)	-1.444 (-1.4)
OccStautsEntry			0.214 (1.3)	0.220 (1.4)
NumChild				-2.787*** (-3.6)
Constant	2.185 (1.3)	3.037* (1.8)	2.875* (1.7)	3.450** (2.1)
Log likelihood	-675.17	-664.45	-656.19	-649.40
Likelihood ratio (LR) $\chi^2$	8.4	29.8	31.8	45.3
p-value LR test	0.136	<0.01	<0.01	<0.01
McFadden's pseudo R <sup>2</sup> (%)	0.6	2.2	2.4	3.4
N	276	276	276	276

Notes: regression results are marginal effects. t-statistics are reported in parentheses. The Big-5 are expressed as standardised residuals (see text for explanation).

\* p<.10, \*\* p<.05, \*\*\* p<.01.

**Table 4: McDonald-Moffitt Decomposition of Tobit Marginal Effects (Table 3, Specifications (1) and (4))**

Specification:	(1)			(4)		
Decomposition:	(a)	(b)	(c)	(a)	(b)	(c)
	Total	Employment	Occupational Status	Total	Employment	Occupational Status
Extraversion	2.185	1.472	0.713	3.450**	2.340**	1.105**
Neuroticism	-0.391	-0.263	-0.128	0.353	0.239	0.113
Conscientiousness	1.645	1.108	0.537	1.014	0.688	0.325
Agreeableness	-3.660**	-2.466**	-1.194**	-3.050**	-2.068**	-0.977**
Openness	0.217	0.146	0.071	-0.879	-0.596	-0.282

Notes: the Big-5 are expressed as standardised residuals (see text for explanation).

\* p<.10, \*\* p<.05, \*\*\* p<.01.

**Appendix Table A1:**  
**Measures of the *Big-5* Personality Traits in TILDA**

<b>Measure</b>	<b>Item</b>
<i>Extraversion</i>	<p>I like to have a lot of people around me.            I laugh easily.            I prefer jobs that let me work alone without being bothered by other people.            I really enjoy talking to people.            I like to be where the action is.            I shy away from crowds of people.            I often feel as if I'm bursting with energy.            I am a cheerful, high spirited person.            I don't get much pleasure from chatting with people.            My life is fast-paced.            I am a very active person.            I would rather go my own way than be a leader of others.</p>
<i>Neuroticism</i>	<p>I am not a worrier.            At times I have felt bitter and resentful.            When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.            I rarely feel lonely and blue.            I often feel tense and jittery.            Sometimes I feel completely worthless.            I rarely feel fearful or anxious.            I often get angry at the way people treat me.            Too often, when things go wrong, I get discouraged and feel like giving up.            I am seldom sad and depressed.            I often feel helpless and want someone else to solve my problems.            At times I have been so ashamed I just want to hide.</p>
<i>Conscientiousness</i>	<p>I keep my belongings neat and clean.            I'm pretty good about pacing myself so as to get things done on time.            I often come into situations without being fully prepared.            I try to perform all the tasks assigned to me conscientiously.            I have a clear set of goals and work towards them in an orderly fashion.            I waste a lot of time before settling down to work.            I work hard to accomplish my goals.            When I make a commitment, I can always be counted on to follow through.            Sometimes I'm not as dependable or reliable as I should be.            I am a productive person who always gets the job done.            I never seem to be able to get organised.            I strive for excellence in everything I do.</p>
<i>Agreeableness</i>	<p>I try to be courteous to everyone I meet.            At times I bully or flatter people into doing what I want them to.            Some people think I'm selfish and egotistical.            If someone starts a fight, I'm ready to fight back.            I'm better than most people, and I know it.            When I've been insulted I just try to forgive and forget.            I tend to assume the best about people.            Some people think of me as cold and calculating.            I have no sympathy for beggars.            I generally try to be thoughtful and considerate.            If I don't like people I let them know it.            If necessary, I am willing to manipulate people to get what I want.</p>
<i>Openness</i>	<p>I enjoy concentrating on a fantasy or a daydream and exploring all its possibilities, letting it grow and develop.            I think it's interesting to learn and develop new hobbies.            I am intrigued by patterns I find in art and nature.</p>

	<p>I believe letting students hear controversial speakers can only confuse and mislead them.</p> <p>Poetry has little or no effect on me.</p> <p>I would have difficulty just letting my mind wander without control or guidance.</p> <p>I seldom notice the moods or feelings that different environments produce.</p> <p>I experience a wide range of emotions and feelings.</p> <p>Sometimes when I am reading poetry or looking at a work of art, I feel a chill or a wave of excitement.</p> <p>I have little interest in speculating on the nature of the universe or the human condition.</p> <p>I have a lot of intellectual curiosity.</p> <p>I often enjoy playing with theories or abstract ideas.</p>
--	---