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Catia Batista
Janis Umblijs

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Forschungsinstitut
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Catia Batista
INOVA, Universidade Nova de Lisboa,
CReAM, IZA and NOVAFRICA

Janis Umblijs
Ragnar Frisch Centre for Economic Research

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IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

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ABSTRACT

Migration, Risk Attitudes, and Entrepreneurship: Evidence from a Representative Immigrant Survey*

Do more risk loving migrants opt for self-employment? This is a question especially relevant for policymakers designing selective immigration policies in countries of destination. In order to provide a rigorous answer to it, we use a novel vignette-adjusted measure of risk preferences in the domain of work to investigate the link between risk aversion and entrepreneurship in migrant communities. Using a representative household survey of the migrant population in the Greater Dublin Area, we find a significant negative relationship between risk aversion and entrepreneurship. In addition, our results show that the use of vignettes improves the significance of the results, as they correct for differential item functioning (where respondents interpret the self-evaluation scale in different ways) between entrepreneurs and non-entrepreneurs, and corrects for variation in the use of self-evaluation scales between migrants from different countries of origin.

JEL Classification: F22, J01, J15, J61, L26

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Corresponding author:

Catia Batista
Nova School of Business and Economics and INOVA
Faculdade de Economia
Universidade Nova de Lisboa
Campus de Campolide
1099-032 Lisboa
Portugal
E-mail: catia.batista@novasbe.pt

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1. Introduction

The deepening economic crisis in many western countries has resulted in a general trend of increasingly restrictive policies toward immigration (OECD, 2010). As governments around the world are struggling with rising unemployment rates, there is growing political pressure to increase restrictions on international migration. This political pressure is often based on the popular perception that the presence of migrants reduces employment opportunities for native workers. Increasingly restrictive immigrant policies can, however, be misguided as they ignore the potential positive effects that migrants can have on host economies. In addition to bringing new skills (Ottaviano and Peri, 2012; Hunt, 2009), increasing domestic demand and easing demographic pressures, migrants often create jobs by engaging in entrepreneurial activities with positive consequences on both employment creation and social security systems (Lacomba and Lagos, 2010).

This paper investigates the motives behind migrant entrepreneurship, focusing specifically on the role that risk preferences play in the decision to become self-employed. While the majority of related studies find a significant relationship between risk aversion and entrepreneurship (Stewart and Roth, 2001), this finding is not unanimous and variation exists in the significance and strength of the effects found. While Ekelund et al. (2005); Cramer et al. (2002), and Van Praag and Cramer (2001) find a statistically significant relationship between risk preferences and the probability of being self-employed; Blanchflower and Oswald (1998) find risk preferences not to be linked to the probability of being self-employed.

In addition, other studies find the link between risk-aversion and entrepreneurship to be statistically significant only in specific cases. For example, Caliendo et al. (2009) find a statistically significant link only for individuals coming out of unemployment, and Dohmen et al. (2005) only find a statistically significant link between risk aversion and entrepreneurship for some of the measures they use. We are aware of only one study (Hormiga and Bolívar-Cruz, 2012) that looks specifically at the relationship between risk preferences and entrepreneurship amongst migrants. However, a limitation of this study is that the indicator

used to capture risk aversion is a question regarding 'fear of starting a new business'. While fear of starting a business and risk aversion might be related, fear is not a direct measure of risk aversion.

The study of risk preferences is of special interest in the context of migration, given the literature looking at the link between risk preferences and the decision to move to a new country or region. In terms of empirical findings, there are mixed conclusions on whether migrants are indeed more risk loving than non-migrants. Two important contribution to this discussion are Jaeger et al. (2010) who find that individuals who are more willing to take risks are more willing to migrate between regions in Germany; and Zimmermann et al. (2009) who find that first generation migrants actually have lower risk attitudes than natives. While the differences in risk attitudes between natives and migrants provides an important context to our work, we look specifically at the difference in risk attitudes within migrant communities, and propose a methodology to improve comparability between individuals from different cultural backgrounds.

Our risk variable is based on a self-evaluation measure of willingness to take risks in the domain of employment that combines several self-evaluation risk questions with anchoring vignettes. The paper most closely related to ours is Caliendo et al. (2009), who measure willingness to take risks in this domain amongst German nationals. Our paper differs however because it specifically focuses on a migrant sample, and combines self-evaluation risk questions with anchoring vignettes. The vignettes allow us to measure risk preferences in a more accurate way, by reducing the bias caused by Differential Item Functioning (DIF), in which individuals interpret the response scale in a non-uniform way. This bias is especially pronounced when the characteristic being measured is subjective and related to earlier experiences of the individual, as is likely to be the case for risk preferences. This bias is further compounded when the population being studied is culturally heterogeneous, since the use of scales has been shown to vary between individuals from different origin countries[1]. This con-

[1]A number of articles have highlighted how differences in the interpretation of scales across countries can

text suggests that our vignette adjusted measure is especially important in the measurement of risk preferences in immigrant populations.

Our vignette-adjusted measure of risk aversion is tested using a tailor made representative survey of the migrant population in Greater Dublin, Ireland. Respondents were asked to rate three hypothetical individuals on their willingness to take risks in their work life, and were then asked to rate their own willingness to take risks on the same scale. The information from the hypothetical vignettes is used to perform an econometric adjustment of the self-evaluation responses, eliminating the bias caused by DIF.

The results confirm the existence of a negative relationship between risk aversion and entrepreneurship when using the DIF adjusted measures, while the unadjusted measure was not statistically significant. Given the importance of vignette adjustment to our results, we use a Compound Hierarchical Probit (CHOPIT) specification to look at the heterogeneous effects of individual vignette choice on the self-evaluation risk measure. We find that entrepreneurs inflate the most risk averse values and undervalue the most risk loving values of the self-evaluation scale, relative to non-entrepreneurs. The results also suggest the existence of a routine bias in the use of scales between: individuals from different countries of birth as well as male and female respondents.

The empirical research on risk and entrepreneurship for native populations has reached varied conclusions, with results depending on the measure used. Our paper contributes to the literature by using a tailor made instrument that corrects for measurement error caused by DIF, and provides an improved measure to test the relationship between risk preferences and entrepreneurship in heterogeneous populations. Our results also suggest that the use of uncorrected DIF measures could be a possible explanation for the variation in the results reported in previous studies.

The results in this paper may be particularly relevant for policy makers designing selec-

introduce bias in international studies. See for example Le (2009); Choi et al. (2009) and Culpepper and Zimmerman (2006).

tive immigration policies in migrant destination countries. Indeed, recent research (such as Umblijs (2012)) has shown that new immigrants without significant networks (be it family, friends or fellow countrymen) at the destination country tend to be less risk averse than those new immigrants who have these networks available at the time of arrival. In related work of complementary relevance for migration policy-making along these lines, it has been shown that immigrants tend to send less remittances flows abroad when they are less risk averse (Batista and Umblijs (2013)) and when communication flows between migrants and their network abroad are reduced (Batista and Narciso (2013)).

The rest of the article is organized in the following way: Section 2 outlines the methodology used; Section 3 provides the econometric framework; Section 4 introduces the data; Section 5 presents the results; and Section 6 concludes.

2. Methodology for Measuring Risk Preferences

We use a vignette approach to counter scale bias in our risk measures in the domain of work. We use non-parametric and semi-parametric scale readjustment methods as well as a more sophisticated Compound Hierarchical Ordered Probit (CHOPIT) model in order to compare these results against the non-adjusted measure. Comparing these results will show the effect that controlling for DIF can have on the general conclusion regarding the link between risk aversion and entrepreneurship in our migrant sample.

2.1. How vignettes work: a hypothetical example

In order to illustrate how the use of anchoring vignettes helps us identify the real unobserved level of risk aversion, we present a hypothetical example. Figure 1 shows the distribution of answers for two groups of individuals. For concreteness, we say that group A is comprised of non-entrepreneurs and group B of entrepreneurs. If we define being risk loving as having a value of 4 or more on our 7 point scale, then the distribution of responses would suggest that group A is more risk loving than group B because a larger proportion

of respondents in group A selected a value of 4 or higher than did those in group B. However, in our hypothetical scenario the two groups also differ in what they understand to be 'risk loving'. For example, the entrepreneurs in group B might rank an individual as being risk averse, where someone from group A would consider the same person as risk neutral, therefore their uses of the 1 to 7 scale will be different. .

In order to compare the real unobserved levels of risk aversion between the groups, a reference point needs to be established. This reference point takes the form of a hypothetical vignette, the average score of which is represented by the dashed line in Figure 1 for the two groups[2]. The figure shows that the two groups scored the same hypothetical individual differently, with group A giving him an average score of 4 and group B an average score of 3. Therefore, non-entrepreneurs (group A) considered the hypothetical individual to be more risk loving than did entrepreneurs (group B). With the reference point now included, the general conclusion regarding which group is more risk loving is reversed. It is clear from the diagram that a higher proportion of individuals in group B (entrepreneurs) rated their willingness to take risks as being greater than the hypothetical vignette level relative to group A (non-entrepreneurs). We can therefore say that while entrepreneurs might not rate themselves as being more risk loving than the rest of the population, because of their more conservative perception of what constitutes 'taking risks', their actual (unobserved) level of risk preference is higher than that of non-entrepreneurs. In addition to differences in scale interpretation between entrepreneurs and non-entrepreneurs, other factors such as cultural norms and gender could influence the way that an individual uses a self-evaluation scale. Vignettes provide a useful way to counter biases caused by these variations in scale interpretation.

[2]The example is based on Figure 1 in Van Soest et al. (2011)

2.2. Rescaling Responses Using Vignettes: Non-Parametric Approach

The simplest way to use vignette is to rescale individual self-evaluation responses mechanically. This rescaling involves moving from the actual scale presented in the survey to a relative scale, where the adjusted value is the position of the self-evaluation response, relative to the value given for the vignettes. In our survey each individual was asked to score three hypothetical individuals, therefore the responses can be recoded on a 7 point scale. If y_i is the categorical self-assessment for individual i , and z_{ij} is the categorical survey response for respondent i on vignette $j(j = 1, 2, 3)$, the self-evaluation response can be rescaled relative to the vignette in the following way:

$$C_i = \begin{cases} 1 & if \quad y_i < z_{i1} \\ 2 & if \quad y_i = z_{i1} \\ 3 & if \quad z_{i1} < y_i < z_{i2} \\ 4 & if \quad y_i = z_{i2} \\ 5 & if \quad z_{i2} < y_i < z_{i3} \\ 6 & if \quad y_i = z_{i3} \\ 7 & if \quad y_i > z_{i3} \end{cases} \tag{1}$$

where C_i represents the recoded value based on vignette responses. Equation 1 shows how a survey question accompanied by 3 vignette results in an adjusted 7 point scale. The non-parametric approach provides a straightforward way to adjust responses for DIF without using statistical modelling techniques. However, the main limitation of this approach is that recoding is only possible when vignettes are not tied and are consistently ranked. For example, if a respondent gives all three vignettes the same rank, the adjusted response C_i , will not take a single value, but will take the vector $\{2, 4, 6\}$. The non-parametric solution to the problem is to delete the responses that contain a vector value of C_i. This approach is not the most efficient as other information could be used to predict actual unobserved values

in the case of tied or mis-ordered vignette responses.

2.3. Rescaling responses using vignettes: a semi-parametric approach

An improvement over the non-parametric approach of deleting vector values of C_i is to assign the value from the vector that has the highest conditional probability of being true based on other available data. As above, we assume that C_i can be either a scalar, or a vector. We assume that there is a single unobserved continuous true value that represents the risk preference of all individuals, denoted by C_i^*. We also assume that in cases in which C_i is a vector we can estimate which value has the highest probability of being C_i^* conditional on explanatory variables x_i. We call the upper and lower bounds of the vignette responses thresholds and denote them as τ_c. Therefore, the Equation for C_i (1) can be rewritten in the general form:

$$C_i = c \qquad if \qquad \tau_{c-1} \leq C_i^* < \tau_c \tag{2}$$

Incorporating the possibility that C_i is a vector variable yields the following equation:

$$C_i = \{m, ..., n\} \qquad if \qquad \tau_{m-1} \leq C_i^* < \tau_n \tag{3}$$

In order to estimate the underlying value for C_i^*, we use a modified version of the ordered probit model in order to break ties when C_i is a vector value, we call this the semi-parametric approach. This can be done by using explanatory variables x_i to find the value in the vector that is most likely to be the true value of C_i given the available information in x_i:

$$Pr(C_i\{m, ..., n\}|x_i) = \int_{\tau_{m-1}}^{\tau_n} N(C_i^*|x_i\beta)dy. \tag{4}$$

In the case of scalar values, C_i is selected in the same way as in the non-parametric approach. In the case of a vector value, expression (4) provides a probability density for each of the values in the vector, which together sum to one. The vector value with the

highest probability, conditional on characteristics x_i, is selected as the adjusted risk measure for that individual.

Selecting Predictor Variables

In order to break ties in vector responses, the predictor variables x_i should be correlated with the way that respondents use self-evaluation scales but not with their actual risk preferences. For our predictor variables we include: gender of interviewer; nationality of interviewer; time and number of attempts taken to complete interview; and the range of responses for other vignette questions. The gender and nationality of interviewers has been shown to influence the way that respondents answer survey questions[3]. The time taken to answer the survey and amount of attempts used to complete the survey is likely to reflect how carefully each questions was considered, and the influence that previous sections of the survey had on the vignette questions, which where towards the end of the questionnaire. In addition to the vignette questions for the risk measure in the domain of work, the survey included six other vignettes related to two other self-evaluation questions. The range of responses, between the lowest and highest response for the two questions, gives an indication of the extent to which the respondent uses the extremes of the scale [4].

We selected predictive variables x_i that are related to the response 'style' of individuals and heterogeneity in the characteristics of the interviewer, which could influence how questions are answered but are not related to the risk preferences of the individual. This additional information is used to break ties in cases where vignettes are tied or inconsistently ranked.

[3]For research on gender impacts, see Catania et al. (1996) and for nationality effects see Webster (1996)

[4]There is evidence of heteoregeneity in the range used in scales that is independent of the question being asked. For example, see Le (2009); Culpepper and Zimmerman (2006)

3. Econometric Framework

We use two econometric specifications. The first specification has entrepreneurship and the second has risk aversion as the dependent variable. The first specification is more closely related to the existing literature on entrepreneurship and risk preferences while the second allows us to investigate the heterogeneous effects of vignettes on different groups of migrants.

3.1. Estimating the Relationship Between Risk Aversion and Entrepreneurship Using the Adjusted Measure

In order to investigate the link between risk aversion and entrepreneurship we propose the following econometric specification:

$$y_i^* = \beta_1 risk_i + \beta_2 X_i + \epsilon_i \tag{5}$$

where the dependent variable y_i^* denotes whether an individual is self-employed or not at the time of the survey; $risk_i$ represents the risk aversion measure (adjusted or unadjusted in different specifications); and X_i is a vector including demographic characteristics (such as age, education, and marital status); controls related to migration (such as years living in Ireland, the size of the population of individuals from one's country of origin living in Dublin), previous entrepreneurial experience before migration, industry, of employment and region of birth controls.

In order to capture non-linearities in the link between risk aversion and entrepreneurship and to make the results comparable to Caliendo et al. (2009), ($risk_i$) is divided into three categories: *lowrisk* relates to individuals having a value of 1 or 2 on the scale, *mediumrisk* relating to individuals with values 3,4, or 5 , and *highrisk* relating to individuals with values 6 or 7. We include *mediumrisk* and *highrisk* as dummy control variables, using *lowrisk* as the reference point.

3.2. Estimating Heterogeneity in the Effect of Vignettes on the Risk Measure: CHOPIT model

In addition to using the adjusted measure of risk preferences as an independent variable, as shown in the econometric specification above, we are also interested in the heterogeneous effects of vignettes on the risk measure itself. In this case, the risk measure is the dependent variable and individual vignette responses enter the right hand side of the equation along with other control variables. While the semi-parametric approach outlined above is comparable with the results reported in the literature, the specification outlined below can provide additional insights into how various groups of migrants interpret the self-evaluation scale differently.

For the parametric specification of the vignette adjustment procedure we use the Compound Hierarchical Ordered Probit (CHOPIT) model which was first applied to vignettes by King et al. (2004), and is an extension of the ordered probit model that corrects for DIF. The model explains the self-assessment values using an ordered response equation with thresholds that depend on individual characteristics.

We denote the self-assessment response of individual i with CS_i, which is a value on the initial 7 point scale that individuals ranked themselves on. In addition, we assume that the self-assessment value is driven by an underlying, unobservable actual level of risk aversion CS_i^*given by:

$$CS_i^* = X_i\beta + \xi_i \tag{6}$$

where X_i is a set of individual characteristics such as age, gender and dummy variable for being an entrepreneur; ξ_i is the residual term and is comprised of unobserved heterogeneity in risk preferences and an idiosyncratic noise term affecting subjective self-reporting. We assume that ξ_i is normally distributed and is independent of X_i, with mean 0. We observe values that correspond to thresholds between vignettes along the latent index:

$$CS_i = j \qquad if \qquad \tau s_i^{j-1} < CS_i^* \leq \tau s_i^j, \qquad j = 1, ..., 7. \tag{7}$$

where the thresholds τ_i^j are given by

$$\tau s_i^0 = -\infty, \qquad \tau s_i^7 = \infty, \qquad \tau s_i^1 = X_i \gamma s^1 + \upsilon_i, \qquad \tau s_i^j = \tau s_i^{j-1} + exp(X_i \gamma s^j), \qquad j = 2, 3, 4, 5, 6. \tag{8}$$

In the above equation υ_i follows an $N(0, \sigma_u^2)$ and is distributed independently of X_i. For the non-adjusted self-evaluation risk questions, β and γs_i^j are not separately identified. In other words, Equation (5) cannot be identified if the use of the scale differs between different groups. However, if an equation specifying vignette selection were defined, the scale could be adjusted to account for the difference in scale interpretation. This is exactly what is done next. Indeed, the vignettes use the same scale as the self-evaluation questions and can be modelled in a similar way to the response equations:

$$CL_i^* = Z_i \pi + \epsilon_{i,} \tag{9}$$

$$CL_i = j \qquad if \qquad \tau l_i^{j-1} < CL_i^* \leq \tau l_i^j, \qquad j = 1, ..., 7. \tag{10}$$

where CL_i^*represents the true unobserved value of vignette L ($L = 1, 2, 3$) and Z_i represents variables that influence the interpretation of a given vignette. Thresholds in Equation(10) are also modelled in a similar way to the self-response equation with τl_i^j instead of τs_i^j. The error term ϵ_{il} in Equation (9) is normally distributed and independent of ϵ_i.

The thresholds are also modelled in a similar way to the response equation, but again using different parameters as shown below.

$$\tau l_i^0 = -\infty, \qquad \tau l_i^4 = \infty, \qquad \tau l_i^1 = X_i\gamma l^1 + \upsilon_i, \qquad \tau l_i^j = \tau l_i^{j-1} + exp(x_i\gamma l^j), \qquad j = 2,3,4,5,6. \tag{11}$$

The key assumption of the CHOPIT model is that there is response consistency between the ranking of vignettes and the ranking of the self-evaluation questions. This assumption means that individuals use the scale in the same way for the vignettes and the self-response questions and that the threshold parameters in Equations (8) and (11) are equivalent:

$$\gamma s^j = \gamma l^j, \qquad j = 1,..,5. \tag{12}$$

As γl^j can be identified separately from the vignette equation and can be matched to γs^j based on the assumption of response consistency, β in Equation (6) can be identified. Given the way that the thresholds vary amongst respondents is controlled for by γs, the results of β in Equation (6) control for differential item functioning. As mentioned above, while this approach does not result in an adjusted risk measure that can be used as an independent variable, it does provide more detailed insights into the characteristics that affect the use of the response scale beyond what is possible using non-parametric and semi-parametric approaches.

4. Data Description

4.1. Survey Background

The empirical analysis in this paper uses a representative data-set of immigrants in the Greater Dublin Area, Ireland. The immigrant survey data were collected as part of an EU NORFACE project, and are a representative sample of the immigrant population residing in the Greater Dublin Area. In addition to detailed information on the migrants, the survey also includes tailor made questions designed to capture individual risk preferences.

The household survey was conducted amongst 1500 immigrants aged 18 years or older, residing in the Greater Dublin Area, who arrived in Ireland between 2000 and six months prior to the interview date, and who were not Irish or British citizens[5]. The survey was conducted between January 2010 and October 2011 by Amarach Research, a reputable survey company with prior experience conducting research surveys in Ireland, under close supervision of our research team.

The sampling framework for the survey was the 2006 Census of Ireland, and the Enumeration Areas were randomly selected according to probability proportional to size sampling, where size is defined as the total number of non-Irish and non-British individuals.

Fifteen households were selected within each EA using a random route approach with clearly stated rules for selecting households to be interviewed. Within an EA, interviewers visited every fifth house, turning right after each attempt. Instructions on which house to select in specific situations, such as in tower blocks and *cul-de-sacs*, were given to interviewers. All addresses visited, even when not resulting in an interview, were recorded to ensure that the survey rules were followed correctly. Non-responses, due to no one being at home at the time of the visit, were minimized by interviewers going back to an address up to five times on different days and at different times. While this five time 'call back' rule was time consuming, it minimized non-response and ensured that a representative sample of migrants was selected, including single dwelling households, which would otherwise be under represented. When respondents declined to be interviewed, their characteristics (namely gender, approximate age, nationality, type of dwelling) were recorded to allow for the adjustment of sampling weights.

In the presence of more than one migrant living in a household, the survey respondent was selected using a randomization rule. If the randomly selected respondent within the house-

[5]Eligibility requirements were set to maximize the probability that migrants still retained contacts outside of Ireland (hence the 2000 arrival threshold) but were already minimally established in Ireland (for six months at least) so that contacts with their networks abroad could provide useful information. British citizens were excluded, given the close historical ties between Ireland and the UK.

hold was not present, an interview with that individual was arranged at a time convenient for the respondent.

The design of the survey questions and data collection strategy were carefully developed in order to ensure that our sample is representative of all migrants, including illegal and non-registered migrants. The randomized procedure for selecting addresses within an EA was useful in capturing a representative selection of migrants, including those that were not registered in official data. The legal status of respondents was not asked for and this was made clear to the respondents before the survey was administered. In addition, it was made clear to respondents that the data would be rendered anonymous and not used for any purpose other than academic research. In order to maximize trust, interviewers were chosen from a broad range of backgrounds and received detailed classroom and in-the-field training, followed up by randomized quality checks.

The self-evaluation risk measure was administered in order to ensure consistency in the ordering of the vignettes and in the way that questions were asked. The questions were piloted at an early phase of development of the survey to ensure that the vignettes were understood in the same way by all individuals. In addition to asking the questions orally, the respondents were given cards with the hypothetical scenario for the questions they were answering so that they could better follow and process all of the information. Great care was taken to ensure that all interviewers asked the questions in a uniform way and were not allowed to influence respondent's answers. The objective was to minimize the ways that the survey questions could be interpreted, while allowing respondents to express their true answers.

The order of the vignette questions was randomized. These questions were immediately followed by the self-evaluation question so that the same scale and context would be transferred from the hypothetical vignettes to the self-evaluation question. The vignette questions on risk perceptions along the work dimension are presented in Figure 4.

4.2. Stability of Risk Preferences Over Time

An importnat issue in measures of risk is the assumption regarding the stability of risk preferences over time. There has been some debate in the economics and psychology literature regarding the stability of personality traits. While Harrison et al. (2007) find that in a representative sample of the Danish population individuals on average become less risk averse after the age of 40; Barsky et al. (1997) and McCrae (1993) find that risk preferences are a stable character trait in adults. McCrae (1993) suggests that changes in individual risk measures for individuals over time found in other studies, are due to measurement error. Given the cross sectional nature of our data-set we cannot directly control for changes in individual risk preferences, in case they do exist. However, given that in this article we address the issue of measurement error in capturing risk preferences, we can look more closely at the relationship between age and risk preferences across individuals by comparing our unadjusted with our adjusted risk measure.

The left hand diagram in Figure 5 shows the relationship between age and willingness to take risks for our unadjusted measure. The polynomial smoothed plot shows that risk preferences remain relatively stable until the age of around 65 where the average willingness to take risk decreases substantially. The right hand diagram in Figure 5 shows the relationship between age and willingness to take risks using the vignette adjusted measure. In contrast to the unadjusted measure, the relationship between age and willingness to take risks shows a general increase in the willingness to take risks from around age 30 and shows far less volatility after age 60, relative to the unadjusted measure. The relatively more stable relationship between age and risk preferences for the vignette adjsuted measure supports the suggestion that changes in risk preferences over time are partly due to measurement error McCrae (1993). More specifically, the graphs in Figure 5 shows that in terms of self-evaluation questions, scale perception is sensitive to age and that older individuals are not substantially more risk averse in terms of employment than younger individuals, within our sample of migrants.

4.3. Descriptive Statistics

Tables 1 and 2 provide summary statistics regarding entrepreneurs in our sample. We define entrepreneurs as individuals who have been self-employed during their current stay in Ireland. Following this definition, our sample contains 111 (8% of the total sample) entrepreneurs. Table 1 describes the sectors of employment for self-employed individuals in our sample, showing that the highest proportions of entrepreneurs are in the transport, construction, and IT sectors.

Table 2 shows the difference in means between entrepreneurs and non-entrepreneurs regarding the most common explanatory variables for entrepreneurial activity found in the literature, namely income, age, years of schooling, and gender. The table shows that while the non adjusted self-evaluation risk measure suggests no statistically significant difference between entrepreneurs and the rest of the population, the adjusted measure reveals that entrepreneurs are more risk loving at a 6% statistical significance level.

The summary statistics also show that there is a statistically significant difference between entrepreneurs and non-entrepreneurs for the income, age, and gender variables. Table 2 shows that the average entrepreneur has a higher monthly income (by EUR 335), is three years older, has a similar amount of education, and is more likely to be male than the average non-entrepreneur.

Figures 2 and 3 show the distribution of responses of entrepreneurs and non-entrepreneurs for the non-adjusted and adjusted risk measures. The difference between entrepreneurs and non-entrepreneurs is less pronounced in the unadjusted (Figure 2) than the adjusted (Figure 3) case, suggesting that entrepreneursroutinely rate the hypothetical vignettes in a way different from the rest of the population. The adjusted measure in Figure 3 suggests that entrepreneurs are more likely to be medium-to high risk loving (4-6 on the scale) and less likely to be risk averse (values 1-3) or extremely risk loving (7 on the scale), relative to the rest of the population.

The summary statistics show that vignette adjustment has a significant effect on the

distribution of responses and that (in our sample) more risk loving individuals are more likely to be self-employed when the adjusted measure is used. The next section looks more closely at how the self-evaluation responses were adjusted using the anchoring vignettes.

Vignette Responses and Relative Rank Analysis

Table 3 provides a breakdown of the adjusted values or vectors after the self-evaluation measure is rescaled using the vignette responses. The first column in Table 3 corresponds to C_i as described in Section 2, the value is the non-parametrically adjusted (or rescaled) self-evaluation measure in the domain of work. In our scale higher values correspond to a greater willingness to take risks with the adjusted measure having a minimum value of 1 and a maximum value of 7. When individuals ranked the vignettes consistently[6] and without ties, C_i takes a single value. If respondents ranked vignettes inconsistently or ranked at least two vignettes in the same way, a single recoded value cannot be obtained, and C_i is a vector. Therefore, even in the presense of inconsistent ranking we can give a range within which the true value lies[7].

The rank analysis in Table 3 suggests that after adjusting the self-evaluation risk measures using the vignettes, 63% of the responses were scalar. This corresponds to a reasonable proportion of correctly ordered vignette responses compared to reports in the literature[8]. In addition, while there were some inconsistencies or ties in 37% of the cases, in the majority of these situations, only two vignettes were ties or mis-ordered. Tied vignettes could reflect the situation where the hypothetical scenarios are so far from the respondent's own prefer-

[6]By consistant we mean that individuals ordered the vignettes as they were designed with the most risk averse hypothetical individual being given the lowest score ect. The most common ranking was 1,2,3, which reflects the order that we intended.

[7]For example, if an individual ties vignettes 1 and 2, and considers himself less risk loving than vignette 3 but more risk loving than the tied vignettes 1 and 2, the adjusted value will lie between the values of 2 and 5. This is because we know that the value cannot be 1, as he has ranked himself above vignettes 1 and 2; at the same time he cannot be more risk loving than 6 because he is more risk averse than vignette 3. Therefore in this example the individual will have vector $\{2, 3, 4, 5\}$ for C_i.

[8]The percentage of correctly ranked vignettes varies between studies. For example (Hopkins and King, 2010) rank 74 % of vignettes correctly when looking at self-reported vignette adjusted differences in political efficacy between China and Mexico, whereas (Bratton, 2010) has only 37% of consistent and non-tied responses when investigating perceptions of democracy in Africa.

ences that distinguish between the vignettes becomes difficult and not necessarily a result of misconception. In total only 9 individuals (0.6%) in the sample mis-ordered all three of the vignettes, as shown by the {1 to 7} category in Table 3. The high proportion of consistently and nearly consistently ranked vignettes is reassuring as it suggests that the vignettes were correctly understood by the majority of respondents.

5. Empirical Results

This section presents the results of the empirical analysis using the non-adjusted, semi-parametric, and parametric models. We also discuss the results of the parametric CHOPIT model, which allows us to see how various groups within our sample interpreted the self-evaluation scale.

5.1. Estimation Results Using Unadjusted Probit Model

As described above, the vignette adjusted variable can be created using either non-parametric or semi-parametric approaches. As a benchmark we start with the non-adjusted self-evaluation measure of risk aversion, as shown in Table 4. This measure is the value that the respondents gave for their self-evaluation without vignette adjustment. Table 4 presents marginal effects of the probit specification and shows that there is no significant relationship between the unadjusted measure and being an entrepreneur. The simple probit regression (column 1), shows that the relationship between entrepreneurship and willingness to take risks is not statistically significant. The risk measure variable remains statistically insignificant even after individual characteristics (column 2) and other potential explanatory factors (column 3) are accounted for. Column 3 in Table 4 also shows that from the other control variables, years in Ireland, and having entrepreneurial experience in the country of origin are the most statistically significant.

5.2. Estimation Results Using Non-Parametric Adjusted Measure

Table 5 shows the marginal effects of the non-parametrically adjusted measure of risk aversion. The table presents marginal effects of the probit specification with all individuals who ordered the vignettes inconsistently removed. Column (1) in Table 5 shows that using this vignette adjustment specification, both the *mediumrisk* and *highrisk* variables are significant at the 1% level. Having a medium level of willingness to take risks increases the probability of an individual being an entrepreneur by 9 percentage points and having a high level of willingness to take risk increases the probability of being an entrepreneur by 10 percentage points. The magnitude of the coefficients drops slightly to a positive effect of 8 percentage points, after controls are added, for both medium and high risk, and remains statistically significant in all of the specifications. It is also interesting to note that women are less likely to be entrepreneurs by 6 percentage points. Arriving in Ireland one year later is associated with a decrease in the probability of being an entrepreneur by just under 1 percentage point. Having previous entrepreneurial experience in the country of origin is correlated with an increase in the probability of being self-employed in Ireland by around 12 percentage points. These results are all statistically significant at the 1% level.

This non-parametric approach does however exclude all inconsistently ranked vignettes as can be seen by the lower number of observations in Table 5.

5.3. Estimation Results Using Semi-Parametrically Adjusted Measure

Table 6 shows results using the semi-parametrically adjusted risk measure in the domain of work. For this measure inconsistently ordered vignettes are allocated to the value with the highest probability of being true (amongst the vector values) based on the choices made by other individuals with similar characteristics, as described in Section 3. Probit regression in column (1) of Table 6 shows that the marginal effects of the risk measure on the probability of being self-employed are statistically significant for both the *mediumrisk* and *highrisk* variables. The coefficient suggests that having a medium level of willingness to take risks increases the probability of being self-employed by 7 percentage points, and having a high

willingness to take risks increases the probability of being self-employed by 9 percentage points. Column (2) in Table 6 includes controls for basic characteristics used in the literature and the migration-specific variables. The results suggest that there is a significant relationship between risk preferences and entrepreneurship even after controlling for all of the variables included in our specification.

With the inclusion of all controls (regression 3 in Table 6) the results suggest that having a medium level of risk increases the probability of being self-employed by 6 percentage points, and having a high level of risk increases the probability of being self-employed by 7 percentage points. Year of arrival and previous entrepreneurial experience remain significant. In this specification, the 'enclave' variable becomes statistically significant while the female variable becomes insignificant. The enclave variable is a measure of the concentration of individuals with the same nationality, which is measured as the percentage of migrants in the respondent's area of residence who are from the same country of origin as the respondent. The change in the significance of the female variable could be due to the fact that women have a different perception of risk but are not necessarily more risk averse.

5.4. How Vignettes Affect the Risk Measure Across Different Variables: Results of the CHOPIT Model

Table 7 shows the results of the CHOPIT model in which the risk measure is the dependent variable for comparison. Column (1) of Table 7 also presents the results of the estimation using the ordered probit model.

Table 7 shows that while the non-adjusted ordered probit model suggests no significant relationship between risk aversion and entrepreneurship, as can be seen in column (1), after vignette adjustment the relationship between entrepreneurship becomes statistically significant (see column (2)). The table suggests a positive relationship between willingness to take risks and entrepreneurship in our sample of migrants. In other words, while the self-reported level of risk of entrepreneurs is not statistically different from the rest of the population, their actual level of risk aversion is significantly lower because they interpret the scale in a

different way.

The difference in statistical significance for the entrepreneur variable between columns (1) and (2) in Table 7 is due to variation in scale interpretation. The vignette threshold values τ provide more information regarding how entrepreneurs percieve the self-evaluation scale. The results in column (2) of Table 7 show that entrepreneurs regard the most risk averse values of the scale as being more risk loving than do non-entrepreneurs (positive sign on τ^1), while considering the more risk loving values as not being as risk loving as the rest of the population (negative sign on τ^2, τ^3, τ^5 and τ^6). The inflation of low values on the scale and undervaluing of higher values by entrepreneurs, has essentially compressed the actual unobserved scale for this subgroup. In other words, the valuation of the vignettes by entrepreneurs results in a narrower range of vignette adjusted values than the non-adjusted self-evaluation measure would suggest. An explanation for this scale compression could be that self-employed individuals undervalue risky employment decisions due to their own willingness to take such risks, while at the same time recognizing that the risk element in seemingly risk-free employment decisions has to be considered, a point that could be missed by non-entrepreneurs.

Another noteworthy result of the CHOPIT model in Table 7 is related to the four variables that are statistically significant for the Ordered Probit (column 1) but not for the vignette adjusted CHOPIT model (column 2). The dummy variables for born in Africa, born in Australia, and gender are all statistically significant when the unadjusted measure is used, but lose their statistical significance after vignette adjustment. This result suggests that while the scale perception of these groups is statistically different from the rest of the population their actual risk preferences are not. While the unadjusted measure suggests that being female is associated with being more risk averse (Table 7, column 1) the 'actual' vignette adjusted measure (Table 7, column 2) suggests that there is no statistically significant relationship between these two characteristics and being self-employed. Furthermore, while the unadjusted measure suggest that individuals born in Africa and Australia are more risk

loving, the adjusted results suggests that there is no statistically significant difference in the risk preferences of individuals from these countries.

More detailed information on the cut-off values is provided in Table 8. The table shows the first, third and fifth cut-off and gives an indication of how the scale is interpreted by individuals from different regions of birth and along different variables. Looking at cut-off values τ^3 and τ^5 in Columns (2) and (3) in Table 8, one can see that the values are positive for Africa and Australia and negative for South America. This suggests that migrants from Africa and Australia think of these values as being more risk loving than the rest of the population, while individuals from South America see the higher values as being less risk loving than the rest of the population. The female variable in Columns (2) and (3) in Table 8 is also negative suggesting that female respondents undervalue the more risk loving vignettes. This undervaluing of the more risk loving individuals suggests that while female respondents tend to rate themselves lower on the self-evaluation scale, they rate the most risk loving vignettes as less risk loving than male respondents.

The results of the CHOPIT model suggest that for certain groups the perceived difference in risk preferences is actually due to differences in scale interpretation rather than to actual differences in risk preferences. Conversely, while the unadjusted measure suggested that entrepreneurs do not differ in their risk preferences from the rest of the population, the 'actual' vignette adjusted level suggests that entrepreneurs are, in fact, more risk loving than the rest of the population,

5.5. Discussion of Results

Our results show that while using the unadjusted measure of risk aversion there is no statistically significant relationship between risk aversion and entrepreneurship, the semi-parametrically adjusted measure suggests a positive relationship between the willingness to take risks and being an entrepreneur. These results confirm our prediction that in heterogeneous populations self-evaluation measures can suffer from differential item functioning and that a vignette adjusted measure can counter bias caused by heterogeneous interpreta-

tion of the self-evaluation scale. Using adjusted measures, our results suggest that having a medium preference for risk increases the probability of a migrant becoming an entrepreneur by between 5.7 and 8.3 percentage points, and being a high risk individual increases the probability of becoming an entrepreneur by between 7.3 and 8.2 percentage points (both results being statistically significant).

Given the difference between the adjusted and unadjusted results, it is possible that some of the variation of results reported in the broader empirical literature, looking at risk and entrepreneurship, could potentially be related to measurement error. This is likely to be the case when the population under examination is highly heterogeneous.

Comparing our results to those of Caliendo et al. (2009), which is the paper closest to ours in terms of measurement instrument, we find that our results do not vary greatly. While Caliendo et al. (2009) do not use vignette adjustment tools, the population they study is much more homogeneous (predominantly German nationals) and therefore does not suffer from the scale perception bias to the same extent as our immigrant sample.

Caliendo et al. (2009) find a significant marginal effect of between 0.7 and 2 percentage points for individuals with medium willingness to take risks and a significant positive marginal effect of 4 percentage points for individuals with a high willingness to take risks in the domain of work. While the magnitude of our effect appears to be greater, the statistical significance and direction of the relationship is the same as in Caliendo et al. (2009) when the adjusted risk measures are used in our analysis.

Our results demonstrate that in the case of a migrant sample the vignette adjusted measure produces the result predicted by the study closest to ours, while the unadjusted measure does not produce statistically significant results. The adjusted measure shows that there is a statistically significant relationship between actual risk preferences and entrepreneurship, a relationship that is obscured by variation introduced by differential item functioning within our population of migrants.

6. Conclusion

This paper investigates the relationship between risk aversion and entrepreneurship, looking specifically at a migrant population. Our findings lend support to the possibility that there are unobservable factors that are correlated with entrepreneurship amongst migrants. More specifically, we find that risk aversion is as statistically significant (or even more so) as other observable characteristics such as age, education, and gender, in explaining who becomes an entrepreneur in our sample of migrants.

The main challenge of investigating the relationship between risk aversion and entrepreneurship amongst migrants is to ensure that the measures used are comparable across individuals. This paper develops a novel vignette adjusted self-evaluation risk measure in order to counter the problem of the different interpretation of scales amongst individuals in our sample, and tests its validity using a tailor made survey of immigrants in the Greater Dublin Area, Ireland. The relationship between risk aversion and entrepreneurship is tested and the results suggest a significant relationship, but only after the measure was adjusted for DIF using a series of vignettes. The difference in results between the vignette adjusted and non-adjusted measures suggests that while entrepreneurs' *stated* willingness to take risks was similar to the rest of the population, their *actual* level of risk aversion was lower. In this case the vignettes were crucial in obtaining a measure that reflects *actual* preferences more closely.

In addition to different scale interpretation for entrepreneurs, we also find statistically significant differences between individuals from different regions of the world, and between the genders.

The novel addition of vignettes to the self-evaluation measure improves the accuracy and reliability of results considerably, with a relatively small additional cost to the survey designer. The addition of vignettes is especially valuable when the sample is made up of individuals from a variety of cultures, as uses of the self-evaluation scale are likely to differ substantially, and biases arising from differential item functioning will be magnified.

In summary, this paper suggests that risk preferences are significantly correlated with

entrepreneurship amongst migrants, and that there is heterogeneity in migrant groups regarding unobservable characteristics. Predicting which migration flows are likely to result in new business creation in the host economy, therefore, requires one to consider unobservable characteristics, in addition to observable variables. While unobservable characteristics are by definition difficult to quantify, our research provides an improved methodology for measuring domain specific individual risk preferences in heterogeneous populations.

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Tables and Figures

Table 1: Entrepreneurs by Occupation

	Ent(%)	**Non- Ent (#)**	**Ent (#)**	**Total**(#)
Transport	41	32	13	45
Construction Sector	22	41	9	50
IT	14	59	8	67
Finance	10	20	2	22
Commerce	8	159	13	172
Education	7	30	2	32
Student	6	281	18	299
Other Services	5	240	13	253
Health	5	172	8	180
Other	7	343	25	368
Total	**8**	**1377**	**111**	**1488**

Note: Table shows the percentage of migrants surveyed who are self-employed, by sector of business.

Table 2: Summary Statistics of Key Variables, by Employment Type

Variable	Entrepreneur Mean	Non-Entrepreneur Mean	Difference (S.E)
Non-adjusted Risk Measure	3.53	3.54	-0.01 (0.95)
Adjusted Risk Measure	4.64	4.39	0.25 (0.06)*
Income (EUR)	1481	1146	335 (0.00)***
Age (Years)	35.47	32.37	3.1 (0.00)***
Years of School	15.07	14.56	0.51 (0.08)*
Female	0.42	0.54	-0.12 (0.01)***

Note: 'Non-adjusted risk measure' refers to the response individuals gave to the self-evaluation question. 'Adjusted risk measure' is the semi-parametrically adjusted value using responses to the three vignettes. Income is given in Euros per month. * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 3: Summary of Relative Rank Analysis

C	N	Prop.
{1}	77	0.052
{2}	117	0.079
{3}	69	0.047
{4}	104	0.07
{5}	391	0.264
{6}	109	0.074
{7}	66	0.045
{1 to 4}	25	0.017
{1 to 5}	25	0.017
{1 to 6}	33	0.022
{1 to 7}	9	0.006
{2 to 4}	190	0.128
{2 to 5}	35	0.024
{2 to 6}	71	0.048
{2 to 7}	19	0.013
{3 to 6}	8	0.005
{3 to 7}	31	0.021
{4 to 6}	14	0.009
{4 to 7}	87	0.059

Note: Number of cases: 547 (37%) with interval value, 933 (63%) with scalar value.
Maximum possible C-rank value: 7

Table 4: Probit Regressions Using Unadjusted Self-Evaluation Risk Measure. Dependent Variable: Entrepreneur

	(1) Probit	(2) Probit	(3) Probit
Medium Risk Loving	-0.004	0.002	0.004
	(0.022)	(0.015)	(0.015)
High Risk Loving	0.011	0.012	0.013
	(0.024)	(0.020)	(0.020)
Age		0.003	0.003
		(0.005)	(0.004)
Age^2		-0.000	-0.000
		(0.000)	(0.000)
English Language		0.014	0.009
		(0.011)	(0.011)
School		0.001	0.001
		(0.003)	(0.003)
Married		0.013	0.013
		(0.014)	(0.015)
Female		-0.031*	-0.031*
		(0.016)	(0.016)
Year of Arrival		-0.009***	-0.008***
		(0.003)	(0.003)
Entrepreneur Experience		0.110***	0.106***
		(0.019)	(0.019)
Live in Migrant Enclave			0.001
			(0.001)
Industry Dummies	No	Yes	Yes
Region Dummies	No	No	Yes
Observations	1495	1326	1326
R^2	0.001	0.141	0.145

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Probit marginal effects estimated at the average. The standard errors in parentheses are robust and clustered by country of birth. 'Entrepreneur' is defined as a respondent who has been self-employed during the current stay in Ireland. 'Medium Risk Loving' is a dummy variable for individuals with values 3,4,5. 'High Risk Loving' is a dummy for individuals with values 6 and 7. 'Entrepreneur Experience' is a dummy variable for having any self-employment experience in the country of origin.

Table 5: Probit Regressions Using Non-Parametrically Adjusted Risk Measure. Dependent Variable:Entrepreneur

	(1) Probit	(2) Probit	(3) Probit
Medium Risk Loving	0.090***	0.082***	0.083***
	(0.031)	(0.032)	(0.032)
High Risk Loving	0.100***	0.082**	0.082**
	(0.036)	(0.033)	(0.033)
Age		0.004	0.005
		(0.004)	(0.004)
Age^2		-0.000	-0.000
		(0.000)	(0.000)
School		-0.002	-0.002
		(0.004)	(0.003)
Married		0.000	0.001
		(0.020)	(0.021)
Female		-0.063***	-0.062***
		(0.017)	(0.016)
Year of Arrival		-0.009***	-0.008***
		(0.003)	(0.003)
Live in Migrant Enclave		-0.000	-0.000
		(0.001)	(0.001)
Entrepreneur Experience		0.119***	0.118***
		(0.023)	(0.021)
Industry Dummies	No	Yes	Yes
Region Dummies	No	No	Yes
Observations	928	925	925
R^2	0.024	0.159	0.160

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Probit marginal effects estimated at the average. The standard errors in parentheses are robust and clustered by country of birth. Individuals with inconsistently ordered vignettes were excluded, resulting in a lower sample size. 'Entrepreneur' is defined as a respondent who has been self-employed during the current stay in Ireland. 'Medium Risk Loving' is a dummy variable for individuals with values 3,4,5. 'High Risk Loving' is a dummy for individuals with values 6 and 7. 'Entrepreneur Experience' is a dummy variable for having any self-employment experience in the sending country.

Table 6: Probit Regressions Using Semi-Parametrically Adjusted Risk Measure. Dependent Variable: Entrepreneur

	(1) Probit	(2) Probit	(3) Probit
Medium Risk Loving	0.071**	0.058*	0.057*
	(0.033)	(0.030)	(0.030)
High Risk Loving	0.092***	0.073**	0.073**
	(0.034)	(0.030)	(0.030)
Age		0.004	0.004
		(0.004)	(0.004)
Age^2		-0.000	-0.000
		(0.000)	(0.000)
School		0.002	0.001
		(0.003)	(0.003)
Married		0.013	0.015
		(0.014)	(0.015)
Female		-0.029*	-0.028
		(0.017)	(0.017)
Year of Arrival		-0.009***	-0.008***
		(0.002)	(0.002)
Enclave		0.001*	0.001*
		(0.001)	(0.001)
Ent. Abroad		0.112***	0.111***
		(0.016)	(0.016)
Industry Dummies	No	Yes	Yes
Region Dummies	No	No	Yes
Observations	1495	1477	1477
R^2	0.015	0.158	0.161

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Probit marginal effects estimated at the average. The standard errors in parentheses are robust and clustered by country of birth. Table shows results when the risk measure has been adjusted using a semi-parametric approach. 'Entrepreneur' is defined as a respondent who has been self-employed during the current stay in Ireland. 'Medium Risk' is a dummy variable for individuals with values 3,4,5. 'High Risk' is a dummy for individuals with values 6 and 7. 'Entrepreneur Home' is a dummy variable for having any self-employment experience in the country of origin.

Table 7: Ordered Probit and Compound Hierarchical Probit (CHOPIT) Model. Dependent Variable: self-evaluated risk measure.

		(1) Ordered Probit		(2) Vignette Adjusted	
μ	**Entrepreneur**	**0.0037**	**(0.10)**	**0.23***	**(0.13)**
	Female	-0.11**	(0.056)	-0.060	(0.070)
	Age	-0.0011	(0.0039)	-0.0018	(0.0049)
	African Origin	0.14**	(0.065)	0.014	(0.083)
	South American Origin	0.21	(0.13)	0.083	(0.17)
	Australian Origin	0.67*	(0.37)	0.47	(0.48)
	From EU12 Countries	-0.065	(0.079)	0.023	(0.10)
	Highest Education, College	-0.050	(0.072)	-0.067	(0.091)
	Highest Education, Secondary	0.10*	(0.067)	-0.073	(0.084)
	Highest Education, Primary	0.15	(0.20)	-0.067	(0.25)
τ^1	Intercept			-1.15	(0.18)
	Entrepreneur			**0.30*****	**(0.096)**
τ^2	Intercept			0.58	(0.095)
	Entrepreneur			**-0.069**	**(0.064)**
τ^3	Intercept			0.57	(0.09)
	Entrepreneur			**-0.062**	**(0.058)**
τ^4	Intercept			0.37	(0.077)
	Entrepreneur			**0.064**	**(0.059)**
τ^5	Intercept			0.54	(0.12)
	Entrepreneur			**-0.062**	**(0.074)**
τ^6	Intercept			0.87	0.17
	Entrepreneur			**-0.11**	**(0.12)**
Vignettes	θ_1			-1.17***	(0.20)
	θ_2			-0.54***	(0.19)
	θ_3			1.41***	(0.20)
Observations	1495			1495	

Standard errors in parentheses

*p<0.10, **p<0.05, ***P<0.01

Note: The standard errors in parentheses are robust and clustered by country of birth. 'Entrepreneur' is defined as a respondent who has been self-employed during the current stay in Ireland. The EU12 countries refers to the New Member States of the European Union and includes Poland, Czech Republic, Slovakia, Slovenia, Hungary, Cyprus, Malta, Lithuania, Latvia, Estonia, Bulgaria, and Romania

Table 8: CHOPIT Model: Cut Off Values.

	(1) τ^1		(2) τ^3		(3) τ^5	
Entrepreneur	0.30***	(0.096)	-0.062	(0.058)	-0.062	(0.074)
Female	0.040	(0.051)	-0.022	(0.032)	-0.048	(0.042)
Age	-0.0008	(0.0036)	0.0015	(0.0022)	0.0046	(0.0030)
African Origin	-0.12	(0.061)	0.065**	(0.038)	0.024	(0.050)
South American Origin	0.022	(0.12)	-0.050	(0.076)	-0.15**	(0.087)
Australian Origin	-0.44	(0.38)	0.045	(0.24)	0.092	(0.29)
From EU12 Countries	0.16**	(0.072)	-0.057	(0.044)	0.032	(0.062)
Highest Education, College	0.058	(0.068)	-0.058	(0.044)	-0.088	(0.057)
Highest Education, Secondary	-0.027	(0.062)	-0.012	(0.039)	0.092**	(0.051)
Highest Education, Primary	-0.020	(0.18)	-0.055	(0.11)	0.40	(0.12)

Standard errors in parentheses

*p<0.10, **p<0.05, ***P<0.01

Note: The table shows the 1st 3rd and 5th τ cut-off values. A negative value denotes that the value of the scale is undervalued by the respondent a positive value suggest an overvaluation of a given value on the seven point scale.

Figure 1: Non-Adjusted Risk Measure, Entrepreneurs, and Non-Entrepreneurs

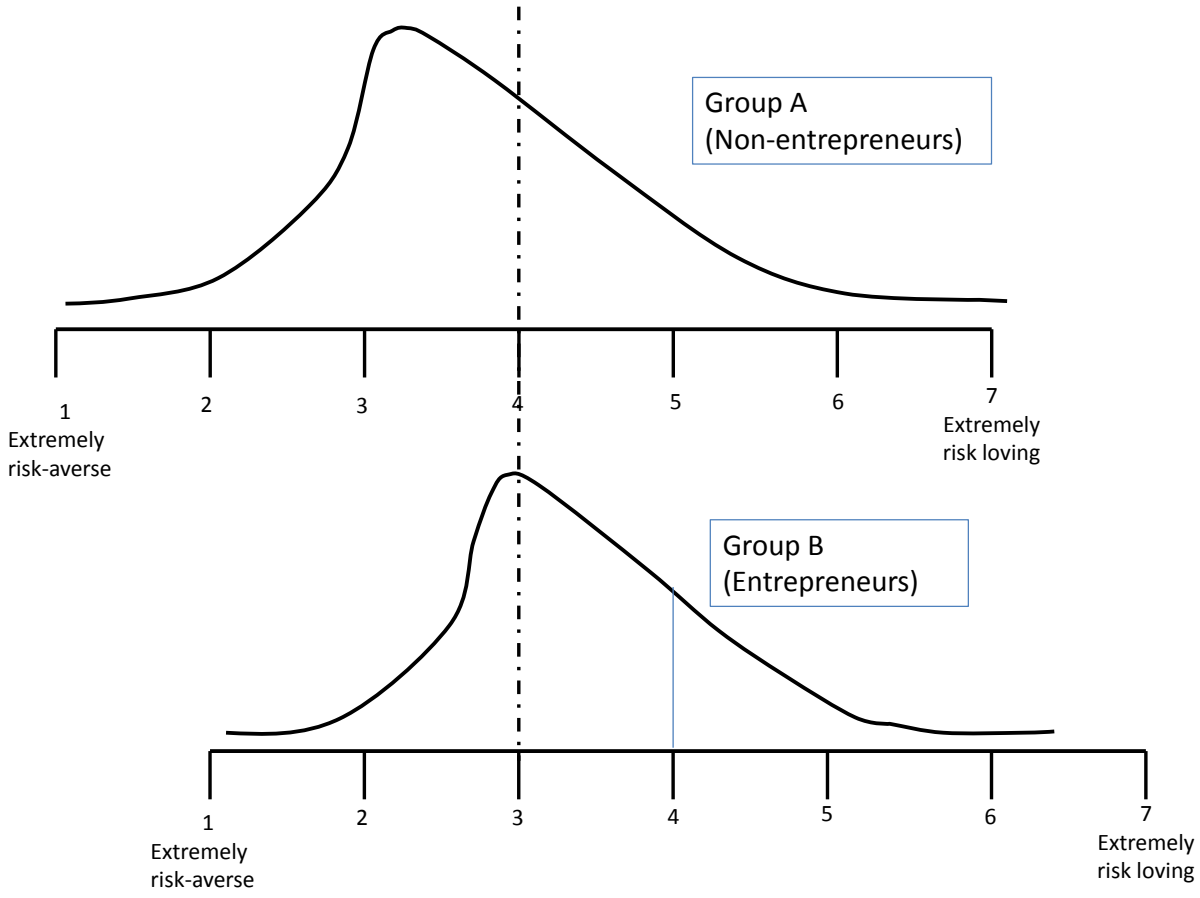


Figure 2: Non-Adjusted Risk Measure, Entrepreneurs and Non-Entrepreneurs

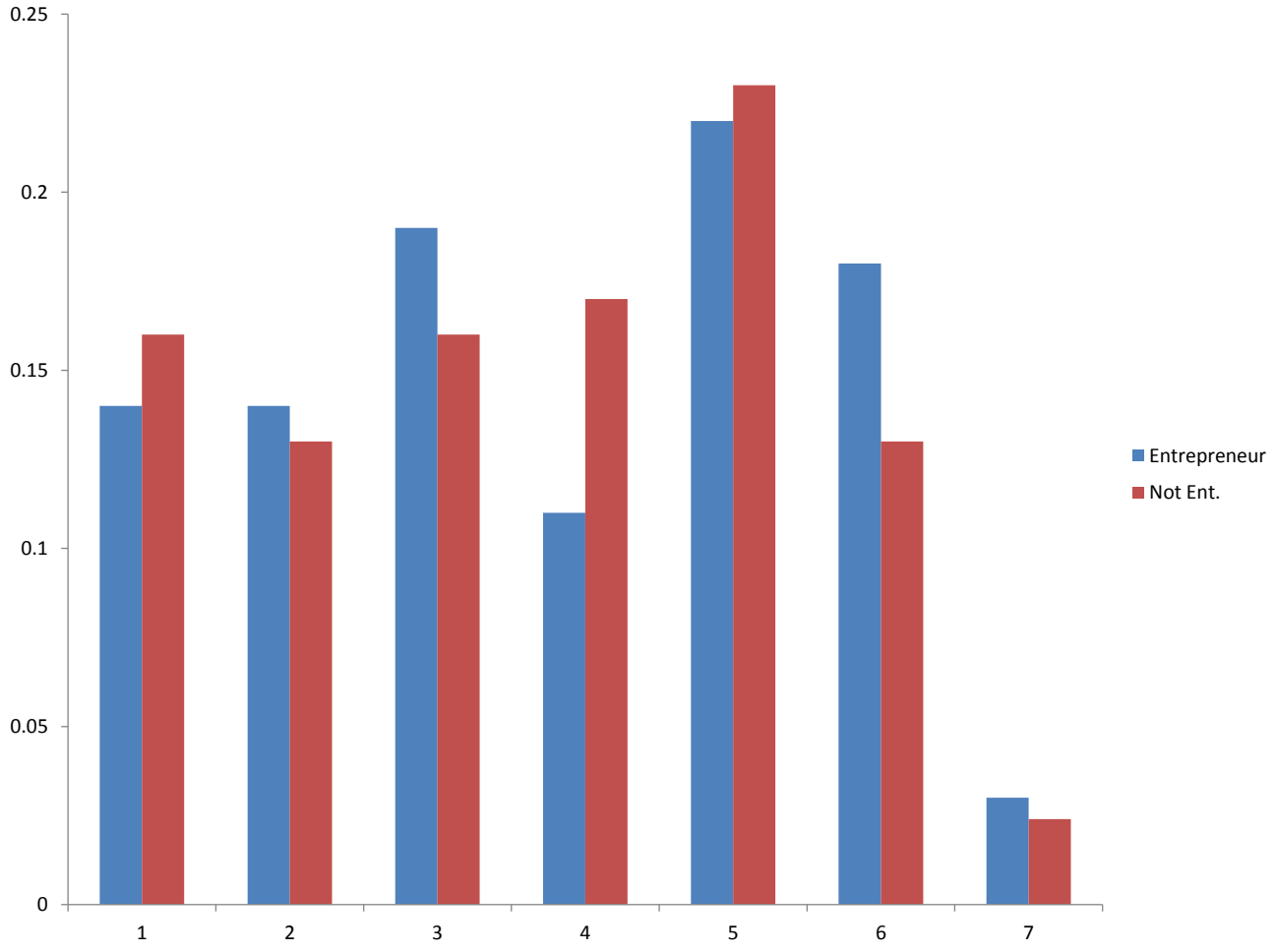


Figure 3: Vignette Adjusted, Entrepreneur and Non-Entrepreneur Comparison

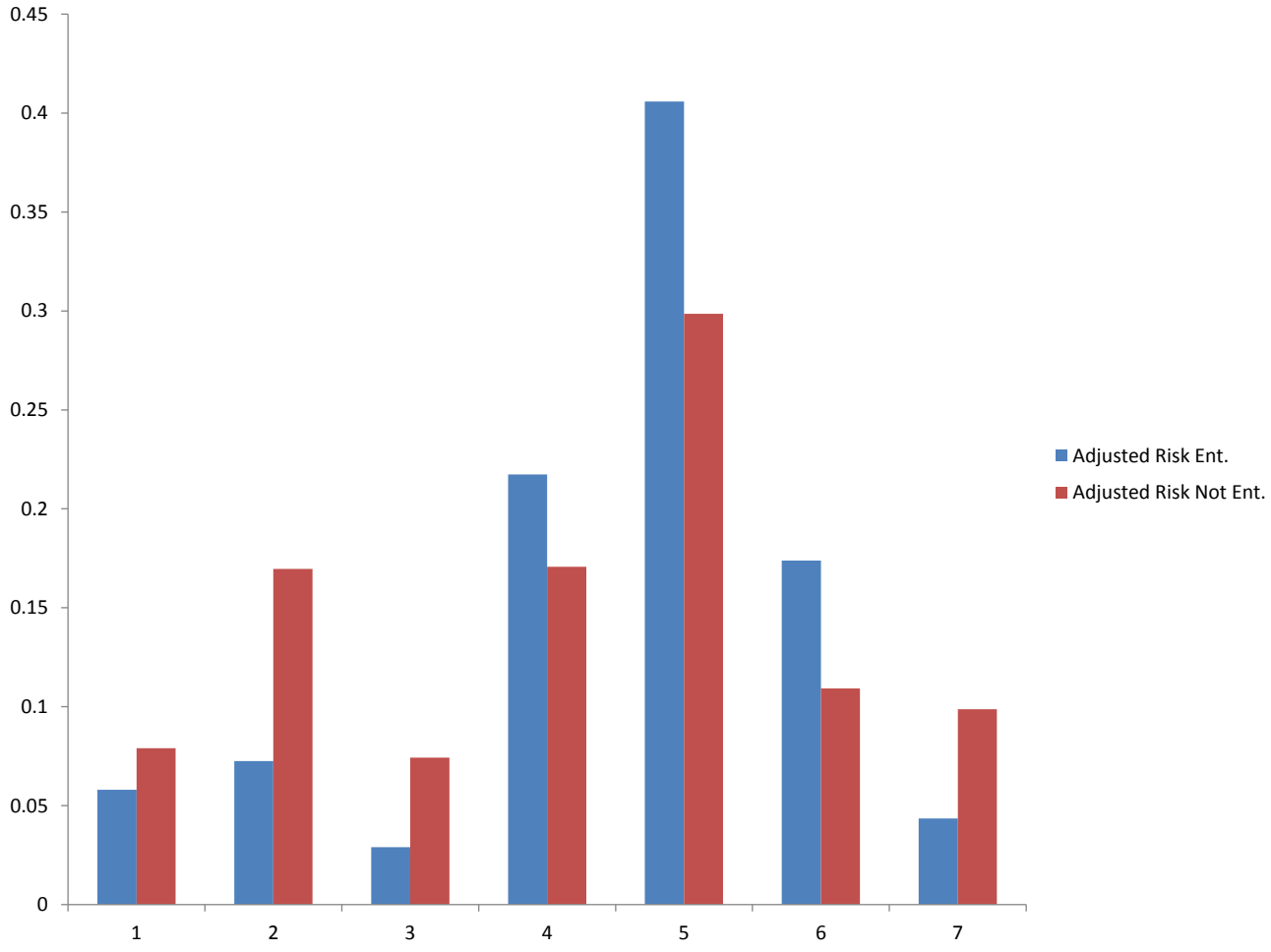
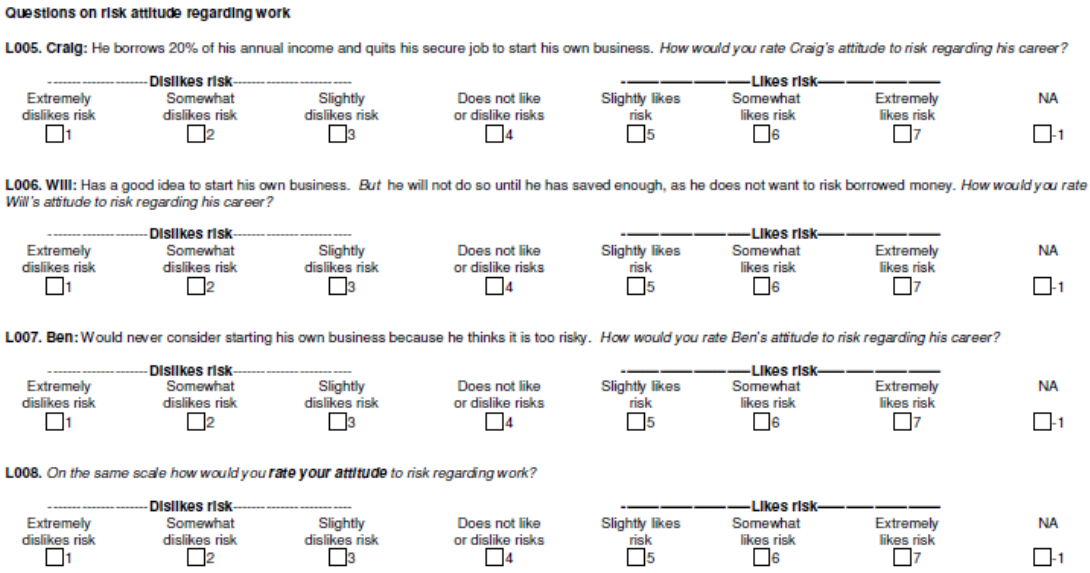


Figure 4: Vignette and Self-Evaluation Questions in Survey



Questions on risk attitude regarding work

L005. Craig: He borrows 20% of his annual income and quits his secure job to start his own business. *How would you rate Craig's attitude to risk regarding his career?*

Dislikes risk				Likes risk			
Extremely dislikes risk	Somewhat dislikes risk	Slightly dislikes risk	Does not like or dislike risks	Slightly likes risk	Somewhat likes risk	Extremely likes risk	NA
☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐-1

L006. Will: Has a good idea to start his own business. *But* he will not do so until he has saved enough, as he does not want to risk borrowed money. *How would you rate Will's attitude to risk regarding his career?*

Dislikes risk				Likes risk			
Extremely dislikes risk	Somewhat dislikes risk	Slightly dislikes risk	Does not like or dislike risks	Slightly likes risk	Somewhat likes risk	Extremely likes risk	NA
☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐-1

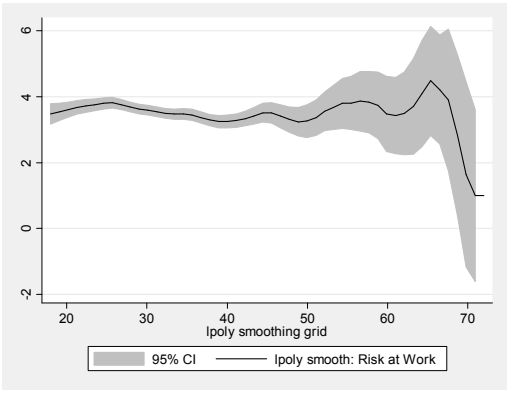
L007. Ben: Would never consider starting his own business because he thinks it is too risky. *How would you rate Ben's attitude to risk regarding his career?*

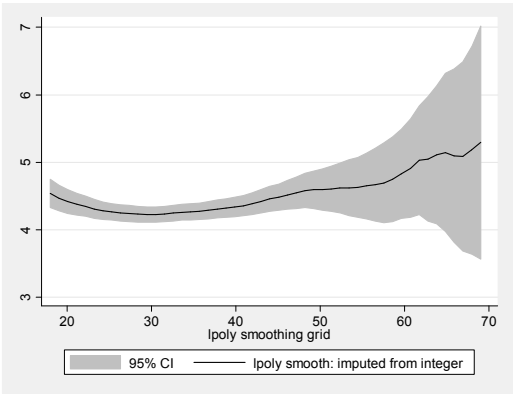
Dislikes risk				Likes risk			
Extremely dislikes risk	Somewhat dislikes risk	Slightly dislikes risk	Does not like or dislike risks	Slightly likes risk	Somewhat likes risk	Extremely likes risk	NA
☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐-1

L008. *On the same scale how would you* ***rate your attitude*** *to risk regarding work?*

Dislikes risk				Likes risk			
Extremely dislikes risk	Somewhat dislikes risk	Slightly dislikes risk	Does not like or dislike risks	Slightly likes risk	Somewhat likes risk	Extremely likes risk	NA
☐1	☐2	☐3	☐4	☐5	☐6	☐7	☐-1

Figure 5: Age and Willingness to Take Risks in the Domain of Work: Non-Adjusted and Adjusted Comparison





Relationship Between Age and Willingness to Take Risks Measure: Unadjsuted Measure

Relationship Between Age and Willingness to Take Risks Measure: Vignette Adjusted Measure

Note: The Figure shows the relationship between the self evaluation measure of willingness to take risks in the domain of work, using the unadjusted measure (left hand side) and the vignette adjusted measure (right hand side). A Least Squares Polynomial Smoothing filter was applied, and a 95% confidence interval is shown by the gray shaded area.