

Does Risk Attitude Affect Young Graduates' Migration Decision and Destination Choice?

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Abstract

Cost-benefit models of migration suggest that individual attitudes towards risk affects both migration decisions and destination choices. However, empirical evidence in this field is limited. Using survey data, we examine to what extent risk attitudes affect international migration behavior and destination choice of young college and university graduates at the time they enter the labor market. Results show that risk tolerance is positively associated with the propensity to migrate. This effect is substantial (43% to 50% of the unconditional migration probability). Moreover, conditional on their migration decision, those who are more willing to take risks are 21 percentage points more likely to move to more distant destinations outside Europe rather than within Europe. In this regard, we provide evidence that risk attitude is associated with both migration decision and destination choice.

Key Words: international migration, risk attitude, graduates, destination choice

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1. Introduction

International migration has strongly increased since 2000, and so has the average education level of migrants (OECD-UNDESA, 2013; OECD, 2014). Research showed that wage differentials (Harris & Todaro, 1970) and demographic characteristics (Newell, 1990) are important determinants of migration and destination choice. However, these insights are not sufficient to explain why some individuals among those who seem to share the same characteristics and face the same circumstances migrate while others decide to stay (Czaika, 2012). Earlier theoretical models of migration suggested that an individual's attitude towards risk is probably a vital characteristic distinguishing movers from stayers as migration can be thought of as a risky decision which involves uncertainties pertaining to labor market opportunities as well as culture (Massey, 1990; Williams & Baláž, 2012). Nonetheless, only few studies provided empirical evidence (Jaeger et al., 2010; Gibson & McKenzie, 2011).

In this paper, we address the question to what extent individual risk attitudes affects migration decisions and destination choices of graduates from college and university.¹ We focus on young graduates because previous studies suggest that young and highly educated people are more willing to take risks (Donkers et al., 2001) and have higher tendency to migrate (Newell, 1990). For young graduates migration is usually a risky decision since labor market entry and outcomes are more uncertain abroad compared to the country where they grew up and studied. Graduates arguably are more likely to have more and more accurate information about labor market conditions in their country of study. In addition, their specific qualifications obtained during the study period are more likely to be better utilized in the country of study² and their professional networks are more likely to be formed there³. However, even if young graduates leave their country of study for pre-arranged jobs, they may still face uncertainties regarding adaptation to a new culture and new labor market practices (Williams & Baláž, 2012). Conditional on the decision to migrate, the destination choice is also a risky decision under the assumption that individuals may be more likely to have better information about conditions in proximate regions than in more distant regions. Moreover, it can be assumed that countries that are geographically closer to each other may share some common social, economic, and cultural characteristics, which makes outcomes of migration at shorter distances less uncertain

¹ We consider migration as an individual decision since earlier studies pointed out that current migration streams of skilled individuals are driven by self-oriented motives such as career progression through international experience, professional development, and pursuit of achieving higher returns on educational investments and better living standards (Suutaria & Brewsterb, 2000; Iredale, 2001; Baruch, et al., 2007).

² "Brain waste" literature shows that skilled immigrants can be prone to underutilization of their skills due to various reasons such as problems in recognition of their degrees and language proficiency (Reitz, 2001; Mattoo, et al., 2008).

³ Social networks are important in finding a (better) job (Granovetter, 1973; Montgomery, 1991; Macmillan, et al., 2013; Kramarz & Skans, 2014; Franzen & Hangartner, 2006) and are most likely to be established through personal contacts in places of study or work (e.g., see Franzen & Hangartner, 2006; Harvey, 2008; Blackburn, et al., 1981).

compared to longer distance moves⁴. In this respect, we expect that young graduates who are more risk tolerant are more resilient to risks and uncertainties associated with migration and therefore more likely to migrate and to move in longer distances.

We test these hypotheses with data of Dutch college and university graduates from the ROA School Leavers Surveys. This data includes information on risk attitudes of graduates and the country in which they work 1.5 years after graduation. Our focus on recent graduates reduces the risk that their preferences have been shaped by past labor market experience. We define migration as moving to another country to work after obtaining a degree from a Dutch higher education institution. Our results show that having a higher risk tolerance is associated with an increase in migration probability. The magnitude of the effects we find is substantial: 43% to 50% of the unconditional probability of migration. Furthermore, our results reveal that graduates' risk attitude is related to destination choice. We find that risk tolerant graduates are 21 percentage points more likely to move to non-European countries conditional on the migration decision. To the best of our knowledge, this paper is the first study using a homogeneous sample of young recent graduates to demonstrate that risk attitude is related with the decision to migrate at the intensive margin⁵ in the context of international migration.

This paper is structured as follows. Earlier literature is discussed in Section 2. Section 3 describes the data used in this study. Section 4 discusses descriptive findings and our estimation results. Finally, Section 5 concludes with a discussion of our findings.

2. Literature review

The literature on the role of risk attitude in migration decision is mainly dominated by two streams: the individualistic view and the “*New Economics of Migration*”. Individual cost-benefit models inspired by human capital theory do not explicitly take risk into account. The Harris-Todaro model, which is the cornerstone of the individualistic view, hinges on the idea that individuals seek to maximize their expected income which could stimulate migration (Harris & Todaro, 1970). As risk is not explicitly accounted for in this model, the model actually assumes risk neutrality (Ghatak et al., 1996). Katz & Stark (1986) criticized this strong assumption because of its shortcomings in explaining some empirical regularities found in rural-to-urban migration (Massey, 1990). These critiques led to the development of an extended Harris-Todaro model with heterogeneous risk preferences (e.g., Fields, 1975; Ghatak et al., 1996). Ghatak et

⁴ Cultural or linguistic distance might also affect migration decisions and destination choice and these may not be strongly correlated with geographical distance (Belot & Ederveen, 2012; Bauernschuster, et al., 2014). However, our comparison groups for destination choice analysis are broadly categorized (i.e. European countries vs. non-European countries). For instance, according to Hofstede's cultural dimension indices (2001), European countries exhibit some common characteristics which distinguish them from other countries in the world. Thus, our broad comparison groups allow us to validly sustain the assumption that geographical distance is associated with cultural and social differences.

⁵ Intensive margin refers to the distance migrated as an indicator of destination choice while extensive margin corresponds to the decision to migrate as used in Jaeger, et al. (2007).

al. (1996) found an overestimated rate of migration under the assumption of risk neutrality compared to the case of risk aversion. However, risk aversion is not necessarily associated with staying in the home region as sufficiently high returns to migration could outweigh the material and psychological costs of migration, even for risk averse people. Moreover, conditional on the decision to migrate, a risk averse person is expected to move in shorter distances after more intensive search for conditions in the place of destination (David, 1974), or to postpone the move until realization of more favorable conditions (Ghatak et al., 1996).

Another strand of literature, the “*New Economics of Migration*”, emerged as a critique to the Harris-Todaro framework mainly to explain the dynamics behind rural-to-urban migration. This literature emphasized the role of the family or household in migration decisions rather than taking the individual as the decision unit (Massey, 1990). The original argument of these studies is that farmer families in rural areas face uncertainties inherent in agricultural production. These uncertainties are exacerbated by technology adoption in the development process, especially in case of surplus insufficiency and underdeveloped insurance and capital markets (Stark, 1981; Stark & Levhari, 1982). Under these conditions, farmer families’ priority is to minimize risks rather than to maximize expected income (Massey, 1990; Williams & Baláž, 2012). To do so, families send one of their members to markets which are uncorrelated with the home economy as a way to diversify risks (Stark & Bloom, 1985). Thus, migration driven by risk aversion serves as an insurance against income volatility by diversifying income sources of rural families (Stark, 1981; Stark & Levhari, 1982).

Although there is substantial evidence confirming predictions of the New Economics of Migration literature,⁶ empirical evidence for the extended Harris-Todaro model is limited and mixed⁷. In this respect, this study aims to contribute to the literature dominated by the Harris-Todaro framework by examining to what extent risk attitude is important for young graduates’ migration decision and destination choice. To the best of our knowledge, there are only two

⁶ See Massey (1990) for a review and Daveri and Faini (1999).

⁷ Heitmueller (2005) developed a theoretical framework where migration outcomes are designed as a monetary lottery and found that risk aversion decreases the likelihood of migration while welfare institutions such as unemployment benefits increases the likelihood of migration for risk averse individuals. Bauernschuster, et al. (2014) investigated why better educated and risk loving individuals have higher propensity to migrate in longer distances by using different cultural and geographic distance measures. They found that having higher risk tolerance is associated with moving to culturally distant regions in Germany while risk attitude is not that much important for the geographic distance migrated. Balaz and Williams (2011) analyzed how risk preferences differ between students with and without migration experience by measuring risk and ambiguity aversion through an experiment. They found higher risk tolerance for female migrants than female non-migrants while risk preferences were the same for males regardless of having previous migration experience. Hao et al. (2014) conducted a similar study among labor migrants and non-migrants in China and found that migrants and non-migrants do not differ in their attitudes towards risk and ambiguity. Bryan et al. (2012) also conducted an experiment where rural households under the risk of famine during the harvest season in Bangladesh were provided incentives to migrate. They found that families close to subsistence level did not prefer migrating despite of the financial incentive, which was interpreted as a result of their risk aversion. Czaika (2012) developed a theoretical framework for migration decision based on prospect theory and provided evidence that migration flows respond more strongly to negative conditions in home country than positive conditions abroad. Czaika’s (2012) findings imply that risk aversion is a driving force of migration.

studies with a similar design to ours. Jaeger et al. (2010) analyzed the effect of risk attitude on migration between regions in Germany in a sample of adults. They measure risk attitude with the same survey question as ours and found a significant positive correlation between risk tolerance and migration probability. Jaeger et al. (2010), however, focus on an heterogeneous sample of adults in terms of educational background and age whereas we focus on a homogeneous sample of recent university graduates for which it can be argued that risk preferences are less likely to have been shaped by past experience (Fouarge et al., 2014). Gibson and McKenzie (2011) also focused their analyses on university graduates but used a small and selective sample of the best students in Pacific countries. They found a large and positive association between risk tolerance and migration. However, their findings are difficult to generalize because of their sample design as well as the fact that in several Pacific countries the brain drain rate from these countries is very high because employment opportunities for those who are highly educated are very poor. In this respect, our large and representative sample allows us to examine international migration behavior of young graduates in a country where employment opportunities are relatively larger and exhibit variation across disciplines.

To our knowledge, no other studies have investigated the association between risk attitude and destination choice in the context of international migration. In an earlier version of Jaeger et al. (2010), Jaeger et al. (2007) used distance migrated within Germany to analyze the impact of risk attitude on migration at the intensive margin. Although they found a positive and significant relationship, the magnitude of the impact is small compared with the unconditional distance migrated in their sample. In this respect, our study attempts to provide further evidence on the impact of risk attitude on the intensive margin of migration in the context of international migration.

3. Data

Our data is from the ROA School Leavers Survey (SIS), a nationally representative survey of graduates in all fields and at all levels of education in the Netherlands. The survey were conducted by the Research Centre for Education and Labour Market (ROA) of Maastricht University. Since the interest of this study is to examine migration decisions of skilled labor market entrants, we focus on college and university graduates of Dutch higher education institutions (HBO and WO)⁸. Graduates were first approached in 2008 through a written questionnaire 1.5 years after graduation to collect information such as their competencies, labor

⁸ There are two types of higher education institutions in the Netherlands offering bachelor's and master's degrees, which are research universities (WO: wetenschappelijk onderwijs) and universities of applied sciences or colleges (HBO: hoger beroepsonderwijs). Both WO- and HBO-Monitor are conducted among graduates of participating institutions, whose coverage rate is 100% and 85%, respectively, while response rate is 37%. The data file used for this study includes 22,015 respondents of both surveys. For more detailed information, see http://roa.sbe.maastrichtuniversity.nl/roanew/wp-content/uploads/2014/07/roa flyer_A4_schoolleavers.pdf (retrieved August 21, 2015).

market status, characteristics of their current job, current place of residence and migration history⁹. One year later, in 2009, graduates who indicated their willingness to participate in a follow-up survey were approached again through an online survey. All the information we use is from the 2008 survey, except for the risk attitude of college graduates that is only included in the 2009 data. We restrict our sample to graduates who are working either in the Netherlands or abroad after graduation.

Risk attitude is measured using a survey question in which graduates have to rate how willing they are to take risks in general: "How do you see yourself? Are you generally a person who is willing to take risk or who tries to avoid risk?" Respondents were asked to answer on a scale ranging from 0 (not willing to take risk at all) to 10 (very willing to take risks). One issue raised in the literature is that survey questions do not reveal actual preferences since they are not incentive-compatible (Camerer & Hogarth, 1999; Hao et al., 2014). However, this self-reported risk attitude has been shown to correlate significantly with risk-taking in lottery choice experiments conducted by Dohmen et al. (2011), as well as with survey respondents' willingness to choose for a lottery voucher with uncertain outcome rather than a safe pay-off voucher as compensation for their participation in a national representative survey (Fouarge et al., 2012). In addition, although risk attitude may differ depending on the context, Dohmen et al. (2011) show that this subjective measure of general risk attitude is a good predictor for risky behavior in different domains of life. We use two measures of risk preference: 'Risk tolerance' is measured as the standardized score of respondent's answer to the general risk preference question, whereas 'higher risk tolerance' is a dummy indicator taking the value one if respondents report a 7 or higher value to the general risk preference question, and 0 otherwise.

The 2008 survey data include information on the labor market status of graduates at the time of the survey. Respondents are asked to report the country in which they currently work. Labor migration is defined as working in another country after graduating from a Dutch college or university. Three different dependent variables are defined to determine the migration status: (1) a dummy variable indicating migration after graduation, (2) a variable differentiating migration to another EU country and migration outside the EU, and (3) a variable indicating the migration distance. This allows us to analyze to what extent risk attitude affects migration decision as well as its impact destination choice. In our analyses, we control for a wide range of covariates, which are selected from previous literature¹⁰. A description of dependent and independent variables are provided in Table 1.

⁹ Thus, the 2006/07 graduation cohort was surveyed in SIS 2008.

¹⁰ For age and gender, see Donkers et al. (2001), Hartog et al. (2002), Dohmen et al. (2011), Coniglio and Prota (2008), Faggian et al. (2007). For previous migration experience, see De Grip et al. (2010), Coniglio and Prota (2008), Venhorst et al. (2010), Bertrand-Cloodt et al. (2014). For GPA and controls regarding study characteristics, see De Grip et al.

Table 1: Dependent and independent variables

Variable name	Definition
Working abroad	Country where the graduate is employed Binary variable: 0 if graduate works in the Netherlands, 1 if abroad
Destination	Region where the graduate is employed Categorical variable: 0 if graduate works in the Netherlands, 1 if another country in Europe, 2 if outside Europe
Migration distance ^a	Distance between the Netherlands and country of employment, continuous variable
Risk attitude	
Risk tolerance	Indicator of a graduate's risk attitude, continuous variable standardized throughout the sample
High risk tolerance ^b	Indicator of a graduate's risk tolerance Binary variable: 0 if answer to risk question is below 7 (base group), 1 if higher than or equal to 7
Age	Age of the graduate in years, continuous variable (restricted to ages between 21 which is the most likely age to finish a bachelor's program in the Netherlands and 30)
Female	Binary variable: 0 if male (base group), 1 if female
Experience abroad	Indicator of previous migration experience Binary variable: 0 if graduate has no study or internship experience abroad (base group), 1 if graduate has either study or internship experience abroad
GPA	Indicator of success, measured by cumulative grade at the graduation, continuous variable
University graduate	Higher education institution where the degree was obtained Binary variable: 0 if college graduate from University of Applied Sciences (HBO) (base group), 1 if university graduate from Research University (WO)
Study field	Categorical variable for study fields: Agriculture, education, technical fields, economics (base group), healthcare, behavior and society, language and culture, law, and natural sciences
Unemployment rate ^c	Field-specific unemployment rate
Months unemployed	Number of months spent as unemployed by a graduate till first employment, continuous variable

Notes: ^a Distance is calculated through a user-written program available in Stata (*geodist*) which measures distance by the length of the shortest curve between two points in kilometers based on a mathematical model of the earth. It takes zero for graduates working in the Netherlands.

^b Mean value of answers is 6.01.

^c Calculated from the same data source and published in ROA (2009).

Enrollment of foreign students has increased in the Netherlands in the past decade (Nuffic, 2014). Several studies revealed that a significant portion of foreign students leave the Netherlands in the early years following graduation (Bijwaard, 2010; Centraal Planbureau, 2012). In our data, we observe that a substantial part of the migrating graduates intend to move back to their countries of birth. Actually, for these graduates staying in the Netherlands may be

(2010), Venhorst et al. (2010), Constant and D'Agosto (2010). Although this paper uses the perspective of individual decisions on migration, insights provided by New Economics of Migration literature (Stark & Levhari, 1982; Katz & Stark, 1986) are useful in the sense that it is not always possible to *a priori* know the direction of the impact of risk attitude on migration. Particularly, in cases of wars, natural disasters, political instabilities, economic crises, staying in home country is probably riskier than moving to another country. Thus, controlling for the labor market situation in the country of origin is necessary to reveal the real effect of risk attitude. Inspired by this literature, indicators of unemployment are added into analyses to control for labor market conditions in the native country. For a further discussion on the impact of unemployment on migration, see Herzog Jr. et al. (1993).

much riskier than moving to their native country when barriers to stay such as language as an impediment to find a job or conditions to obtain a residence permit for graduates from non-EU countries are taken into account. Therefore, we restricted our sample only to graduates born in the Netherlands in order to exclude the possibility of a potential bias in the estimates due to inclusion of graduates who return back to their home countries.

The size of final estimation sample is 4,533 observations (2,307 university and 2,226 college graduates) after dropping missing values in variables of interest. The average age in the sample is 25.4 years, and 55% of the sample consists of female graduates (see Table A.1). Approximately half of the graduates graduated from a university (WO) while graduates of fields such as economics, engineering, behavior and society, and healthcare constitute the majority of the sample. Mean value of the unstandardized risk variable is 6.01 and almost half of the graduates report a 7 or more to the general risk question. 2.8% of all graduates are working abroad at the time of survey: 2.1% within Europe and 0.7% outside Europe. The average distance migrated among labor migrants is approximately 2,891 km.

4. Results

4.1. Descriptive analysis

Table 2 shows the share of migrants and the average risk attitudes of migrants and non-migrants across different subgroups in our sample. Overall, 126 of 4,533 graduates moved abroad to work, which accounts to 2.8% of the sample. The share of migrant graduates is similar to the one reported by De Grip et al. (2010).¹¹ In addition, the propensity of migration to non-European countries, and so to make a longer migratory move, is lower than the propensity to move to other European countries. This is in line with findings from the 2005 Eurobarometer Survey (Vandenbrande et al., 2006).

Table 2 reveals that graduates who are working abroad are more risk tolerant than graduates working in the Netherlands. Migrant graduates reported 1.1 points higher average risk tolerance than non-migrant graduates. Furthermore, graduates moving to non-European countries reported 0.7 points higher average risk tolerance than those moving to another European country. A similar difference is observed between graduates moving in shorter and longer distances. These differences are significant at any conventional level. Likewise, a higher proportion of migrants reported a value equal to or greater than 7 for the risk question compared to non-migrants. 70% of migrants moving in Europe reported a 7 or higher value in the risk scale while this ratio is 88% among graduates migrating to non-European countries.

¹¹ It should be noted that this ratio is under the emigration rate of skilled individuals from Western European countries documented by Docquier et al. (2009). It might be due to underrepresentation of the graduates going abroad since the response rate of migrant graduates might be lower as argued by De Grip et al. (2010) for REFLEX data.

Table 2: Descriptive statistics of risk attitudes for migrant and non-migrants

Variables	Average risk tolerance (unstandardized)		Share Higher risk tolerance=1		N		Share of migrants
	Non-migrants	Migrants	Non-migrants	Migrants	Non-migrants	Migrants	
Working abroad	5.977	7.111	0.484	0.746	4,407	126	0.028
Destination	5.977		0.484		4,407		
Europe (excl. NL)		6.903		0.699		93	0.021
outside Europe ^{a,b}		7.697		0.879		33	0.007
Migration distance ^{a,b}	5.977		0.484		4,407		
≤686 km.		6.651		0.635		63	0.014
>686 km.		7.571		0.857		63	0.014
Age ^b							
≤25	5.915	6.930	0.461	0.702	2,352	57	0.024
>25	6.049	7.261	0.510	0.783	2,055	69	0.033
Gender							
Male	6.134	7.200	0.527	0.760	1,946	75	0.037
Female	5.853	6.980	0.450	0.726	2,461	51	0.020
Experience abroad							
No	5.868	6.815	0.457	0.704	3,282	27	0.008
Yes	6.297	7.192	0.561	0.758	1,125	99	0.081
GPA ^b							
<7.5	6.037	7.300	0.494	0.750	1,836	40	0.021
≥7.5	5.935	7.023	0.477	0.744	2,571	86	0.032
Graduate from							
College	6.101	7.417	0.497	0.750	2,190	36	0.016
University	5.856	6.989	0.471	0.744	2,217	90	0.039
Study field							
Agriculture	6.018	7.333	0.515	0.792	330	24	0.068
Education	5.964	8.000	0.477	1.000	363	3	0.008
Technical fields	6.041	6.941	0.503	0.735	809	34	0.040
Economics	6.107	7.222	0.510	0.694	1,027	36	0.034
Healthcare	6.012	8.600	0.486	1.000	601	5	0.008
Behavior & Society	5.868	6.786	0.441	0.714	757	14	0.018
Language & Culture	5.723	5.250	0.455	0.500	202	4	0.019
Law	5.639	6.800	0.418	0.800	194	5	0.025
Natural sciences	5.863	7.000	0.476	1.000	124	1	0.008
Unemployment rate ^b							
<0.04	5.960	7.156	0.477	0.779	2,997	77	0.025
≥0.04	6.014	7.041	0.499	0.694	1,410	49	0.034
Months unemployed ^b							
0 months	6.025	7.054	0.497	0.728	3,366	92	0.027
≤3 months	5.769	7.667	0.422	0.889	697	18	0.025
≤6 months	5.922	6.333	0.498	0.556	219	9	0.040
≤12 months	5.857	7.429	0.418	0.857	98	7	0.067
>12 months	6.259	-	0.519	-	27	-	-

^a Distance is here divided into two groups where 686 km. is median distance between the Netherlands and a potential destination.

^b These variables are continuous but they are here grouped for the purpose of providing descriptive statistics.

Higher tolerance to risk observed among migrants is persistent in most of the subgroups in the sample¹². Additionally, differences in risk attitudes observed between subgroups such as age,

¹² Differences in risk attitudes between migrants and non-migrants are not statistically significant for subgroups of individuals who hold a degree in fields of language and culture, law, and natural sciences, nor for those who experienced unemployment after graduation for 3 to 6 months and more than 12 months.

gender, GPA, experience abroad, university type, field, degree, and unemployment spell in months vanish among migrants. These descriptive results provide the first signal in support of our hypotheses that risk attitude has a strong association with both migration decision and location choice.

4.2. Analysis of migration decision

Table 3 shows the estimation results of probit analyses on the relationship between graduates' risk attitude and migration decisions¹³. Columns 1 to 6 present the results of analyses conducted with our standardized risk measure while columns 7 to 12 present estimations performed by using the binary risk variable. In columns 1 and 7, the binary relationship between migration probability and risk attitude is examined. In the subsequent columns, demographic variables, previous migration experience, grade, level and field of study, and unemployment experience are added, respectively.

Results show that the coefficients of our risk variables are positive and significant at 1% significance level independent of the covariates included and specification. This shows that being more risk tolerant is associated with a higher probability to move abroad. The first column shows that one standard deviation (1.96 points) increase in risk tolerance is correlated an increase in migration probability by 3.1 percentage points. Likewise, the seventh column shows that individuals having higher risk tolerance have a 2.7 percentage points higher probability to migrate compared with risk averse individuals. It accounts for almost all of the unconditional migration probability (2.8%) observed in the sample.

As expected, age does not have any significant association with migration propensity due to the narrow range of our age variable¹⁴. While female graduates have a lower likelihood of migrating, having a higher GPA and university diploma increases the propensity to migrate. Studying in fields such as education, healthcare, language and culture, and natural sciences is associated with a lower migration probability compared to that of economics graduates while the decision to migrate is not significantly responsive to the unemployment rate in the field of study nor the individual length of unemployment. Although inclusion of these covariates improves the overall performance of the models, none of them leads to a substantial change in marginal effect of risk variables except for the indicator of previous migration experience.

Experience abroad is positively correlated with the migration decision after graduation in all specifications where it is included and it reduces the estimated correlation between risk and migration propensity by almost a half. It brings the issue of whether experience abroad

¹³ Table A.2 in the appendix shows the estimation results of similar linear probability models.

¹⁴ In the data, some oscillations are observed in migration propensity of graduates after age 26. To control for any potential nonlinear effect, age squared has also been controlled for but results do not change.

mediates a part of the effect of risk attitude on migration decision. It could be possible in the sense that experience abroad indicates graduates' previous international migration experience which is potentially affected by their risk attitudes. Mediation analysis conducted by following the methodology of Karlson, et al. (2012)¹⁵ show that 16-18% of the effect of risk attitude on migration decision is mediated by experience abroad.

As column 6 in Table 3 reflects, one standard deviation (1.96 points) increase in risk tolerance is associated by 1.4 percentage points increase in migration probability when effects of all other covariates are isolated. Similarly, in column 12, being highly risk tolerant predicts that 1.2 percentage points increase in migration probability. These effects account for 43% to 50% of unconditional migration probability (2.8%) observed in the estimation sample. Considering a part of the effect is mediated by experience abroad, these estimates constitute a lower bound for the impact of risk attitude on migration decision. Recalling our first hypothesis that individuals who are more resilient to risks and uncertainties are more likely to migrate, these results constitute a substantial evidence supporting our first hypothesis.

4.3. Reverse causality

A widely-accepted view among economists is that risk preferences are stable over time (Jaeger et al., 2010). However, this view has been challenged in recent studies.¹⁶ If risk preferences of individuals change through personal experiences, our results may suffer from reverse causality. Jaeger et al. (2010) raise this reverse causality issue, but do not find any evidence on changing risk attitudes due to migration within Germany. To the best of our knowledge, no other study examined whether or not migration experience affects risk attitude of individuals. Salamanca (2015) shows that attitudes towards risk change only slowly over time. Sahm (2012) also indicated that risk tolerance slightly declines by age and varies by macroeconomic conditions. However, personal experiences such as job displacement or serious health problems have only modest effects on individual risk preferences. According to Sahm (2012), 73% of systematic differences between individuals' risk attitudes is attributed to time-invariant characteristics.

The evidence suggests that substantial changes in risk attitudes are not likely in short time intervals. We check for the stability of risk preferences of graduates over time by using a panel component of our data consisting of 843 university graduates who answered the risk question in both 2008 and the 2009 follow-up survey.¹⁷ The correlation between the answers given to the

¹⁵ For Stata application, see Kohler, et al. (2011).

¹⁶ Examples are Tymula et al. (2013) and Bonsang and Dohmen (2015) for changes in risk preferences by age, Hoffmann et al. (2013), Guiso et al. (2013), and Malmendier and Nagel (2011) for the impact of economic crisis on risk aversion, Sahm (2012) for the impact of macroeconomic conditions and job displacement on risk preferences.

¹⁷ As described in Section 2, information on risk attitude of college graduates was not collected in SIS 2008 so the panel component consists of only university graduates who answered the risk question in both surveys. Since SIS supplement

risk question in both surveys is high (0.67) and significant at 1%. Reassuringly, the test-retest correlation is not statistically different in the sub-sample of migrants compared to non-migrants¹⁸.

2009 does not include information on places where graduates work at the time of survey, it is not possible to directly check for reverse causality.

¹⁸ The estimated correlation is 0.13 which is not significant at any conventional significance level. It indicates that workplace of a graduate being in the Netherlands or abroad does not have any effect on the internal consistency of answers given to the risk question in the survey.

Table 3: Probit estimates for migration decision

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Risk attitude												
Risk tolerance	0.016*** (0.003)	0.015*** (0.003)	0.008*** (0.002)	0.007*** (0.002)	0.008*** (0.002)	0.007*** (0.002)						
Higher risk tolerance							0.027*** (0.004)	0.025*** (0.004)	0.014*** (0.003)	0.012*** (0.003)	0.014*** (0.003)	0.012*** (0.003)
Age		0.002 (0.001)	0.001 (0.001)	0.000 (0.001)	0.001 (0.001)	0.000 (0.001)		0.002* (0.001)	0.001 (0.001)	0.000 (0.001)	0.001 (0.001)	0.000 (0.001)
Female		-0.011** (0.004)	-0.009*** (0.003)	-0.005* (0.003)	-0.010*** (0.003)	-0.005* (0.003)		-0.012*** (0.005)	-0.010*** (0.003)	-0.005* (0.003)	-0.010*** (0.003)	-0.005* (0.003)
Experience abroad			0.034*** (0.004)	0.027*** (0.004)	0.032*** (0.004)	0.027*** (0.004)			0.035*** (0.004)	0.029*** (0.004)	0.033*** (0.004)	0.028*** (0.004)
GPA				0.006*** (0.002)	0.006*** (0.002)	0.006*** (0.002)				0.006*** (0.002)	0.006*** (0.002)	0.006*** (0.002)
University graduate				0.007** (0.003)		0.007** (0.003)				0.007* (0.004)		0.007* (0.004)
Study field (base: Economics)												
Agriculture				-0.005 (0.007)		-0.005 (0.007)				-0.005 (0.007)		-0.005 (0.007)
Education				-0.014** (0.006)		-0.014** (0.006)				-0.015** (0.006)		-0.015** (0.006)
Technical fields				-0.008 (0.005)		-0.008 (0.005)				-0.009 (0.006)		-0.009 (0.006)
Healthcare				-0.018*** (0.005)		-0.018*** (0.005)				-0.019*** (0.005)		-0.019*** (0.005)
Behavior & Society				-0.007 (0.006)		-0.007 (0.006)				-0.007 (0.006)		-0.008 (0.006)
Language & Culture				-0.013* (0.007)		-0.013** (0.007)				-0.015** (0.007)		-0.015** (0.007)
Law				-0.006 (0.009)		-0.007 (0.009)				-0.008 (0.009)		-0.008 (0.009)
Natural sciences				-0.019*** (0.005)		-0.019*** (0.005)				-0.020*** (0.006)		-0.020*** (0.006)
Unemployment rate					0.125 (0.081)						0.128 (0.083)	
Months unemployed						0.001 (0.001)						0.001 (0.001)
Observations	4,533	4,533	4,533	4,533	4,533	4,533	4,533	4,533	4,533	4,533	4,533	4,533
Pseudo R-squared	0.0394	0.0485	0.1662	0.1954	0.1734	0.1966	0.0305	0.0404	0.1608	0.1891	0.1675	0.1904
Log-likelihood	-553.00	-547.75	-480.01	-463.19	-475.86	-462.49	-558.14	-552.39	-483.08	-466.84	-479.22	-466.07

Source: Authors' tabulation

Notes: Dependent variable is *working abroad*, a binary variable equal to 0 if graduate works in the Netherlands, 1 if abroad. Marginal effects at sample means from probit estimations are provided in columns. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.4. Analysis of destination choice

Our second hypothesis in this study is that more risk tolerant individuals make longer distance moves. This is because migrating over longer distances (in this case, moving to non-European countries) may involve higher economic and psychological costs associated with potentially less cultural, linguistic, social and economic affinity (Sjaastad, 1962). In addition, being employed in another European Union member state may ease economic and legislative aspects of migration (De Grip et al., 2010), which make outcomes of moving to another country less uncertain. We estimate two models to test this hypothesis.

Firstly, Heckman selection models with probit specification are estimated where the probability of migrating to a non-European country is compared with the probability of migrating to a European country in the second step, conditional on the migration decision. Migrants are likely to be self-selected to specific destinations based on their characteristics (Dostie & Léger, 2009); thus, Heckman selection model might be preferable in order to correct for a potential selection bias. The selection model included the variables used to analyze the migration decision in columns 6 and 12 of Table 3. In the destination choice model, we include covariates which likely affect location choices²⁰. Results are presented in Table 4.

As ρ is not significant, this suggests that selection bias does not play a role in our analysis. However, it should be noted that the significance level of the selection term changes depending on the exclusion restrictions, which is likely due to the relatively low number of graduates who migrated. In such cases, Heckman models are prone to give inconsistent results (Puhani, 2000) so subsample probit estimates are preferred due to their consistency across different specifications. Column 3 in Table 4 shows that one standard deviation (1.78 points in the migrant subsample) increase in risk tolerance is correlated with an increase in migration probability to a non-European country by 21 percentage points. Similarly, being more risk tolerant is associated with an increase in probability to migrate to a non-European country by 21.3 percentage points. Thus, these results suggest that more risk tolerant graduates move to distant countries.

²⁰ In addition to usual controls such as age and gender, GPA is included in the second stage of the Heckman probit estimations by following the finding of De Grip et al. (2010) that more successful graduates exhibit a higher tendency to move to non-European countries such as the USA, Canada, and Australia. As indicated by De Grip et al. (2010), another potential variable to be included in the second step could be the field of study. However, we preferred excluding this variable considering the limited number of migrants in our sample since only several migrants are available in fields such as education, healthcare, law, and natural sciences which predict failure or success perfectly in probit estimations.

Table 4: Pooled Heckman probit estimates for destination choice

Variables	Heckman correction:		No correction:		Heckman correction:	
	Selection equation (1)	EU (0) vs. non-EU (1) (2)	EU (0) vs. non-EU (1) (3)	Selection equation (4)	EU (0) vs. non-EU (1) (5)	EU (0) vs. non-EU (1) (6)
Risk attitude						
Risk tolerance	0.007*** (0.002)	0.095*** (0.035)	0.118** (0.049)			
Higher risk tolerance				0.012*** (0.003)	0.171** (0.069)	0.213** (0.099)
Age	0.000 (0.001)	-0.000 (0.016)	0.000 (0.021)	0.000 (0.001)	0.003 (0.017)	0.004 (0.021)
Female	-0.005* (0.003)	0.113* (0.068)	0.146* (0.077)	-0.005* (0.003)	0.103 (0.069)	0.135* (0.078)
Experience abroad	0.027*** (0.004)	0.042 (0.093)		0.028*** (0.004)	0.060 (0.096)	
GPA	0.006*** (0.002)	0.032 (0.053)	0.047 (0.061)	0.006*** (0.002)	0.016 (0.053)	0.031 (0.062)
University graduate	0.007** (0.003)	0.010 (0.019)		0.007* (0.004)	0.012 (0.015)	
Study field (base: Economics)						
Agriculture	-0.005 (0.007)	-0.005 (0.014)		-0.005 (0.007)	-0.007 (0.017)	
Education	-0.014** (0.006)	-0.019 (0.041)		-0.015** (0.006)	-0.026 (0.041)	
Technical fields	-0.008 (0.005)	-0.008 (0.019)		-0.009 (0.006)	-0.013 (0.022)	
Healthcare	-0.018*** (0.005)	-0.034 (0.073)		-0.019*** (0.005)	-0.047 (0.072)	
Behavior & Society	-0.007 (0.006)	-0.008 (0.018)		-0.008 (0.006)	-0.011 (0.021)	
Language & Culture	-0.013** (0.007)	-0.017 (0.037)		-0.015** (0.007)	-0.026 (0.043)	
Law	-0.007 (0.009)	-0.008 (0.021)		-0.008 (0.009)	-0.013 (0.028)	
Natural sciences	-0.019*** (0.005)	-0.035 (0.074)		-0.020*** (0.006)	-0.050 (0.075)	
Months unemployed	0.001 (0.001)	0.001 (0.002)		0.001 (0.001)	0.001 (0.002)	
Observations	4,533	4,533	126	4,533	4,533	126
Uncensored observations		126			126	
Pseudo R-squared	0.1966		0.0624	0.1904		0.0526
Log-pseudolikelihood	-462.49	-530.31	-67.93	-466.07	-534.49	-68.64
Coefficient ρ		-0.201 (0.472)			-0.275 (0.486)	

Source: Authors' tabulation

Notes: Dependent variable is *working abroad* in selection equations (columns 1 and 4). In the other equations, the dependent variable is binary, equal to 0 if a graduate moved to a European country and 1 if a graduate moved to a non-European country. In columns 2 and 5, conditional marginal effects at means and coefficient of ρ from Heckman probit models are reported. In the other columns, marginal effects at means from probit models are reported. Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Tobit estimates for migration distance

Variables	(1)	(2)
Risk attitude		
Risk tolerance	0.210*** (0.051)	
Higher risk tolerance		0.340*** (0.080)
Age	0.011 (0.020)	0.015 (0.020)
Female	-0.086 (0.070)	-0.099 (0.071)
Experience abroad	0.726*** (0.106)	0.751*** (0.110)
GPA	0.142** (0.056)	0.140** (0.057)
University graduate	0.115 (0.087)	0.095 (0.088)
Study field (base: Economics)		
Agriculture	-0.102 (0.125)	-0.108 (0.128)
Education	-0.294 (0.193)	-0.299 (0.196)
Technical fields	-0.137 (0.109)	-0.156 (0.111)
Healthcare	-0.537*** (0.141)	-0.547*** (0.144)
Behavior & Society	-0.158 (0.123)	-0.165 (0.125)
Language & Culture	-0.290 (0.180)	-0.333* (0.180)
Law	-0.147 (0.174)	-0.176 (0.175)
Natural sciences	-0.558** (0.267)	-0.584** (0.267)
Months unemployed	0.011 (0.014)	0.013 (0.015)
Observations	4,533	4,533
Uncensored observations	126	126
Pseudo R-squared	0.1334	0.1281
Log-likelihood	-732.08	-736.56

Source: Authors' tabulation

Notes: Dependent variable is migration distance, a continuous variable indicating the distance between the Netherlands and a potential destination country in kilometers. For the analysis, the scale of the dependent variable is adjusted to 1,000 kilometers. Marginal effects from tobit estimations are provided. Standard errors are in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Secondly, tobit models are estimated where migration distance in 1,000 kilometers is used as alternative dependent variable to test our second hypothesis. Tobit estimation is preferred since the degree of censoring is high due to graduates working in the Netherlands after graduation. Distance is calculated by the length of the shortest curve between geographical central points of origin (the Netherlands) and destination countries in kilometers. Results presented in Table 5 reveal that one standard deviation increase in risk tolerance (1.78 points in the migrant sample) is correlated with 374 kilometers increase in distance migrated while being more risk tolerant is significantly associated with an increase in distance migrated by 340 kilometers. Average distance migrated is about 2,891 kilometers in our data given that migration has been realized. Thus, estimated coefficients account for 12% to 13% of observed distance. Although the impact

of risk attitude on migration distance is lower relative to estimates provided for migration and destination choice in Table 3 and 4, the coefficient is still significantly positive.

5. Discussion and conclusion

Attitude towards risk has shown to be a determinant of migration decision (Massey, 1990) and destination choice (David, 1974). However, empirical evidence asserting risk tolerance as a triggering factor for migration is thin. This study aims to examine the extent to which risk attitudes affect migration decisions and destination choices of young graduates by using tracer studies for Dutch graduates (ROA School Leavers Survey). Based on the idea that graduates have more as well as more accurate information on the labor market conditions in their country of study and in geographically proximate regions, we tested two hypotheses. One is that being risk tolerant is associated with a higher tendency to migrate since migration is a risky decision due to uncertainties involved in the process. The other is that higher risk tolerance makes graduates move to more distant regions since long-distance migration involves more uncertainties than short-distance migration due to larger economic, social, and cultural differences.

Our findings are in line with both hypotheses. Estimation results show that graduates with a higher risk tolerance are more likely to migrate by 1.2 to 1.4 percentage points after controlling for other observable characteristics. These estimates amount to 43% to 50% of the unconditional migration probability of 2.8% observed in our sample. Moreover, risk tolerant graduates are 21 percentage points more likely to migrate to non-European countries instead of European countries compared to risk averse graduates. This effect is also substantial compared to the proportion of graduates moving to non-European countries (26% of all migrants in the sample). Similarly, having higher risk tolerance is correlated with the migration distance. Estimates for risk indicators explain 12% to 13% of distance migrated in our sample (2,891 kilometers) conditional on migration decision.

On the one hand, our findings for the impact of risk attitude on the migration decision is relatively high compared to the findings on regional migration of Jaeger et al. (2010). The latter found that one standard deviation increase in risk tolerance increases migration propensity within Germany by 0.7 to 1.7 percentage points with respect to an unconditional migration probability of 5.8%. This suggests that risk attitude is more deterministic in case of international migration than on regional migration within a country, which is likely since there are more uncertainties associated with migrating to another country than with migrating within a country. Another potential explanation for the lower effects in Jaeger et al. (2010) is that, contrary to us, they focus on an heterogeneous sample of adults in terms of age and education so their findings represent the impact of risk attitude on migration decision of an average individual in Germany.

On the other hand, the magnitude of the impact of risk attitude in our study is lower than the results provided by Gibson and McKenzie (2011) who reported a 6 to 8 percentage points increase in the migration propensity for a one standard deviation increase in risk attitude. However, the estimates by Gibson and McKenzie (2011) are based on a non-representative sample of young graduates, who are the best and brightest students in Pacific countries where the brain drain rate is very high due to scarcity of employment opportunities in the home country.

As mentioned above, few studies have examined the effect of risk attitude on country destination choice. In an earlier version of Jaeger et al. (2010), Jaeger et al. (2007) estimated that, among those who relocated within Germany, risk attitude explains 4% to 7% of the unconditional distance moved. In line with these findings, we observe a stronger impact of risk attitude on the extensive margin than on the intensive margin. Nevertheless, conditional on migration, we find a higher explanatory power of risk attitude for distance migrated compared to Jaeger et al. (2007). More importantly, our estimates for destination choice measured by the choice between another European country vs. a country outside Europe reveal that risk tolerance has a high correlation with the probability of migrating to a non-European country compared to moving within Europe.

Reverse causality is an unlikely explanation for our findings for two reasons. Firstly, we focus on a sample of recent graduates who have had little exposure labor market experience that could have shaped their preferences. Secondly, evidence shows that risk preferences are stable, and if anything change only very gradually over time (Sahm, 2012). Reassuringly, we show that the test-retest correlation in risk preference in our data is high and significant, and that it is not statistically different in the sub-sample of migrants compared to non-migrants.

This paper provides evidence on the association between individual risk attitudes and migration decisions and destination choice. However, we did not clearly distinguish risk and uncertainty concepts in the context of this study. In mainstream economics, a risky decision refers to a decision process among possible outcomes with known probabilities. Nevertheless, knowing the probabilities of outcomes is not always possible in real-life events such as the decision to migrate (Williams & Baláž, 2012). In this respect, the role played by ambiguity tolerance in migration decision might be important and still needs to be examined. Furthermore, migration decisions can be driven by personality traits such as optimism or overconfidence (Balaz & Williams, 2011). In that sense, investigating the relationship between ambiguity aversion, personality traits, and migration decision offers further directions of research.

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Appendix

Table A.1: Sample statistics

Variable	N	Mean	Std. Dev.	Min.	Max.
Working abroad	4,533	0.02780	0.1644	0	1
Destination	4,533	0.03508	0.2200	0	2
The Netherlands	4,407	0.9722 ^a			
European countries	93	0.0205 ^a			
Non-European countries	33	0.0073 ^a			
Migration distance	4,533	80.346	839.07	0	18530
Conditional on migration ^b	126	2,890.535	4,163.824	190.0335	18,529.61
Risk attitude					
Risk tolerance (unstandardized) ^c	4,533	6.0088	1.9586	0	10
Higher risk tolerance	4,533	0.4911	0.5000	0	1
Age	4,533	25.428	2.0704	21	30
Female	4,533	0.5542	0.4971	0	1
Experience abroad	4,533	0.2700	0.4440	0	1
GPA	4,533	7.4411	0.5942	6	10
University graduate	4,533	0.5089	0.5000	0	1
Study field	4,533	4.3419	1.9263	1	9
Agriculture	354	0.0781 ^a			
Education	366	0.0807 ^a			
Technical fields	843	0.1860 ^a			
Economics	1,063	0.2345 ^a			
Healthcare	606	0.1337 ^a			
Behavior & Society	771	0.1701 ^a			
Language & Culture	206	0.0454 ^a			
Law	199	0.0439 ^a			
Natural Sciences	125	0.0276 ^a			
Unemployment rate	4,533	0.03443	0.01623	0.01	0.08
Months unemployed	4,533	0.8515	2.1341	0	23

^a These values indicate the percentage distribution of subcategories in the sample.

^b It provides summary statistics of migration distance only for graduates who are working abroad. The scale was adjusted to 1,000 kilometers for tobit analysis.

^c Respondents of SIS surveys were asked to answer the question regarding self-perceived risk attitude in 0-10 scale. Summary statistics provided here are based on unstandardized scale. However, standardized measure of risk tolerance was used in the analyses.

Table A.2: Linear probability estimations for migration decision

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Risk attitude												
Risk tolerance	0.016*** (0.003)	0.015*** (0.003)	0.012*** (0.002)	0.012*** (0.002)	0.012*** (0.002)	0.012*** (0.002)						
Higher risk tolerance							0.028*** (0.005)	0.027*** (0.005)	0.020*** (0.005)	0.021*** (0.005)	0.020*** (0.005)	0.021*** (0.005)
Age		0.002* (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)		0.002* (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Female		-0.013** (0.005)	-0.015*** (0.005)	-0.010* (0.006)	-0.017*** (0.005)	-0.010* (0.006)		-0.013** (0.005)	-0.015*** (0.005)	-0.010* (0.006)	-0.017*** (0.005)	-0.010* (0.006)
Experience abroad			0.070*** (0.008)	0.065*** (0.008)	0.068*** (0.008)	0.065*** (0.008)			0.070*** (0.008)	0.066*** (0.008)	0.069*** (0.008)	0.066*** (0.008)
GPA				0.014*** (0.005)	0.014*** (0.004)	0.015*** (0.005)				0.014*** (0.004)	0.013*** (0.004)	0.015*** (0.005)
University graduate				0.013** (0.006)		0.013** (0.006)				0.012** (0.006)		0.012** (0.006)
Study field (base: Economics)												
Agriculture				0.003 (0.014)		0.002 (0.014)				0.002 (0.014)		0.002 (0.014)
Education				-0.016** (0.007)		-0.017** (0.007)				-0.017** (0.007)		-0.017** (0.007)
Technical fields				-0.009 (0.009)		-0.009 (0.009)				-0.009 (0.009)		-0.009 (0.009)
Healthcare				-0.032*** (0.007)		-0.031*** (0.007)				-0.032*** (0.007)		-0.031*** (0.007)
Behavior & Society				-0.010 (0.008)		-0.010 (0.007)				-0.010 (0.008)		-0.010 (0.007)
Language & Culture				-0.021* (0.012)		-0.022* (0.012)				-0.022* (0.012)		-0.022* (0.012)
Law				-0.010 (0.013)		-0.010 (0.013)				-0.010 (0.013)		-0.011 (0.013)
Natural sciences				-0.041*** (0.011)		-0.041*** (0.011)				-0.042*** (0.011)		-0.041*** (0.011)
Unemployment rate					0.270* (0.159)						0.264* (0.159)	
Months unemployed						0.002 (0.001)						0.002 (0.001)
Constant	0.029*** (0.002)	-0.015 (0.031)	-0.014 (0.030)	-0.101** (0.048)	-0.127*** (0.048)	-0.104** (0.048)	0.014*** (0.002)	-0.028 (0.031)	-0.024 (0.030)	-0.112** (0.048)	-0.134*** (0.048)	-0.115** (0.048)
Observations	4,533	4,533	4,533	4,533	4,533	4,533	4,533	4,533	4,533	4,533	4,533	4,533
R-squared	0.009	0.012	0.047	0.054	0.049	0.055	0.007	0.010	0.045	0.053	0.048	0.053

Source: Authors' tabulation

Notes: Dependent variable is *working abroad*, a binary variable equal to 0 if graduate works in the Netherlands., 1 if abroad. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.