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The Relationship between Unemployment and Risk-Aversion

Luis Diaz-Serrano
Donal O'Neill

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Luis Diaz-Serrano
National University of Ireland, Maynooth
and IZA Bonn

Donal O'Neill
National University of Ireland, Maynooth

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IZA

P.O. Box 7240
53072 Bonn
Germany

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

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ABSTRACT

The Relationship between Unemployment and Risk-Aversion*

In this paper we use a direct measure of individual risk-aversion to examine the relationship between risk-aversion and unemployment. The traditional search model predicts that more risk-averse individuals have lower reservation wages and thus are less likely to be observed in unemployment. Our findings, however, do not support this prediction: on the contrary our data suggest that more risk-averse individuals are more likely to be unemployed.

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Corresponding author:

Luis Diaz-Serrano
Department of Economics
National University of Ireland
Maynooth, Co. Kildare
Ireland
Email: luis.diaz@may.ie

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Introduction

Although an individual's attitude to risk is often crucial in predicting behaviour there appears to be very little empirical research linking risk attitudes to individual characteristics[1] and even less on the observed relationship between unemployment and risk-aversion. In an early study Feinberg (1977) examined the relationship between risk, risk-aversion and unemployment and found that more risk-averse individuals have shorter unemployment spells. However the measure of risk-aversion used by Feinberg was an indirect measure based on a number of observed outcomes such as the condition of one's car, having insurance on cars, the use of seat belts and the extent of cigarette smoking. While these may be related to attitudes to risk they may also reflect other factors such as individual income or social class, which need not be associated with the level of individual risk-aversion. More recently, Guiso et al (2002) use data from the 1995 wave of the Bank of Italy Survey of Household Income and Wealth (SHIW) to classify individuals into high, medium and low risk-averse categories. They concluded that risk-aversion indicators do not explain unemployment risk; the coefficient on the dummy for high levels of risk-aversion was positive but imprecisely estimated. In this paper we re-examine the relationship between unemployment and risk-aversion. In contrast to Feinberg (1977) we use a direct non-parametric measure of risk-aversion. We use data taken from both the 1995 and 2000 Bank of Italy Surveys of Household Income and Wealth (SHIW). This allows us to obtain more precise estimates than those reported by Guiso et al (2002). As expected, our results show that that more risk-averse individuals are less likely to hold risky assets and are also less likely to be self-employed. However, we find no support for the traditional job-search model; on the

[1] Exceptions include Palsson (1996), Hartog et al (2002), Guiso and Paiella (2001) and Guiso et al (2002).

contrary we find that more risk-averse individuals are significantly more likely to be unemployed.

Theory

The simplest partial equilibrium job search model assumes that infinitely lived agents are risk neutral and search each period by selecting independent draws from a known exogenous wage offer distribution, F(w), at a constant known cost c per draw. The agent can accept the offer currently in hand and work forever for the wage w. Alternatively, they can refuse the wage offer, without the possibility of recall, and sample once again. It is well known that in this situation the solution is characterised by a reservation wage strategy; workers accept the wage if it exceeds a predetermined threshold (w^R) which is called the reservation wage, and reject otherwise. The probability of employment in this model is simply (1-F(w^R)).

Pissarides (1974) and Nachman (1975, 1979) extend this model to consider cases where individuals are risk-averse and maximise expected utility rather than expected income. They show that, with or without recall, more risk-averse individuals are less selective and terminate their search at an earlier stage; the acceptable wage set of the less risk-averse is a subset of the acceptable set of the more risk-averse searcher. In deciding whether or not to continue searching an individual must choose whether or not to forsake the current wage offer in return for higher expected earnings. The more risk-averse individual attaches less value to the *expected* future gains of search and therefore will be more inclined to turn down the opportunity of continued search, in favour of employment. As a consequence more risk-averse individuals will spend less time unemployed but conditional on employment will receive a lower expected wage. When risk-averse individuals sample with recall the optimal stopping strategy may not satisfy

the reservation wage property. Nevertheless the negative relation between risk-aversion and the probability of unemployment is still valid even in these models (Lippman and McCall (1976)). Assuming the offer arrival rate does not depend on the level of risk-aversion, the probability of employment (1-F(w^R)) increases with the level of risk-aversion, ρ. This is because $\frac{dr}{d\rho} < 0$. In the next section of the paper we examine the relationship between the probability of unemployment and risk-aversion in order to test this prediction.

Data and Results

The data we use in our study are taken from the 1995 and 2000 waves of the Survey of Household Income and Wealth (SHIW) carried out by the Bank of Italy. These surveys contain detailed information on employment status and individual and household characteristics for a large representative sample of the Italian population. Starting from 1995, in each wave there is a set of rotatory questions addressed to the study of specific issues. To our purposes, the 1995 and 2000 waves contains questions addressed to the household heads that allow us to compute a direct measure of risk aversion. This measure of risk-aversion is based on individual responses to the following question:

C.51 "You are offered the opportunity of acquiring a security permitting you, with the same probability, either to gain **10 million lire** or to **lose all the capital invested**. What is the most you are prepared to pay for this security?

Thus individuals who pay P lire for this "lottery" have a 50% chance of winning ten million (10m) and a 50% chance of winning zero. The expected value of this lottery net

of the purchase price is *0.5·10m-P*. Clearly individuals who are risk neutral will pay anything up to 5 million lire to play this lottery, since the expected value of the winnings will remain positive; a risk-averse decision taker will pay less than 5m and a risk-lover would be willing to pay more than 5m lire. Using a Taylor series approximation to the utility function, Hartog et al (2002) obtain the following approximate expression for the Arrow-Pratt measure of absolute risk-aversion:

$$r_i(y) = \frac{(5m - P_i)}{[\frac{P_i^2}{2} + 0.5\frac{10m^2}{2} - 5m \cdot P_i]} \qquad (1)$$

For individuals who are risk neutral P_i=5m, so that $\rho_i(y)=0$; For risk-averse individuals $\rho_i(y)>0$ (with a maximum value of $\rho_i(y)=.2$ when $P_i=0$) and for risk-loving decision makers $\rho_i(y)<0$ (with a minimum value of $\rho_i(y)=-.2$ when P_i=10m. Furthermore, the measure is symmetric around the point of risk neutrality.[2] In practice we would not expect individuals to pay more than 10m lire for a lottery that has a maximum prize of 10m. However, in our data we do observe a small number of cases for which $P_i>10$m. For these individuals we set $\rho_i(y)=-.2$.

The security/lottery question was asked of all household heads though in 1995 only 3,396 provided a positive reservation price, 2234 individuals did not know (1586) or were unwilling (648) to answer the question. A further 2418 reported a reservation price of zero, and 87 cells have a missing value. In 2000, 1173 individuals reported a

[2] This is slightly different than the approach taken by Guiso and Paiella (2001). They view the expected benefit of the lottery as .5(10-P_i); that is individuals that are successful in the gamble receive 10m *along with their initial stake*. However, their resulting measure of risk-aversion is asymmetric, with the maximum value of risk-aversion corresponding to R=.2 and the maximum value of risk-loving corresponding to -.04. As a result the curvature of the resulting risk-aversion measure produces greater variation over the range of risk-averse individuals than over the risk-lovers. Since this can cause problems in regression analysis we preferred to adopt the symmetric approach discussed above.

positive reservation price, 740 did not know (720) or were unwilling (20) to answer, and 2020 provided a reservation price of zero. We show a summary statistics in table 1.

The levels of individual risk-aversion reported in our samples report a similar distribution than those observed in Guiso ad Paiella (2001) and Hartog et al. (2002) for The Netherlands, though the Dutch data tend to exhibit a more risk-aversion than Italians. Considering just individuals with a positive reservation price, we get that in 1995 about 76.5% of the respondents were risk-averse, 17% were risk-neutral and 6.5% were risk-lovers. However, in 2000 risk-averse goes up to 92.4%, risk-neutrality and risk-loving fall to 6.7 and 0.85%, respectively.

Table 2 estimates two simple models to examine the determinants of risk-aversion. The first estimates a linear regression of ρ_i on a set of regressors X. The second estimates a probit model where the dependant variable is 1 if the individual is risk-averse and zero otherwise. The results are much as expected. Consistent with decreasing risk-aversion, we observe a negative and significant effect of household income. On the other hand, women tend to be more risk-averse, whereas according to some human capital literature more educated individuals show a lower level of risk-aversion (see e.g. Shaw 1996).

Measured risk-aversion based on hypothetical lottery games is sometimes criticised by researchers who doubt whether such questions can be answered in a meaningful way, and whether such answers can really be correlated with real risk propensity (e.g. risk taken in portfolio investments). To address this criticism we examine the relationship between our measure of risk-aversion and two other outcome variables, namely the percentage of risky assets overall in a household's portfolio and the propensity to become self-employed.[3,4] In so far as our measure of risk is

[3] For related analysis of these issues see also Guisso and Paiella (2001) and Wagner (2002).

appropriate we would expect to observe a negative relationship between risk-aversion and both the holding of risky assets and the probability of being self-employed.

Our data provides no information on the duration of unemployment. Therefore, to look at the relationship between risk attitudes and unemployment we estimate a probit model where the dependent variable is 1 if the individual is currently unemployed and zero otherwise. The simple search model outlined above predicts that the coefficient of risk-aversion in this model should be negative. The main results of our paper are presented in Table 3. As expected the results from the asset equation and the self-employment equation indicate that more risk-averse individuals are less likely to hold risky assets and are also less likely to be self-employed. The results would seem to confirm that our measure is a reasonable indicator of individual risk attitudes. Given our earlier discussion of the job search model we would expect the risk-aversion measure to be negatively related to unemployment status. However, when we look at the unemployment probit we find the opposite result; more risk-averse individuals are more likely to be unemployed even when we include a set a large number of control variables. Furthermore the coefficient on risk-aversion is precisely estimated with a p-value of 0.059. One possible explanation for our finding is the search model presented earlier assumes that the distribution of risk attitudes is randomly distributed among the stock of unemployed job-seekers and furthermore that the offer arrival rate is the same for all workers. There are two reasons as to why these assumptions may not hold. Firstly, since search itself is costly more risk-averse individuals may search less intensively. This in turn would reduce their offer arrival rate, which would in turn reduce their probability of employment. Alternatively, it may be that by searching longer less risk-averse

[4] When presenting the results for the asset equation we focus only the simplest specification. However we also estimated a Tobit model to account for truncation at zero. The estimated coefficient on the risk parameter in this model was still negative and significant.

individuals secure a more stable job match, which would reduce the likelihood of these individuals quitting or firing. The simple job search model we presented does not allow for quits or firings. Either of these features could alter the prediction of the simple search model and lead to the prediction obtained in our analysis. Unfortunately given the structure and size of our data set we are not able to address these issues. Nevertheless we see them as important avenues for future research.

Conclusion

In this paper we use a direct non-parametric measure of risk-aversion to empirically test the relationship between attitudes to risk and unemployment. The traditional search model predicts that the probability of unemployment at a given time should be lower for more risk-averse individuals. However, we find the opposite result, in that more risk-averse individuals are significantly less likely to be employed. We suggest that studies of the search intensity of unemployed job-seekers and/or analysis of the relationship between job matching and risk-aversion may shed further light on our findings.

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Annex of tables

Table 1: Participation shares in the "lottery" question.

	1995		**2000**	
Non participation	4,739		2760	
Do not know	1,586		720	
Unwilling to answer	648		20	
Missing	87			
with 0€	2,418		2,020	
Participation (>0€)	3,396		1,173	
Total	8,135		3,933	
	(1)	**(2)**	**(1)**	**(2)**
Risk Averse (P<2,582€)	86.26%	76.47%	97.21%	92.41%
Risk Neutral (P=2,582€)	9.92%	16.99%	2.47%	6.73%
Risk Lovers (P>2,582€)	3.82%	6.54%	0.31%	0.85%

Table 2: Determinants of Risk-aversion. The endogenous variable is ρ as defined in (1)

	All responses				Responses with positive outcome			
	OLS		Probit		OLS		Probit	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Constant term	0.2656	16.59	3.7053	9.60	0.3131	11.19	3.3800	7.72
Household char.								
Number of children	0.0004	0.47	-0.0160	-0.82	-0.0005	-0.31	-0.0253	-1.13
Log(Income)	-0.0088	-5.70	-0.2100	-5.61	-0.0126	-4.63	-0.1875	-4.43
Household head char.								
Age	0.0003	5.03	0.0097	6.12	-0.0001	-0.88	0.0007	0.36
Years of schooling	-0.0014	-5.27	-0.0245	-4.09	-0.0021	-4.47	-0.0235	-3.44
Female	0.0088	3.66	0.2175	3.63	0.0200	4.64	0.2997	4.41
Married	0.0026	0.98	0.0839	1.34	0.0049	1.02	0.1196	1.67
Region (base North-West)								
North-East	0.0138	5.20	0.2694	4.58	0.0198	4.23	0.2639	3.89
Centre	0.0132	4.95	0.2162	3.68	0.0124	2.48	0.1115	1.60
South	0.0143	5.25	0.2805	4.51	0.0310	6.59	0.3940	5.59
Islands	0.0182	5.57	0.3563	4.55	0.0361	6.28	0.4442	5.01
City size (base < 20,000)								
20,000 to 40,000	0.0004	0.15	-0.0016	-0.03	-0.0006	-0.13	-0.0031	-0.04
40,000 to 500,000	-0.0055	-2.55	-0.1242	-2.45	-0.0068	-1.73	-0.0836	-1.43
> 500,000	-0.0048	-1.46	-0.0520	-0.69	-0.0069	-1.20	-0.0168	-0.19
1995	-0.0312	-16.18	-0.8817	-14.65	-0.0453	-11.76	-0.7707	-10.94
Sample size	8,180				4,265			

Table 3: Probit models on the probability of unemployment, self-employment and investment in risky assets.

	All responses						Responses with positive outcome					
	Unemployment		Self-employment		Investment in risky assets		Unemployment		Self-employment		Investment in risky assets	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Constant term	-4.014	-7.32	-1.733	-6.49	-2.181	-8.35	-3.676	-5.03	-1.365	-4.09	-1.940	-5.99
ρ (ARA)	0.734	1.89	-1.652	-7.96	-0.740	-3.63	0.595	1.36	-1.598	-7.08	-0.780	-3.56
Household head												
Age	0.131	5.50	0.048	4.66	0.089	8.34	0.124	3.72	0.031	2.38	0.082	6.07
Age squared	-0.002	-6.99	0.000	-4.91	-0.001	-10.42	-0.002	-4.87	0.000	-2.26	-0.001	-7.54
College	-0.576	-3.73	0.697	12.09	0.059	0.96	-0.816	-3.12	0.675	9.21	0.004	0.05
Female	-0.287	-3.27	-0.203	-3.60	-0.589	-10.56	-0.148	-1.20	-0.163	-2.17	-0.609	-8.12
Married	-0.349	-4.16	0.134	2.41	-0.062	-1.19	-0.407	-3.40	0.123	1.66	-0.099	-1.42
Region (base North-West)												
North-East	-0.085	-0.71	-0.058	-1.10	0.107	1.95	-0.297	-1.80	0.019	0.28	0.130	1.80
Centre	0.044	0.40	-0.268	-4.88	0.071	1.31	-0.010	-0.07	-0.245	-3.14	0.135	1.83
South	0.612	6.42	-0.812	-12.71	-0.044	-0.80	0.630	5.21	-0.820	-10.00	-0.060	-0.85
Islands	0.645	6.13	-0.922	-10.84	-0.031	-0.47	0.428	2.90	-0.962	-8.46	0.077	0.90
City size (base < 20,000)												
20,000 to 40,000	-0.133	-1.41	-0.001	-0.02	-0.076	-1.47	-0.138	-1.08	0.085	1.10	-0.062	-0.89
40,000 to 500,000	-0.075	-0.97	-0.047	-0.98	-0.070	-1.58	-0.143	-1.31	0.017	0.26	-0.039	-0.66
> 500,000	0.016	0.14	0.038	0.52	-0.169	-2.33	-0.131	-0.83	0.116	1.22	-0.179	-1.87
Previous or current activity												
Office worker	0.996	7.44					1.210	6.42				
Junior manager	1.050	4.00					1.711	4.79				
Professional	1.396	3.88					2.221	5.09				
Sole proprietor	2.342	7.22					2.825	7.69				
Free lance	1.743	12.37					2.254	11.25				
Shareholder	1.971	3.39					2.535	4.47				
1995	0.086	1.17	-0.216	-5.03	-0.013	-0.32	0.156	1.29	-0.328	-5.20	-0.101	-1.69
Sample size	8,037		8,203		8,203		4,185		4,278		4,278	