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Secure Job and Risky Choices? An Analysis of *State* and *Wealth* Dependence of Risk Aversion Using Severance Pay Allocation

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Abstract

State- and *Wealth*-dependence of individual risk preferences are investigated using Italian panel data. To elicit risk aversion, a social security policy reform occurred in Italy in 2008 is exploited. This law asks private sector employees to invest their accruing severance pay in three alternative pension funds strongly heterogeneous in terms of risk. The determinants of this choice are analyzed and the focus is posed on the effect of wealth and job-status. These are investigated considering *i*) the behavior of workers changing job contract; *ii*) the presence of different income prospects associated to labor contracts' length; *iii*) the exogenous threshold provided by firm size in terms of Employment Protection Legislation. Fixed-Effects estimates show that preferred funds - and consequently risk preferences - are not affected by wealth modifications pointing out for the presence of Constant Relative Risk Aversion. Conversely, job contract characteristics in terms of job protection from the risk of layoff appear to significantly affect risk attitude pointing for the existence of a *State Dependent Constant Relative Risk Aversion*.

Key Words: Relative Risk Aversion, Pension Funds, Panel Data, Job Movers.

JEL: D10, D80, D81.

1 Introduction

The assumption concerning Constant Relative Risk Aversion (CRRA) is at the root of many macroeconomic models. The reason grounds on the need to collapse heterogeneous individuals in a single representative agent with the purpose of easing macroeconomic model building. Moreover, if preferences are taken as primitive and stable across states and time, dynamic intertemporal choices may be treated straightforwardly. However, a number of empirical facts seem to be in contrast with the presence of constant risk attitude (Kocherlakota, 1996) so that there have been empirical attempts to investigate the actual shape of preferences and the relevance of wealth and states of nature in determining individuals' behavior. Unfortunately, the identification of these effects is not an easy task and strong assumptions may undermine the reliability of existing results (Bhamra and Uppal, 2006; Chiappori and Paiella, 2011).

The goal of this study is to provide evidence on individual risk preferences elicited by means of workers' severance pay investments. We exploit a change in the Italian Law asking all workers in the private sector to invest their accruing severance pay in alternative pension funds which are very different in terms of riskiness. Risk attitude is then measured according to the specific fund choice. Evidence gathered by this measure has the main advantage of being grounded on real-life choices (Levitt and List, 2007) and, furthermore, the mandatory nature of the normative setting used in this study implies that problems of sample selection - which might affect standard measure of risk aversion related to financial assets holding - are not present in our data. Indeed, households engaged in financial activities typically have more education and higher occupational status so that

they may differ in systematic ways from the average real-world families. In follows that results based on financial assets holding should be prudently generalized. By relying on mandatory severance pay allocation of private sector employees, this study provides evidence from an unselected category of workers.

In this frame, we present a simultaneous evaluation of the dependence of individual risk preferences upon both *state* and *wealth*, which represents the second target of our analysis. The particular state of nature considered in this work refers to the security of job position in terms of risk of layoff. We use panel data and our attention is focused on workers who changed job contract length within the same firm - going from temporary to permanent jobs - and we analyze choices undertaken under different contracts associated to various wealth and job security prospects. Our results show that attitude toward risk is constant in wealth, confirming the presence of CRRA. Conversely, the state in terms of job security appears to significantly shape risk attitude pointing out for the presence of *State Dependent* CRRA.

The rest of the paper is organized as follows. Next Section briefly discusses the literature and our insights while Section 3 describes the institutional setting used to elicit risk preferences and job security and the data. Section 4 illustrates how individual discrete choices in terms of funds can be related to a measure of relative risk aversion and a simple theoretical frame in which relative risk aversion is related to individual states of nature is provided. Section 5 presents the identification method while Section 6 contains the results. Concluding remarks are discussed in Section 7.

2 Literature and Our Insights

The dependence of risk preferences on wealth and states of nature has been evaluated in order to fit many empirical facts which seem to be at odds with constant risk attitude (Kocherlakota, 1996). Existing studies can be classified in two main branches. On the one side, some authors investigate if variation in wealth affects assets holding using cross sectional household data (Blake, 1996; and Guiso and Paiella, 2001). This approach has been criticized for two reasons. Firstly, Bhamra and Uppal (2006) argue that cross-section methodologies do not allow for identification of risk aversion and intertemporal elasticity of substitution unless the set of available choices remains constant over time. Secondly, Chiappori and Paiella (2011) show that it is not possible to untangle the effect of wealth on individual preferences from the joint distribution of risk aversion and wealth using cross sectional data since the time variation provided by panel data is required. By using Italian data, these authors show that relative risk aversion does not depend on individual wealth, confirming the CRRA hypothesis. However, the authors recognize that the inclusion of business equity among assets reverses their conclusion. In this case, their results are similar to that presented in Bucciol and Miniaci (2011) and Dohmen et al. (2011). On the other side, field-experiments have been implemented to test the stability of risk preferences (Harrison *et al.* 2007). Among existing works, Andersen *et al.* (2008) suggest the importance of considering the possibility that risk preferences are actually state-contingent. Quoting these authors (p. 1105) "common sense and interpretation suggests that individual risk preferences could be state dependent". To investigate the issue, the authors evaluate if individual risk attitudes change over time using 97 Danish

individuals undertaking two times - over a 17 months period - experiments designed to elicit risk aversion. Some variation of elicited risk attitudes over time is detected, suggesting that subjects who become more optimistic about future tend to reduce their risk aversion.

At this stage, it is interesting to remark the implications that the results of these approaches have the one for the other. In the former (Chiappori and Paiella, 2011), the empirical frame considers *only* the wealth effect on the share of risky assets owned by households and neglects the possible *state* effect shaping both risk attitude (*per se*) and wealth. This could lead to biased estimates of RRA. Indeed, this caveat could also undermine panel data estimates, unless the assumption of stable risk preferences across states holds. Consider, for example, the possible impact of the event of a parent's death which can negatively influence individual's happiness being at the same time wealth increasing through bequests. These two elements may affect in an opposite way individual's risk attitude and the ignorance of state-effect could induce a negative bias in the estimation of wealth-effect. In the latter (Andersen *et al.*, 2008), evidence concerning state-dependence of risk aversion heavily relies on the *ex-ante* assumption of CRRA. In other words, by relying on existing evidence on CRRA, it is assumed that any change in *state* affects risk attitude *per se* and not because of wealth modifications associated to the change in *state.* To give an example, consider an individual who has fallen into a depressive disorder and assume that he/she became more risk averse. Then, the interpretation of this evidence in the presence of CRRA excludes *a priori* that this individual has changed risk attitude because of income loss due to his/her illness and then, the causal relation between health state and risk aversion follows. However, the evidence on CRRA on which this interpretation is grounded neglects

the possible state-effect on risk attitude. Paradoxically, the main result of this contribution undermines the validity of its basic assumption, that is, relative risk aversion is constant in wealth.

Our empirical methodology is targeted to single out state- and wealth- dependence of risk attitudes by investigating real-life choices related to mandatory severance pay allocation over pension funds. This measure may present some advantage with respect to existing ones related to households' financial investments since it does not suffer from sample selection problems arising from the fact that the latter are observed only for those who have actually decided to engage in financial activity: whether participants in financial activities differ in systematic ways from the entire population, attempts to generalize the obtained results can be questioned. In our setting, we evaluate the behavior of workers who changed job contract's length within the same firm going from temporary to permanent positions. We argue that the security of job position is a relevant state of nature which is likely to affect risk attitude. The intuition is that permanent workers have a clear-cut social position and whenever a risky event has a negative outcome, its consequences may be relatively less important for individuals who feel safe because of the stability of their job position. However, the identification of this state effect could be particularly challenging since, as discussed in previous examples, it can be correlated with income effect. The caveat is that a secure job implies higher expected life-income too. To tackle this issue, we use a panel data methodology which, at the outset, allows to differentiate out all observed and unobserved characteristics affecting risk attitude which are constant over time. Moreover, in order to single out wealth and state effects, we consider the exogenous threshold provided by firm size in terms of EPL regulations and the income disparities associated to

contract length.

3 Institutional Frame and Data

In order to evaluate individuals' risk attitude we exploit a change in the Italian Law regulating severance pay which obliged all workers in the private sector to invest their accruing severance pay in alternative funds which are very different in terms of riskiness. Before 2008, the Italian Private Sector Social Security System was characterized by the presence of a severance pay known as *Trattamento Fine Rapporto,* that is, a lump-sum payment received by employees upon job termination. For each year, it consisted of a fraction of the annual salary (6.91%) recapitalized at fixed interest rate. The accrued severance pay is then paid when job separation occurs or at retirement and, meanwhile, it is managed by the firm. The legislative decree n. 252/2005, definitely in charge from 2008, has deeply modified the normative setting for private sector employees. In particular, individuals have to invest their accruing severance indemnity in three possible alternative funds. The safest national fund (INPS Fund) is risk-free while private funds - both those specific for job-category (Closed Funds) and those open to all workers (Open Funds) follow the market riskiness.[1] These three options are strongly differentiated in terms of risk. In Figure 1 we report the average return for the three funds derived using data from the National Board of Supervisors on Pension Funds (COVIP, 2013). From this figure it is fairly evident that the variability in terms of rate of return for

[1]INPS is the National Institute for Pension System. In the case of INPS Fund, severance pay remain with the firm which has to transfer it to the INPS. Closed Funds are created and administrated by specific workers' categories that, usually, delegate financial activity to private institutions such as banks or insurances. Open Funds are pure private pension funds activated by banks and insurance companies.

both Closed and Open Funds is very high during time, implying high variance and uncertainty associated to these financial activities. Conversely, when INPS Fund is considered, its return is rather stable, confirming that much less uncertainty is associated to this form of investment funds. Interestingly, average returns to each fund-type reflect the risk-revenue relation being Open and Closed Funds at the top of the rank (2.6% and 2.4% respectively) followed by INPS Fund (1.5%). It is important to note that, once the fund has been chosen, it is not possible to modify this choice until job termination. More precisely, only in the case of INPS Fund, it is possible to reset the choice going from the safest to other funds while the converse is not allowed. Moreover, if the individual remains silent, by not giving any indication within 6 months from the introduction of the new regime, the INPS Fund is automatically attributed to him. In the next Section we discuss how the choice in terms of pension funds can directly be related to individual risk aversion.

Some words should be spent to briefly discuss the normative setting concerning individual layoffs in the Italian labor market, since it plays an important role in our identification procedure being our main interest posed on the job-protection state. Since 1973, the Italian legislation allows for individual dismissal only if it is justified by a *just cause* rule. The courts' reports have established that only misconduct can be considered as *just cause* while economic reasons cannot. If the dismissal is considered unfair, workers are entitled to a compensation which crucially varies according to firm size. Those firms employing less than 15 employees must pay to the worker a monthly forfeit while firms employing more than 15 workers have to entirely pay the forgone wages and, most importantly, they must re-hire the worker.[2]

[2]The 15 employees threshold is computed by considering the specific establish-

To estimate our models, we use Italian data coming from a survey conducted by the Institute for the Development of Vocational Training of Workers (ISFOL) on a representative sample of Italian workers interviewed in 2008 and re-interviewed in 2010. The survey yields a two-year panel that allows for the analysis of individuals' flows across jobs. Each wave is composed of about 6,485 individuals employed in the private sector and the panel is strongly balanced. The data set contains several information on socioeconomic and demographic characteristics. We rely on these two specific waves since they provide information concerning the allocation of the severance pay across pension funds.

Before discussing some preliminary statistics, in Figure 2 we show correlation between a measure of individual risk attitude and choices in terms of fund. This measure is determined by asking individuals about the amount of money they would accept in order to give up a lottery ticket that yields 0 or 100,000 euros with 50% of chance. A measure of the certainty equivalent is then determined.[3] Evidence reported in Figure 2 goes exactly in the expected direction being the riskiness of the chosen fund increasing in the certainty equivalent. Table 1 gives some information concerning job flows in the considered period for individuals in our sample reporting the net flow of workers across job contracts. The number of individuals who moved from temporary to permanent and from part-time to full-time contract is also reported according to firm size which indicates EPL

ment rather than the whole firm. However, in case the single plant belongs to a firm employing more than 60 employees in the same province, the most binding employment protection applies independently of plant size. To fix the threshold, apprentices and temporary workers with tenure shorter than nine months are not considered, while part-time workers and all other temporary contracts are included.

[3]Guiso et al. (2013) use a similar measure to evaluate if risk aversion is stable over time.

enforceability (firms with more than 15 employees are under the most binding EPL). We record 541 individuals whose job contract changed within the same firm. Moreover job-flows are almost equally distributed across the 15-employees threshold.

Table 2 shows how the severance pay has been allocated across funds. The Italian legislation clearly states that workers who do not give any indication within six months from the beginning of their labor contract will be considered as if they set the safest INPS Fund. As reported in the COVIP (2011) relation, actually 20% of all Italian workers employed in the private sector clearly invested in market funds, while the remaining 80% opted for the INPS Fund either directly (20%) or indirectly (60%). Our data are perfectly in line with these numbers.

Some interesting pattern concerning changes in fund-choice from 2008 to 2010 can be gathered from Figure 3. In this figure we ordered the fund choice according to a 0-3 discrete variable, taking the value 0 for INPS Fund chosen indirectly, 1 for INPS Fund chosen explicitly, 2 for Closed Fund and 3 for Open Fund. It is fairly evident that in 2010 individuals tend to confirm the choice they have made in 2008. The distribution is unimodal and differences across fund-settings are almost normally distributed. The same pattern is reported in Figure 4 where we restrict our sample to individuals who did not change their employment status.[4] Interestingly, if we investigate choice of fund of those workers who have changed job contract duration, we can gather some additional insights. In Figure 5 we consider only those employed under a temporary contract in 2008 who became permanent workers in 2010. It appears that, albeit a large part of them confirm their previous

[4]Differences in the choice of fund arise for individuals who did not change contract typology while signing temporary contracts in the same firm.

choice, the distribution presents a right-skewness. Conversely, when permanent employees becoming temporary are considered (Figure 6) the distribution appears to have a left-skewness.

4 A Simple Theoretical Frame

In this Section we formalize how a discrete choice of fund as that discussed above can be used to elicit risk preferences. In particular, we extend the Friend and Blume (1975) setup to account for indivisible wealth and states of nature. Consider an individual i (with $i = 1, 2, ...N$) whose utility function at time t is given by:

$$U_{i,t} = U\left(W_{i,t}, S_{i,t}\right) \tag{1}$$

where $W_{i,t}$ is a positive continuous variable indicating wealth and $S_{i,t}$ is a strictly positive continuous variable defined as follows. Indicate with $\left\{\Gamma_{i,t}^1, \Gamma_{i,t}^2 ... \Gamma_{i,t}^M\right\}$ a vector of M possible states of nature of individual i at time t. These include, in particular, employment status (employed or unemployed), duration of job contract (fixed-term or open-ended), and a set of other relevant socioeconomic characteristics. For individual i, each $k^{th}-$state $\Gamma_{i,t}^k$ $(k = 1, 2, ...M)$ takes a specific value that can change during time. We indicate with $\gamma_{i,t}^k$ the specific realization of state k at time t for individual i. By defining $\mathbf{\Gamma}_{i,t} = \times_{k=1}^{M} \Gamma_{i,t}^M$ as the set of all possible combinations of states of nature for individual i at time t, it is possible to define $S_{i,t}$ as a function such that:

$$S_{i,t} : \mathbf{\Gamma}_{i,t} \rightarrow \mathbb{R}^+ \tag{2}$$

which implies that $S_{i,t}$ transforms all the combinations of states of nature into a strictly positive continuous variable.

We assume that:

$$S_{i,t+1} = S_{i,t} + \varepsilon_{i,t} \tag{3}$$

where ε_{it} is a random shock normally distributed across i and t with $E[\varepsilon_{i,t}] = 0$. In words, a specific realization of the $k^{th}-$state of nature can change from $\gamma_{i,t}^{k}$ to $\gamma_{i,t+1}^{'k}$ with $\gamma_{i,t+1}^{'k} \neq \gamma_{i,t}^{k}$ only through a random shock and this applies to all M states, hence the probability that an aggregate change in $S_{i,t}$ occurs, follows a random process. Moreover, when the considered time period is very small (dt) shocks occur with probability zero so that:

$$S_{i,t+dt} = S_{i,t}. \tag{4}$$

Assuming that $U(.)$ is a homogeneous function of degree 1 we can write it as follows:

$$u_{i,t} = u(w_{i,t}) \tag{5}$$

where $u_{i,t} = U_{i,t}/S_{i,t}$ and $w_{i,t} = W_{i,t}/S_{i,t}$. This utility function gives us information on how utility changes according to wealth, conditional upon the current states of nature of individual i. Now, consider the case where each individual i at time t has the opportunity to invest his wealth in financial activities. Assume that there are two types of activities. Risk free activities have constant revenue rate indicated by r_f, while market activities have a variable revenue whose mean and variance are r_m and σ_m^2 respectively. Under the assumption of divisible wealth, the wealth

conservation equation is given by (Friend and Blume, 1975):

$$W_{i,t+dt} = W_{i,t}\left[1 + \left[r_f + a_{i,t}E(r_m - r_f)\right]dt + a_{i,t}y(t)\sqrt{\sigma_m^2 dt}\right] \tag{6}$$

where $a_{i,t}$ is the share of wealth invested in risky assets and $y(t)$ is a standardized normal random variate. Here, we take the case where $a_{i,t} = \{0, 1\}$ hence we consider a scenario where individuals can place their indivisible wealth in either risky or risk-free assets. We prove that discrete choice allocation can also be used to infer relative risk aversion. By dividing eq. (6) by $S_{i,t+dt}$, expanding $u\left(w_{i,t+dt}\right)$ in a Taylor series about $w_{i,t}$ up to the second order, taking expectations and dropping negligible terms with dt at the exponential, we get:

$$E\left[u\left(w_{i,t+dt}\right)\right] = u\left(w_{i,t}\right) + u^{'}\left(w_{i,t}\right)w_{i,t}\left[r_f + a_{i,t}E(r_m - r_f)\right]dt + \frac{1}{2}u^{''}\left(w_{i,t}\right)w_{i,t}^2 a_{i,t}^2\sigma_m^2 dt. \tag{7}$$

According to the expression above, individual i maximizes his expected utility at time t by indifferently setting $a_{i,t} = 0$ or $a_{i,t} = 1$ only if:

$$-u^{'}\left(w_{i,t}\right)w_{i,t}E(r_m - r_f) = \frac{1}{2}u^{''}\left(w_{i,t}\right)w_{i,t}^2\sigma_m^2. \tag{8}$$

By re-arranging we get:

$$\frac{2E(r_m - r_f)}{\sigma_m^2} = -\frac{u^{''}\left(w_{i,t}\right)}{u^{'}\left(w_{i,t}\right)}w_{i,t} \tag{9}$$

or, alternatively:

$$\frac{2E(r_m - r_f)}{\sigma_m^2} = \underbrace{-\frac{U''(W_{i,t}, S_{i,t})}{U'(W_{i,t}, S_{i,t})}\frac{W_{i,t}}{S_{i,t}}}_{state-dependent\ relative\ risk\ aversion} \quad . \tag{10}$$

Eq. (10) contains two important results. The first one can easily be gathered by assuming the standard case of constant *states of nature*, i.e., $S_{i,t} = S_i$. If states are constant over time, the RHS of eq. (10) contains the standard Arrow-Pratt measure of relative risk aversion. In this case, individuals set their choice in terms of $a_{i,t}$, according to their own relative risk aversion. This implies that discrete choice between free-risk and risky activities - and not only the combination of them - can be directly related to individual relative risk aversion. In this case, it is possible to test if variations in wealth $W_{i,t}$ affect $a_{i,t}$ (hence, to test for CRRA) using the Chiappori and Paiella (2011) procedure. The second result we have achieved concerns the fact that, if the utility function is shaped by states of nature changing over time, then the choice of $a_{i,t}$ depends on the RHS term of eq. (10) that we define *state dependent relative risk aversion* (*SD-RRA*). Given this condition, in the absence of any variation in $a_{i,t}$ when individual wealth changes, we cannot conclude that relative risk aversion is constant in wealth unless we exclude that any modification of state of nature is associated to wealth changes.

5 The Identification Strategy

5.1 The main empirical setup

In order to evaluate wealth and state dependence of risk preferences we focus on some aspects characterizing the individual positioning in the labor market which are likely to influence income prospects as well as job protection from the risk of layoff. Our interest in this specific state of nature relies on the belief that it is extremely relevant in conditioning individual's behavior and presumably risk attitude. To identify the impact of these elements on risk aversion, we adopt an empirical approach based on the evaluation of choices on pension funds as described in Section 3. In particular, we estimate econometric models using panel data which record severance pay investments of workers who changed their labor market *status* during the period of the survey. We consider various categories of private sector workers and we define a specific state according to the duration and to the legal protection from layoffs associated to the employment contract. The basic intuition is the following. When workers change their position within the same firm, say from a temporary to a permanent job contract, two possible effects modifying their investment behavior may arise. First of all, the expected life income to be invested rises, inducing a wealth effect on risk preferences. Secondly, job security in terms of probability of layoff also changes having in this case an impact *per se* on risk attitudes through social status or mindset modifications. In order to single out these two effects we compare workers maintaining *ceteris paribus* conditions with respect to expected income or job security. In the former case, we compare workers changing contract in firms of different size. Considering the Italian institutional setup which provides special tutelages to employees in large firms, these workers

face different job security but similar expected income changes so that - under some conditions discussed below - we may single out the state dependence of risk preferences. In the latter case, we compare investment decisions of workers with different working hours in firms providing similar job protection and we attempt to isolate the wealth effect.

According to the notation presented in Section 4, consider the latent variable $a_{i,t} = \{0, 1\}$ indicating the choice of fund of individual i at time t, where $a_{i,t} = 0$ indicates risky-free choice, while $a_{i,t} = 1$ indicates market-revenue fund. We can write an expression for $a_{i,t}$ as follows:

$$a_{i,t} = \beta_0 + \boldsymbol{\beta}_1 \mathbf{X}_{i,t} + \beta_2 Status_{i,t} + \beta_3 Wealth_{i,t} + \delta_i + \xi_{i,t} \tag{11}$$

where $\mathbf{X}$ is a vector of control variables; $Wealth$ is the amount of wealth to be invested, $Status$ is a dummy variable indicating the characteristic of job contract, with $Status = 1$ indicating open-ended contracts and 0 otherwise, δ captures time invariant unobserved heterogeneity in preferences including risk attitude while ξ is a random error uncorrelated with the explanatory variables. Individuals' specific time-varying characteristics that may affect our proxy for risk attitude are contained in the vector $\mathbf{X}$. These variables mainly include current monthly wage, family composition, profession, seniority and civil state. These should be introduced in our model in order to avoid biased estimates of β_2 and β_3 which represent the effect that employment status and wealth have on risk attitude respectively. If relative risk aversion is constant with respect to both wealth and state these parameters should be not statistically different from zero.

It is worth noting that whenever risk preferences are heterogeneous - and het-

erogeneity is a function of both employment status and wealth - eq. (11) cannot be estimated on cross sectional data because the error term $\delta_i + \xi_{i,t}$ would be correlated with $Status$ and $Wealth$. The problem could be overcome by using panel data. Taking the first differences of eq. (11) we get:

$$\Delta a_{i,t} = \boldsymbol{\beta}_1 \Delta \mathbf{X}_{i,t} + \beta_2 \Delta Status_{i,t} + \beta_3 \Delta Wealth_{i,t} + \Delta \xi_{i,t} \tag{12}$$

Therefore, any observed and unobserved stationary heterogeneity of preferences is removed and β_2 and β_3 can consistently be estimated.

5.2 The identification of state and wealth effects

The main problem we have to tackle at this stage is that we do not directly observe individual wealth. However, we know that employment contract modifications (from temporary to permanent) involve state as well as wealth changes. Indeed, if we estimate:

$$\Delta a_{i,t} = \boldsymbol{\beta}_1 \Delta X_{i,t} + \tilde{\beta}_2 \Delta Status_{i,t} + \Delta \xi_{i,t}. \tag{13}$$

$\tilde{\beta}_2$ captures the mixed resulting effect of wealth and status on fund choice. In order to separate these effects we adopt the following strategy. We know that employment protection changes according to firm size and, in particular, it is more stringent in large firms so that permanent workers have different legal protection from the risk of layoff. It is then possible to estimate the following equation:

$$\Delta a_{i,t} = \boldsymbol{\beta}_1 \Delta X_{i,t} + \beta_2 (\Delta Status * EP)_{i,t} + \beta_3 \Delta Status_{i,t} + \Delta \xi_{i,t} \tag{14}$$

where EP is a dummy variable indicating if subject i is employed in a firm whose dimension implies employment protection. In eq. (14) parameter β_2 provides a measure of how relative risk aversion changes when the *status* changes while parameter β_3 identifies the *wealth* effect on relative risk aversion. Intuitively, when going from a temporary to a permanent job the amount of wealth to be allocated changes and this gives us the opportunity of testing the CRRA assumption by looking at parameter β_3. Given the wealth effect, by interacting the change in employment state with the firm size dummy variable, we can estimate if individuals who gain more employment protection change their risk attitude.

5.3 Additional specifications

The approach highlighted in eq. (14) is not immune from problems. The main caveat is that, when becoming fully protected, individuals in large firms have also a higher expected life income than those employed in small plants. Whenever the marginal effect of wealth on risk attitude is not constant, the interpretation of β_2 as the pure state-effect could be questioned. Indeed, unprotected individuals' discount rate could embody the probability that their job relation ends at any instant of time while truly protected individuals do not discount this event. In this case parameter β_2 in (14) could capture wealth-related instead of state-related effect on risk attitude. To overcome this problem, it is possible to use the following strategy.

Consider those individuals with a permanent contract going from part-time to full-time jobs. Their expected wealth rises. Since part-time to full-time movers do not change their employment state in terms of job protection (they remain

unprotected in small firms and protected in large ones), we are able to estimate the pure wealth effect testing for the CRRA assumption. Furthermore, since workers in large firms have a higher expected wealth arising from a longer time prospect, we can test for the existence of a constant marginal effect of wealth on risk attitude by comparing the choices of workers in firms of different size. In case we do not detect any difference among them, we can argue that the marginal effect of wealth is constant across workers employed in firms of different size.

Formally, we estimate the following equation:

$$\Delta a_{i,t} = \boldsymbol{\beta}_1 \Delta X_{i,t} + \beta_2 (\Delta PartFull * EP)_{i,t} + \beta_3 \Delta PartFull_{i,t} + \Delta \xi_{i,t} \qquad (15)$$

where $\Delta PartFull$ indicates the variation of the employment status from part-time to full-time. Parameter β_3 provides a measure of the wealth effect on relative risk aversion obtained by using a source of variation for wealth that is different from that highlighted in eq. (14). Instead, parameter β_2 gives us the potential effect that life-income variation of protected workers can have on risk aversion. As far as parameters β_2 and β_3 in eq. (15) are statistically identical we can hypothesize that the marginal effect of wealth on risk attitude is constant.

Finally we can further check our conclusions by estimating eqs. (14) and (15) simultaneously according to the following framework:

$$\begin{aligned} \Delta a_{i,t} \;=\; & \boldsymbol{\beta}_1 \Delta X_{i,t} + \beta_2 (\Delta Status * EP)_{i,t} + \beta_3 \Delta Status_{i,t} + \\ & \beta_4 (\Delta PartFull * EP)_{i,t} + \beta_5 \Delta PartFull_{i,t} + \Delta \xi_{i,t}. \end{aligned} \qquad (16)$$

In this case, β_2 gives the state-effect on risk aversion while parameters β_3, β_4 and β_5 represent the effect of wealth on risk aversion. These parameters should be not statistically different from each other.

6 Results

6.1 First check: using temporary to permanent job movers

Table 3 reports some preliminary results. Column (I) refers to the baseline specification in eq. (14) estimated in levels by means of a Random Effect (RE) Logit model. The dependent variable $a_{i,t}$ takes the value zero in case of INPS Fund choice while it takes the value of 1 in case of Closed and Open Funds. In this model we consider only full-time workers. We control if at time t they are employed under either temporary or permanent contracts ($Status$) and in firms whose dimension implies employment protection for permanent workers (EP). On top of that, we add 19 regional dummies, 20 time invariant control variables (gender, nationality, 3 dummies for education and 15 dummies for firm sector) and 19 time variant control variables (current monthly wage, civil state, number of family components, age, 14 dummies for profession and seniority). The main interest is on parameters associated to the variable $Status$ and its interaction with EP. These estimates provide a measure of the wealth and the state effect respectively. Although we are aware of the inconsistency of RE estimators when unobserved individual features are likely to be correlated with some of the regressors, some interesting preliminary results arise from this specification. Individuals employed permanently appear to be more prone to risky decisions compared to temporary ones, being the coeffi-

cient associated to the $Status * EP$ variable positive and statistically significant. Conversely, the wealth effect does not appear to be statistically significant since the coefficient of $Status$ is not related to specific fund's choice.

Interestingly, the same results arise when parameters in eq. (14) are estimated through fully efficient and consistent FE estimator (Column II in Table 3). In this case, parameters identify the state and wealth effect and are unaffected by individual unobserved components. The CRRA hypothesis detected in Chiappori and Paiella (2011) is confirmed. On top of that, our estimates detect a positive and significant state-effect related to job protection. This implies that workers who gain job protection allocate their expected income in more risky funds. This corroborates the intuition of Andersen *et al.* (2008), albeit the evidence provided in the present work does not hinge on the *ex-ante* assumption of CRRA.

6.2 Robustness: using part-time to full time job movers

The findings highlighted in the previous paragraph call for a deeper investigation. Indeed, although the discussed estimates of wealth and status effect on risk attitude do not appear to be influenced by unobserved characteristics, some caveats could affect the interpretation of our coefficient associated to the $(Status)*(EP)$ variable. This variable is capturing differences in fund's choice between individuals who went from temporary to permanent contracts in firms with more than 15 employees compared to those who became permanent in small plants. The interpretation of the results could be problematic since workers who gain full employment protection face a much lower probability of layoff and, consequently, a different expected life income. Since we are controlling for a wealth effect, this would not be problematic

in our setting as far as the marginal effect of wealth on risk attitude is constant. However, if this is not the case, the wealth effect on risk attitude could change at the threshold because different amount of expected wealth are involved. In this case, our interpretation of the state and wealth coefficients would be much less clear cut.

To address this concern we use the following strategy. We consider permanent employees who, while employed in the same firm, changed labor contract going from part-time to full-time positions. In this case, the choice concerning the accruing severance pay is made two times. Since full-time job implies higher income (both current and expected) there is a different source of variation that enables us to consistently estimate the wealth effect. Turning to the state effect, individuals becoming full-time in plants with more than 15 employees did not change their employment state (they were protected even under part-time contract). The only difference they have when compared with individuals below the 15 employees threshold is that they have a potentially higher expected income arising from a lower probability of layoff. This implies that using permanent workers who moved from part-time to full-time jobs we can test if the marginal effect of wealth is constant across firm size and, in addition, we can implement a falsification test to evaluate the job-security dependence of risk aversion.

Results are reported in Table 4. As before, Column I contains our RE estimates, while Column II refers to the FE estimator. In both cases, parameters associated to the variable capturing if an individual has a part-time or a full time job ($PartFull$) are statistically not different from zero, confirming the CRRA hypothesis. Also the parameter associated to its interaction with the EPL threshold ($PartFull * EP$) is statistically equal to zero, which implies that the wealth effect on risk attitude

is constant below and above the EPL threshold (the F-test does not reject the hypothesis that the parameters are equal to each other at 1% level). Moreover, it is important to remark that this parameter should be zero even in the presence of a state-effect since there is no job protection change for individuals above the firm size threshold, hence the falsification exercise corroborates our main findings.

6.3 A further check: using part-time to full-time and temporary to permanent job movers

In order to further check the robustness of our evidence we can collapse all sources of variation for wealth and status in a unique empirical framework. Formally eq. (16) contains the expression (in differences) we estimate using part-time to full-time as well as temporary to permanent job movers. In this case, we can test if the parameters associated to the wealth effect, respectively $Status$ and $PartFull$ and $(PartFull) * EP$ are identical to each other. Moreover, we can evaluate if employment protection ($Status * EP$) affects risk attitude. Results are reported in Table 5. Column I and Column II contain the main RE and FE estimates. Variations in wealth appear not to be statistically related to fund's choice confirming our previous results. This is true for individuals going from temporary to permanent jobs as well as for individuals going from part-time to full-time jobs. Even the expected income effect arising when dealing with individuals who became full-time in larger firms turns out not to be different from zero. Conversely, individuals who have gained job protection behave differently in terms of choice of fund. We detect a significant positive parameter associated to our job-protection variable $Status * EP$. This is confirmed in both our specifications. These results

point for the presence of CRRA and for a state dependence of risk attitude, i.e., they highlight the presence of a *State Dependent Constant Relative Risk Aversion*, i.e., *SD-CRRA*.

7 Conclusions

This paper provides an evaluation of the dependence of risk attitude on individuals' wealth and status. The issue belongs to the wider discussion on the stability of risk preferences and on the reliability of the CRRA assumption. We highlight some crucial aspects that may undermine the existing evidence on this topic and we present an alternative identification strategy that attempts to single out the role of wealth and individual states of nature in shaping risk attitude. We implement an econometric model using panel data on individuals who are job movers and make their pension funds allocation in the presence of different expected wealth and job protection status. We report robust estimates which support the CRRA assumption with respect to wealth. At the same time, we offer some evidence that job contract influences risk taking so that workers who gain job protection are willing to invest in riskier financial activities. Interestingly, relative risk aversion appears to be affected by the individual level of job protection so that we argue that our findings may lead to the hypothesis of the existence of a State Dependent CRRA. This result adds a further starting point of discussion to the mentioned economic modeling debate since it suggests that while constant risk aversion in terms of wealth may be a good approximation to study agents' behavior, the state independence assumption may generate some distortion. Our assessments derive from the analysis of labor market and undoubtedly further evidence should be

gathered to understand if our conclusions apply to other relevant individual states of nature.

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Table 1: Descriptive statistics: employees in the sample by job contract and year

	2008		2010	
	observations	share	observations	share
Employed	3741	100%	3741	100%
- Employed Temporary	455	11.9%	351	9.4%
in Firm<15 employees	239	6.1%	191	5.1%
in Firm≥15 employees	216	5.8%	160	4.3%
- Employed Permanently	3286	88.1%	3390	90.6%
in Firm<15 employees	1379	36.9%	1407	37.6%
in Firm≥15 employees	1907	51.0%	1983	53.0%
- Employed Part-Time	789	21.1%	802	21.4%
- Employed Full-Time	2952	79.9%	2939	78.6%

Temporary in year 2008 who became Permanent in 2010: 332 (8.9%)

in Firm with less than 15 employees: 160
in Firm with more than 15 employees: 172

Part-time in year 2008 who became Full Time in 2010: 209 (5.6%)

in Firm with less than 15 employees: 83
in Firm with more than 15 employees 126

Table 2: Accruing severance pay allocation

	2008		2010	
	Observations	share	Observations	share
Chosen Fund - All workers				
- INPS Fund	3044	81.3	3071	82.0
- Closed/Open Funds	697	18.7	670	18.0
Chosen Fund - Temporary workers				
- INPS Fund	404	82.9	316	89.9
- Closed/Open Funds	83	17.1	35	10.1
Chosen Fund - Permanent workers				
- INPS Fund	2640	80.3	2755	81.2
- Closed/Open Funds	647	19.7	635	18.8
Chosen Fund - Full-Time workers				
- INPS Fund	2379	80.5	2388	81.0
- Closed/Open Funds	573	19.5	551	19.0
Chosen Fund - Part-Time workers				
- INPS Fund	665	83.2	683	85.2
- Closed/Open Funds	134	16.8	119	14.8

Table 3: Random and Fixed Effects Panel Estimates: First Check

	(I)	(II)
Method	Random Effect	Fixed Effect
Coeff.		
$Status$	$-.450$ (.393)	$-.962$ (.393)
EP	$-.814$ (.244)	No time variation
$(Status) * (EP)$	1.423^{**} (.045)	3.040^{**} (.049)
Robust S.E.	Yes	Yes
Time Variant Control Var. (19)	Yes	Yes
Time Invariant Control Var. (20)	Yes	No
Regional Dumm. (19)	Yes	No
Obs.	3,805	846

Notes: Maximum Likelihood estimates. The dependent variable is a latent variable taking the value 0 in the case of INPS Fund, 1 in the case of either Closed or Open Funds. Robust p-values in parentheses. $Status = 1$ if an individual is employed permanently, $Status = 0$ in case of a temporary contract. $EP = 1$ if the individual is employed in a firm with more than 15 employees, $EP = 0$ if the individual is employed in a firm with less than 15 employees. In all specifications, only individuals employed full-time are considered. 19 regional dummies, 20 time invariant and 19 time variant control variables have been included. Time invariant control variables include gender, nationality, 3 dummies for education levels and 15 dummies for firm sectors. Time variant control variables include current monthly wage, civil state, number of household's components, age, 14 dummies for profession and seniority. Column I reports Random Effect estimates, Column II reports Fixed Effect estimates for coefficients associated to time-varying variables.

Table 4: Random and Fixed Effects Panel Estimates: Robustness Exercise

Method	(I) Random Effect	(II) Fixed Effect
Coeff.		
EP	.389 (.403)	No time variation
$PartFull$	$-.090$ (.826)	32.091 (.992)
$(PartFull) * (EP)$	.169 (.741)	-57.366 (.999)
Robust S.E.	Yes	Yes
Time Variant Control Var. (19)	Yes	Yes
Time Invariant Control Var. (20)	Yes	No
Regional Dumm. (19)	Yes	No
Obs.	4,222	922

Notes: Maximum Likelihood estimates. The dependent variable is a latent variable taking the value 0 in the case of INPS Fund, 1 in the case of either Closed or Open Funds. Robust p-values in parentheses. $EP = 1$ if the individual is employed in a firm with more than 15 employees, $EP = 0$ if the individual is employed in a firm with less than 15 employees. $PartFull = 1$ if an individual is employed full-time, $PartFull = 0$ in case of part-time job. Only individuals employed permanently are considered. 19 regional dummies , 20 time invariant and 19 time variant control variables have been included. Time invariant control variables include gender, nationality, 3 dummies for education levels and 15 dummies for firm sectors. Time variant control variables include current monthly wage, civil state, number of household's components, age, 14 dummies for profession and seniority. Column I reports Random Effect estimates, Column II reports Fixed Effect estimates for coefficients associated to time-varing variables.

Table 5: Random and Fixed Effects Panel Estimates: Further Check

	(I)	(II)
Method	Random Effect	Fixed Effect
Coeff.		
$Status$	$-.494$ (.274)	-1.321 (.385)
EP	$-.912$ (.198)	No time variation
$(Status) * (EP)$	1.291^{**} (.043)	2.472^{*} (.070)
$PartFull$	$-.250$ (.509)	2.137 (.245)
$(PartFull) * (EP)$	.222 (.639)	-18.41 (.989)
Robust S.E.	Yes	Yes
Time Variant Control Var. (19)	Yes	Yes
Time Invariant Control Var. (20)	Yes	No
Regional Dumm. (19)	Yes	No
Obs.	4,924	1,098

Notes: Maximum Likelihood estimates. The dependent variable is a latent variable taking the value 0 in the case of INPS Fund, 1 in the case of either Closed or Open Funds. Robust p-values in parentheses. $Status = 1$ if an individual is employed permanently, $Status = 0$ in case of a temporary contract. $EP = 1$ if the individual is employed in a firm with more than 15 employees, $EP = 0$ if the individual is employed in a firm with less than 15 employees. $PartFull = 1$ if an individual is employed full-time, $PartFull = 0$ in case of part-time job. 19 regional dummies , 20 time invariant and 19 time variant control variables have been included. Time invariant control variables include gender, nationality, 3 dummies for education levels and 15 dummies for firm sectors. Time variant control variables include current monthly wage, civil state, number of family components, age, 14 dummies for profession and seniority. Column I reports Random Effect estimates, Column II reports Fixed Effect estimates for coefficients associated to time-varying variables.

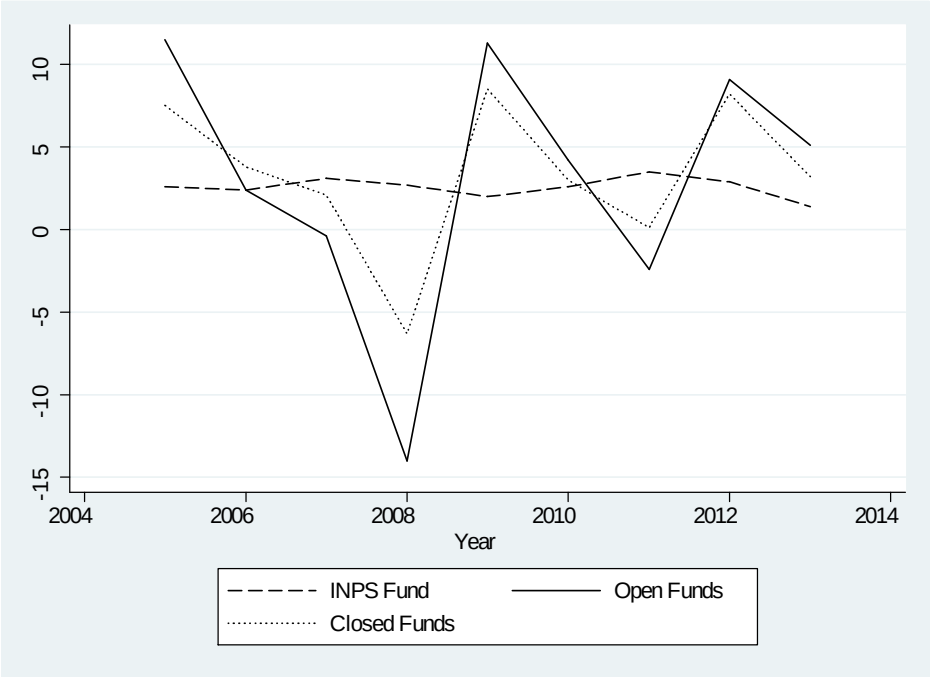

Figure 1: Return rate (in percentage) of Pension Funds in Italy, 2005-2013. Source: COVIP (2013).

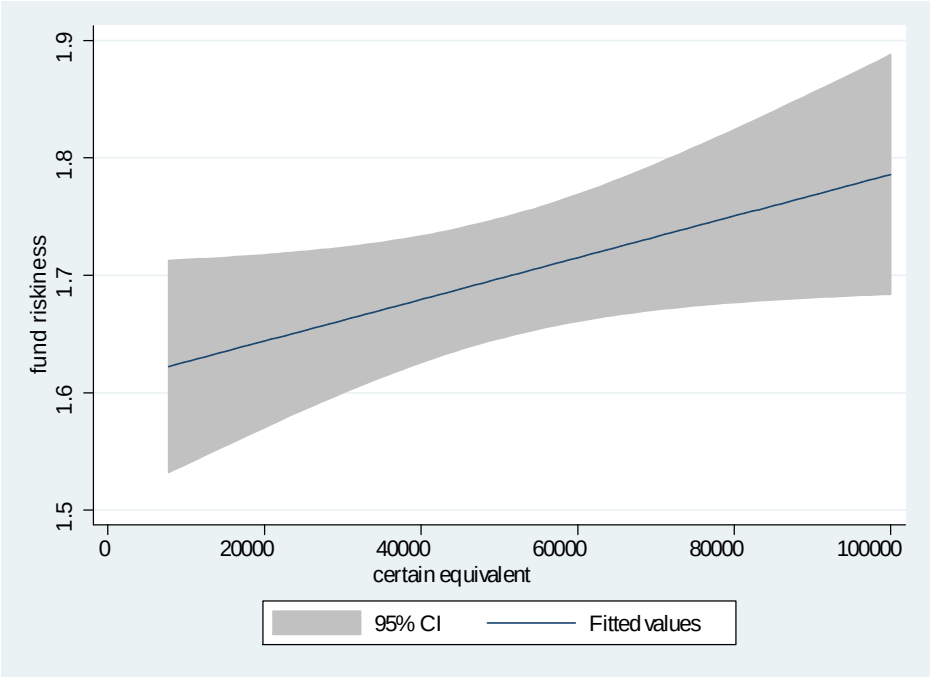

Figure 2: Correlation between elicited individual risk attitude and the riskiness of the chosen pension fund.

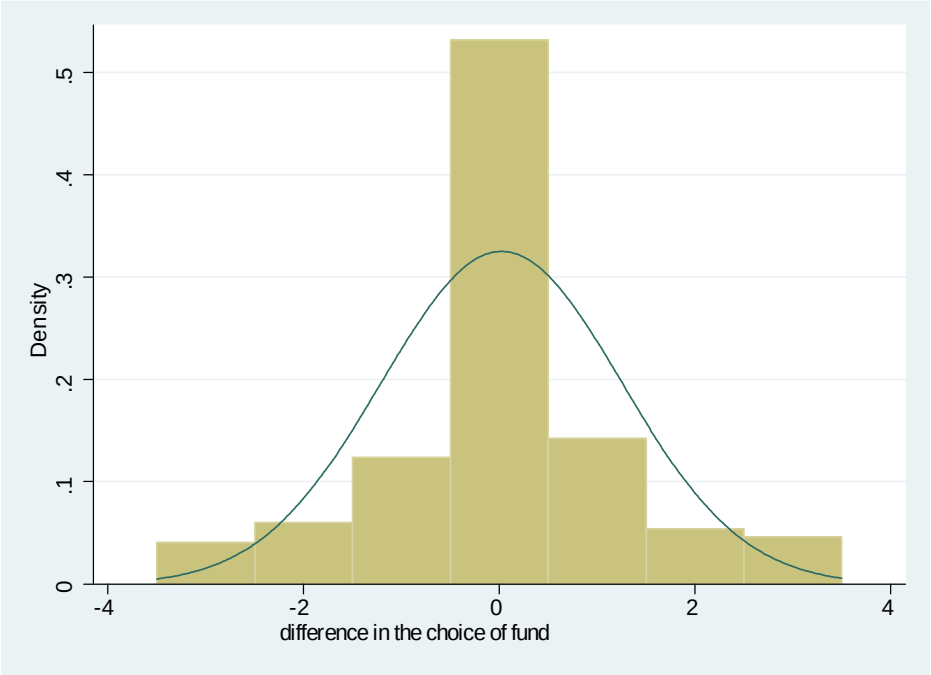

Figure 3: Differences in the choice of fund between 2008 and 2010: all workers.

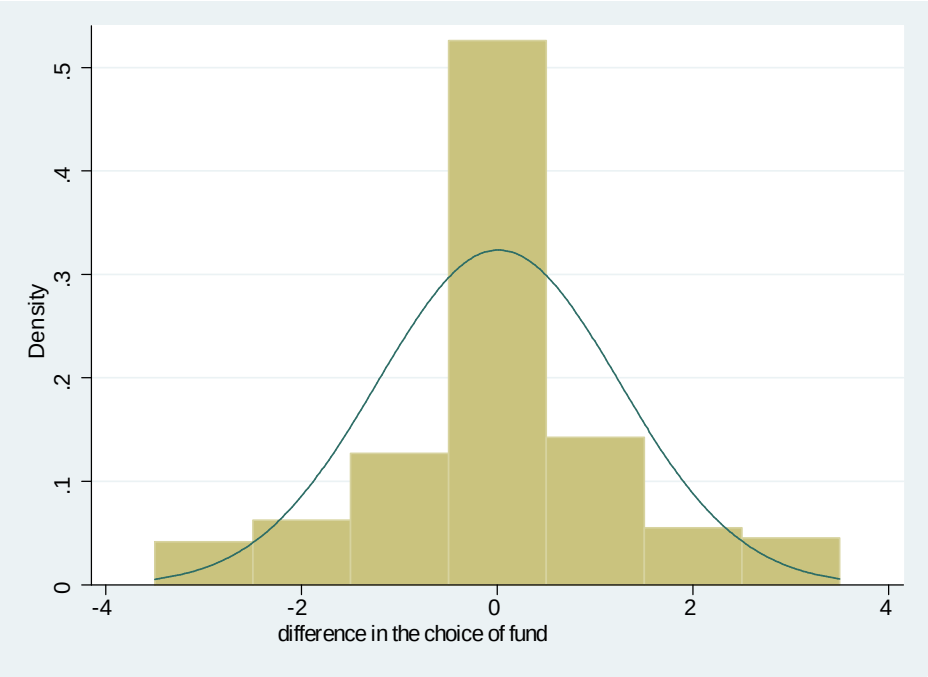

Figure 4: Difference in the choice of fund between 2008 and 2010: only workers with the same type of job contract.

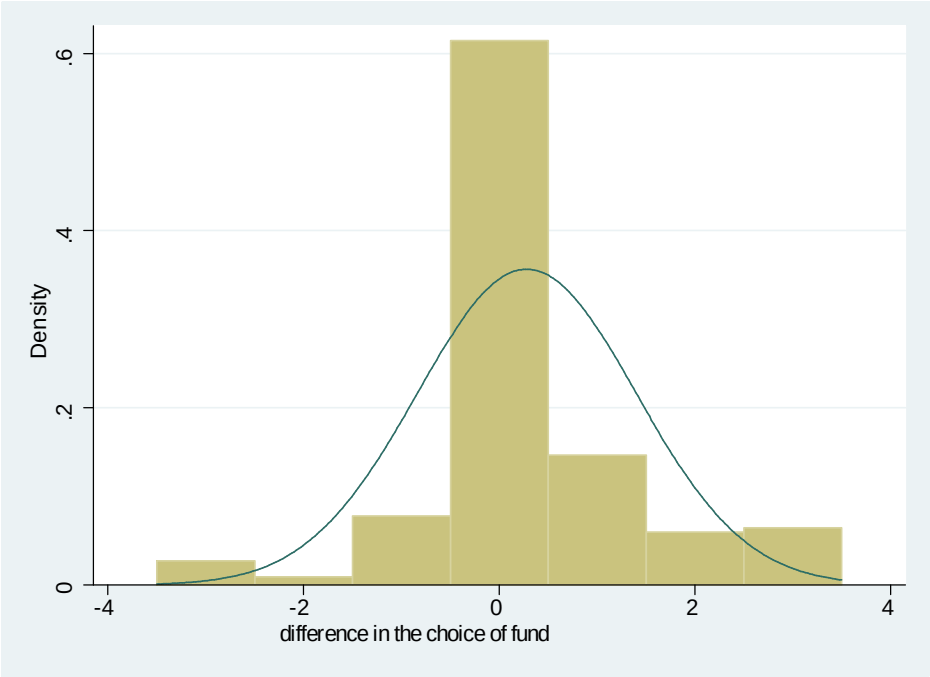

Figure 5: Difference in the choice of fund between 2008 and 2010: only temporary workers who became permanent.

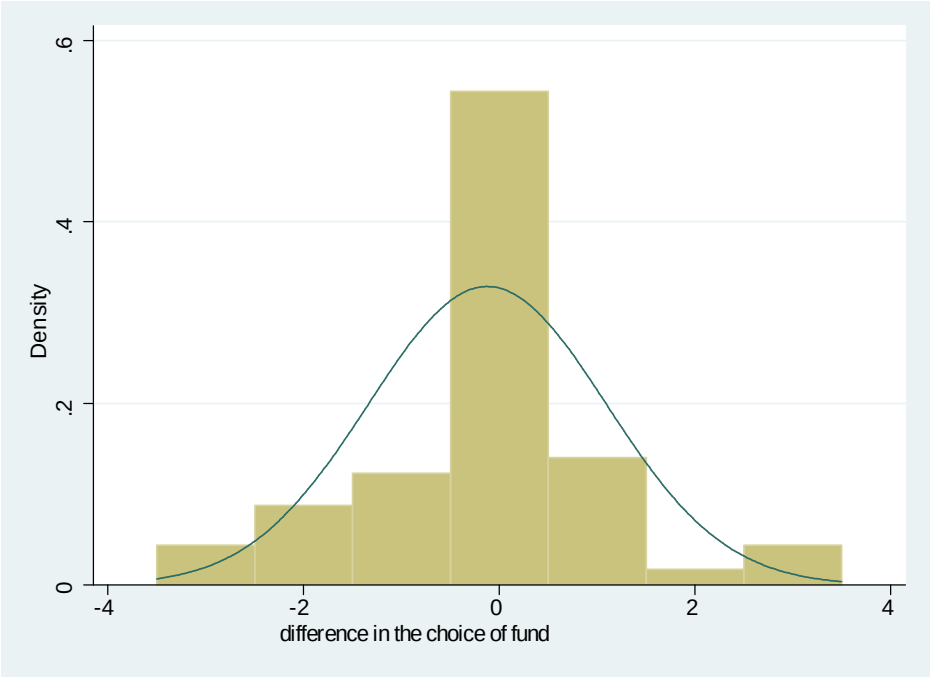

Figure 6: Difference in the choice of fund between 2008 and 2010: only permanent workers who became temporary.