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AN EMPIRICAL ASSESSMENT OF THE ITALIAN SEVERANCE PAYMENT (TFR)

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Abstract

The Italian TFR ("Trattamento di Fine Rapporto") is a statutory payment made by firms to staff on separation. Recent reforms of the national pension system are based on voluntary transfers of the TFR to a supplementary pension fund. The purpose of this paper is to provide a probabilistic distribution of how workers currently make use of their severance payment, on the basis of their demographic and occupational characteristics. We find that the TFR mainly acts both as a buffer stock and as an income source upon retirement.

Jel–Classification: D91

Keywords: Severance Pay, Retirement Saving, Pension Schemes

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1 Introduction

Employees in Italy are entitled to lump-sum termination indemnity payments upon leaving. This severance payment, called "Trattamento di Fine Rapporto" (TFR from now on), was instituted in the 1920s and is currently disciplined by the law n. 297 of 1982. The TFR has two functions. First, it contributes to build one's retirement wealth over the working life. Technically, for each employee, the employer retains a fixed fraction (1/13) of her annual salary to be accumulated and paid either upon job termination or upon retirement. The accumulated resources yield an interest rate made of a predetermined nominal rate (1.5 percent per year) plus 0.75 percent of the inflation. In other words, the retirement and the severance payment are two forms of delayed salary.[1] Second, the severance payment is a form of precautionary saving, as it can be used, under certain restrictions, either to overcome liquidity contraints that may become active at some point in time and that require enough cash at hand (such as spells of bad health or first home purchase) or to self-insure against rare but large shocks to income (such as a prolonged spell of unemployment). In fact, an important feature of the TFR is that a worker can ask, only once under the same job tenure, to withdraw up to 70 percent of his accumulated TFR, if she has a tenure of at least 8 years with the same employers, and for any of the following reasons: home purchase for himself or his sons, ordinary/extrordinary repairs of the principal home for himself or his sons, medical expenses for himself or his sons.

Economists have for a long time tried to split individual saving decisions into separate components (saving for retirement, for buying a house, for children, for bequest, and for other purposes) and treated each component as independent from one another. However, it is not so clear why such saving motives should be unrelated, both *a priori* and *a posteriori*. This has an important policy implication: if in practice single agents take their decision without having this academic classification of motives for saving in their minds, then some economic policies may fail and lead to inefficient outcomes.

[1] The rationale behind it is a paternalistic view of individual saving behavior. If let alone, individuals might suffer from myopia (or eventually implement moral hazard) and not provide adequately for their own retirement. Indeed, planning for retirement is a complex task. Bernheim and Scholz (1993) claim that many US families do not save enough for retirement and that policy interventions should be designed to raise personal savings. Similarly, Lusardi (2000) shows that approximately thirty percent of US households whose head is close to retirement have done little or no planning for retirement.

Recent reforms of the pension system in Italy are based on voluntary transfers of the TFR to a supplementary pension fund. The main consequence will then be to separate the retirement function from the precautionary function and eventually eliminate the latter. This paper aims at disentangling how much of the accumulated TFR is expected to serve as retirement wealth (Retirement-TFR), rather than to be used during the working life in the occurrence of job dismissals (Buffer-TFR) and/or as an anticipated withdrawal (Liquidity-TFR). The accumulation of the TFR is represented by a probabilistic model which describes at each year the probability of job dismissal and that of anticipated cash-outs. From these two sets of annual transition probabilities we obtain the cumulative probability distributions associated to the following events:

1. continuity of job careers and no withdrawals, for the expected Retirement-TFR;

2. continuity of job careers and withdrawals, for the expected Liquidity-TFR;

3. discontinuity of job careers, for the Buffer-TFR.

The expected distribution of the TFR among the three components, at each year of the job career, is derived from the three cumulative probability distributions mentioned above.

In order to disentangle the two sets of annual probabilities, and possibly link them with workers' individual and occupational characteristics, we consider two different methodologies. The first one consists of a duration analysis applied to job spells; the second one is a logistic model applied to cashing-out behavior. Both analyses are conducted on an Italian microeconomic dataset provided by INPS, the national institute governing social security, covering workers employed in the private sector between 1985 and 1996.

The empirical analysis on the determinants of withdrawals points out that only a minority of workers cashes out their TFR during the working life. The Buffer-TFR can overcome Retirement-TFR if the probability of dismissal is high, as it happens for workers employed in firms of lower dimension: our estimates suggest that working in small firms - with less than 20 employees - increases the probability of job separations by almost three times. These findings are consistent with previous estimates of the effects of demographic and occupational characteristics on the probability of job separation.

The paper is organized as follows. Section 2 briefly reviews the literature related to the topic. The probabilistic sequential model for cashing out the TFR is described in section 3. In particular, we develop the duration model in order to derive the probabilities of dismissal, and the logistic model for withdrawals in order to get the annual probabilities of anticipated cash-outs, respectively. Section 4 reports the dataset used for the empirical analysis. The empirical results are reported in Section 5. Section 6 shows how the estimated probabilities will be used to derive the expected TFR distribution between precautionary wealth (i.e. the expected fraction of TFR that is expected to be used during the working life) and retirement wealth (i.e. the expected fraction of TFR which can be expected to be available at the beginning of the retirement period). In Section 7 we derive some conclusions and some hints for future research.

2 Related literature

This paper is related to a body of literature dealing with the quantitative analysis of saving behavior. The primary theoretical framework for such purpose has been the life-cycle/permanent-income model (Modigliani and Brumberg, 1954; Friedman, 1957), according to which households should smooth consumption over the life cycle, by saving during the working period and dissaving when they retire. Extensions to this model have been developed over the last decades. The theory of precautionary saving (Kimball, 1990) suggests that saving serves also to insure against uncertain events, income shocks *in primis.* The "buffer stock model" of saving, pioneered in Deaton (1991) and Carroll (1992), suggests that if consumers are both impatient and prudent, liquidity constraints increase saving even when the constraint is currently not binding. In other words, even when current earnings plus current cash at hand are large enough to cover current expenses, the existence of future liquidity constraints is costly for agents with a concave felicity function because of the misallocation of consumption that it generates. These agents are willing to pay for the reduction of the risk and so they accumulate more wealth. Buffer stock models imply a wealth/income ratio target, such that if actual wealth exceeds the target, then impatience leads the consumer to spend freely and wealth will fall (in expectation), while if actual wealth is below the target, then prudence dominates so that the consumer will

spend less than permanent income and wealth will be expected to rise.[2]

Such frameworks shed light on the dichotomy between precautionary saving and other forms of saving. The severance payment in Italy is, under the current rules, both a precautionary and a retirement saving. The proposal of transferring the TFR into a DC pension scheme will separate these two functions and eventually lessen the former one. However, it is well known that *pension saving is an imperfect substitute for other forms of wealth accumulation.*

First, retirement saving is usually conditioned by some capital markets' imperfections: pension saving becomes less easily substitutable for other forms of saving in the case of those individuals more widely exposed to liquidity constraints, or for those who desire to bequeath. In the empirical literature a consensus on the extent to which prudence induces saving has not been reached and quite a wide range for the proportion of private wealth that can be attributed to precautionary motives has arised. Skinner (1988), Kuehlwein (1991) and Dynan (1993) do not find any evidence to support precautionary savings, while Carroll and Samwick (1995a) find a strong relationship between income variance and wealth; moreover, in Carroll and Samwick (1995b) it is showed that 40% of wealth accumulation is due to buffer stock behaviour. For Italy, Guiso, Jappelli and Terlizzese (1992) find that only 1.8% of saving is due to precautionary motives, while Lusardi (1993) reports that precautionary motives explain 13% of wealth accumulation.

Second, differences in taxation do affect substitutability between pensions and other forms of wealth. The tax laws of many nations provide that, upon death of the insured person, the pension benefits will not be completely transferred to her heirs, as the transfer would not be of a pension, but simply of assistance – (Bosi and Guerra, 2002). In theory, tax incentives should provide beneficiaries of pension saving with a higher return than that offered by other similar forms of saving. Several empirical studies have tried to measure the impact of taxation on the structure of household portfolios in the US (Poterba and Samwick, 1999) as well as in a number of countries in Europe (Banks and Tanner, 2001; Eymann and Börsch-Supan, 2001; Guiso and Jappelli, 2001; Alessie, Hochguertel and van Soest, 2001). The empirical evidence suggests a weak link between taxation and asset allocation.

[2]The expression "buffer stock" saving denotes the excess of saving with respect to its level when agents can freely save and borrow under the lifetime budget.

3 The sequential model for the use of the TFR

In this section a probabilistic model for the TFR accumulation over the working life is considered. Two typologies of events may cause a reduction in the amount of the accumulated TFR: severance (total resetting) and withdrawals (partial reduction). Let TFR_t and TFR_{t-1} be an individual's TFR amount at the end of year t and $t-1$, respectively. Three cases can be observed, depicted in Figure 1. If the individual works for the same employer in t as in $t-1$, and $TFR_t > TFR_{t-1}$, then no withdrawals have occured and the amount of the TFR increases (Retirement-TFR). If the individual works for the same employer and $TFR_t < TFR_{t-1}$, then the individual has cashed out (part of) her TFR (Liquidity-TFR). If the individual has a different employer, then a job change has occured and the TFR_t goes to zero (Buffer-TFR).[3]

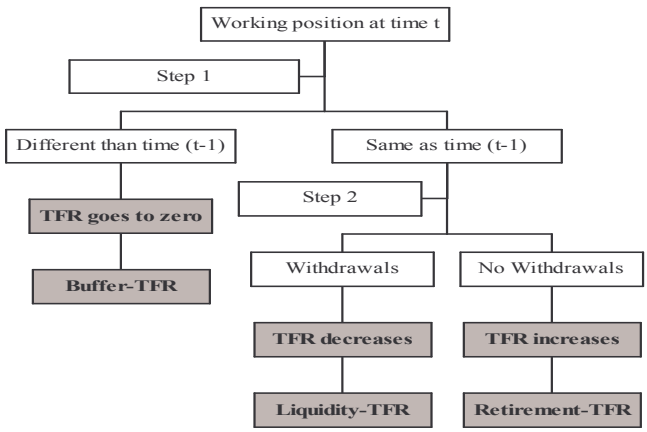

Figure 1: The two-step model for the TFR.

The two steps of the process are modelled separately. Both steps can be characterized as discrete-state models describing the probability distribution of changing the state at a given discrete time. This work aims at disentangling the

[3]In doing this, we implicitly assume dismissals and withdrawals as independent events. One may object that these events are somehow related, e.g. firms may prefer to fire workers who have cashed out (part of) their TFR (Garibaldi and Pacelli, 2004).

effect of workers' characteristics on the probability distributions. In particular we characterize the probability of leaving the current job and the probability of cashing out the TFR at each year as depending on worker-specific (or job-specific) factors, such as age, gender, qualification, sector and geographic area. We tackle the first step by implementing a duration analysis (both non-parametric and parametric); for the second step, we use a logistic analysis.

4 The data

The panel of workers and firms merges three sources of information provided by INPS, the Italian institute governing social security for private employees. The first source of information is the employees related archive (O1M archive) that collects annual administrative data about personal and working characteristics, elaborated by employers for each single worker. The second source of information is the employers related archive (DM10M) that collects monthly contributions by firms. Figure 2 shows the information flows generating the panel. From the O1M archive all modules between 1985 and 1996 of a random sample of workers are extracted.[4] From the DM10M archive the records of the corresponding employers are extracted. The third source of information is the employers anagraphic archive, that collects individual background characteristics, such as name, gender, year of birth, place of birth. A detailed description of the O1M archive and the employers' anagraphic archive is reported in Appendix A.

[4] The panel is built by means of the following random selection: all workers born on the 10th of March, June, September and December of any year are considered.

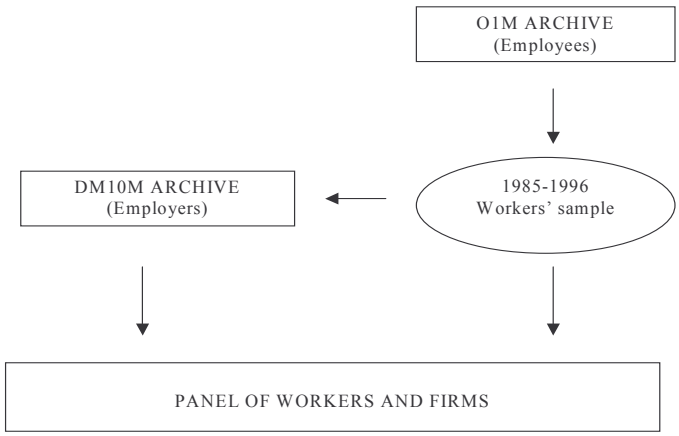

Figure 2: Information flows generating the panel

The data allows:

1. To build the career of each worker and thus to monitor job mobility among firms, job changes, as well as the workforce composition by job qualification, average earnings and so on;

2. To merge the information about workers (i.e. age, working position, wage) with the one about the corresponding employers (i.e. size, sector, employment trend);

3. To identify, at least for a huge number of firms, potential company transformations and the corresponding workers flows.

The dataset's main shortage is that it does not provide information either about individual consumption and saving behavior or about cash-out spending. It consists of all private firms, state participated firms, municipal enterprises (i.e. transportation, litter), associations among public and private operators, banks, with at least one employee. National railroads and the whole agricultural sector are excluded. The public administration, both centrally run (Post service, Education) and locally run (Regions, Provinces, Municipalities), is almost completely absent.

The panel runs for a period of 12 years, from 1985 until 1996. It is made of more than 250,000 workers aged between 14 and 75 years. The total number of observations is 1,624,137.[5] For this paper's purposes, we only consider blue collars, white collars and managers, both working full time and part time, aged more than 16.[6] We are then left with 185,578 individuals, for a total of 1,099,468 observations. (see Table 1). Over the years, males represent the large majority of observations, around 70 percent. Blue collars and white collars represent 66 and 33 percent of the observations, respectively. Managers only represent 1 percent. We consider three sectors of activity, namely manufacturing, construction, and services (54%, 12% and 34% respectively). Four geographic sub-areas are considered: North-West, North-East, Center and South. The majority of observations

[5] To clarify the distinction between workers and observations, it is worth mentioning that for each single worker we may have one or more observations, in that a worker may be observed for a minimum of one year (1 observation) up to a maximum of 12 years (12 observations). It is then clear that if all workers were observed for 12 years, we would have more than 3,000,000 observations.

[6] We thus disregard trainees and all minor categories of workers.

belong to the North-West (35%), whereas each of the other areas have almost the same weight (25% for North-East, 20% for Center and 20% for South). We then report a categorical variable for the firm's dimension, which takes the value of 1 for firms with less than 20 employees, the value of 2 for firms between 20 and 199 employees, the value of 3 for firms between 200 and 999 employees and the value of 4 for firms with 1000 employees and more. It is worth noting that 40 percent of the observations refer to small firms (with less that 20 workers), while very big firms (1000 workers and more) represent only 17 percent. Finally, the table shows the amounts in euros of the severance payments cumulated over the years.

Table 1: *Summary statistics for the whole sample.*

Variable	**Mean**	**Std.Dev.**	**Min.**	**Max**	**N.Obs.**
Age	35.7	11.05	16	89	1,099,468
Job tenure	5.51	3.96	0	11.9	1,099,468
Gender	0.69	0.46	0	1	1,099,468
Job qualification	1.35	0.49	1	3	1,099,468
Sector of activity	1.82	0.92	1	3	1,099,468
Geographic area	2.22	1.12	1	4	1,099,468
Firm's dimension	2.06	1.1	1	4	1,099,468
TFR (amounts in €)	8,668.848	9,885.12	299.012	102,691.3	899,710

Table 2 reports the annual number of observations in percentages by sector. The manufacturing sector represents more than half of the panel, followed by services (up to 40 percent) and by the buildings sector (around 10 percent). The importance of services has increased over the years, from 30 percent in 1988 to more than 39 percent in 1995 and 1996. On the contrary, the manufacturing sector has shrinked from 56 to 50 percent. The building sector has basically registered no relevant changes. When exploring the number of annual observations by sector and geographic area (North, Center and South), we find that Northen Italy is oversampled, especially in the manufacturing sector, reflecting the high concentration of big industries and factories in this area. Moreover, we observe

more homogeneity across greographic areas only for the buildings sector. Table 3 reports the average ages of workers by employer's dimension, sector and geographic area. Ages for years 1988 and 1995 are confronted.

Table 2: *Annual observations by sector (percentages)*

	Manufacturing	**Buildings**	**Services**
Year			
1985	56.1	13.2	30.7
1986	56.2	11.8	32.0
1987	55.5	11.7	32.7
1988	54.7	11.8	33.5
1989	54.3	11.8	33.9
1990	54.2	11.6	34.2
1991	52.8	12.0	35.3
1992	51.8	12.2	36.0
1993	50.2	11.8	37.9
1994	50.4	10.9	38.7
1995	50.6	10.2	39.2
1996	51.1	9.8	39.1

Table 4 reports frequencies and percentages for the dynamics of the TFR. We present results covering the period from 1986 to 1996, as the observations relative to 1985 cannot be compared to the ones in the previous year. Moreover, we do not include observations for which job changes have been reported in December. As already raised by Leombruni and Quaranta (2001), we may face apparent discontinuities in job carees due to missing updates.[7] Moreover, in this section we include both employees who worked for more than 46 weeks per year (they sum up to 25% of the total labor force) and managers. We report the observed behavior for the whole sample, as well as for the subsamples of blue collars,

[7]Consider for example a worker present in a firm until December 1997, absent in 1988, and present again in 1999. Very probably, this worker never stopped working in that firm, but due to administrative delays in filling the forms, he seems that he left his job for one year. This would obviously bias our estimates. We are thus forced to discard such cases, even if this procedure severly reduces the total number of observations (from 1,099,468 (see Table 1) to 310,584 (see Table 4).

Table 3: *Average ages in the private sector by employer's dimension, sector and geographic area (Years 1995 vs. 1988)*

Firm's dim.	<10		10 - 19		20-199		200-999		≥1000	
Years	'88	'95	'88	'95	'88	'95	'88	'95	'88	'95
Manufact.										
North	31	32.2	32	33.1	35	35.4	38.5	37.7	40.7	40.4
Center	33	34	34	35	36	36	38.8	39	40.9	41
South	31.1	33	32.9	34	35.1	35	39.4	40	41.9	43
Buildings										
North	35.8	34.7	37.5	36.5	38.6	38.3	40.1	40.2	38.7	38.7
Center	38	37	40	39	40	39	41.1	40	41.6	40
South	33.9	36	35.7	37	36.3	39	38.9	40	40.6	38
Services										
North	31	33.0	34	34.7	35	35.1	37.8	36.6	38.4	38.2
Center	32	34	35	36	37	37	38.3	39	40.8	41
South	31.5	33	33	35	35.8	36	37.9	39	40.4	42

white collars and managers. A caveat is needed: the number of observations for the managers subsample is very small. Besides we distinguish individuals with observed job tenures of any lenght from those whose observed job career is longer than 3 years, in order to separate less consolidated working positions (i.e. initial careers) with more stable ones.[8] We observe that for most cases people do not withdraw from their severance pay, so that the TFR is accumulated over time (60.3 percent for the whole sample); this is even more true when longer working careers are considered (74.7 percent for the whole sample). The same pattern is observed for each subsample. Only a very small percentage of workers cash out part of the TFR, irrespective of the working life (4.7 and 5.7 respectively for the whole sample). This is valid for both the blue collars and the white collars, whereas the managers use their severance payment more (28.2 and 31.7 percent). Job changes occur for 34.9 percent of all observations and are more frequent among the blue collars (37.5 percent).

As it is clear from Table 4, the number of observations for managers is extremely low (less than 3,000) and does not allow us to get significant estimates. For this reason, we decided to disregard them from now on.

In Figure 3 the average annual earnings by gender (top chart) and type of occupation (bottom chart) are shown. We have first translated the amounts into Liras of year 2000 and then converted them into Euros. As expected, females have substantially lower and flatter annual earnings than males. Women reach a maximum at ages 41-45, with 16,710 Euros; men reach a maximum at ages 46-50, with 23,284. Since no information about the education level are provided, we consider the type of activity as a proxy. We find that blue collars have substantially lower and flatter earnings than white collars, meaning that lower levels of education are associated with lower and flatter wages. At ages 56-60, the average annual earnings for white collars are twice as much as for blue collars (32,000 vs. 16,000 Euros).

[8] A caveat is needed. The dataset does not allow us to know whether individuals observed in 1985 (the first year of the panel) started to work in 1985 or before that year. A more detailed argument about this issue can be found in section 5.1.

Table 4: *TFR dynamics*

	Any working life		**Working life > 3 years**	
	Freq.	%	Freq.	%
All				
No withdrawals	187,434	60.3	165,344	74.7
Withdrawal	14,734	4.7	12,721	5.7
Job change	108,416	34.9	43,346	19.6
TOTAL NUMBER OF OBS.	310,584	100	221,411	100
Blue collars				
No withdrawals	118,681	57.8	103,428	73.5
Withdrawal	9,658	4.7	8,151	5.8
Job change	76,948	37.5	29,247	20.7
TOTAL NUMBER OF OBS.	205,287	100	140,726	100
White collars				
No withdrawals	67,607	65.9	60,837	77.6
Withdrawal	4,301	4.2	3,831	4.9
Job change	30,637	29.9	13,688	17.5
TOTAL NUMBER OF OBS.	102,545	100	78,356	100
Managers				
No withdrawals	1,146	41.6	1,079	46.3
Withdrawal	775	28.2	739	31.7
Job change	831	30.2	511	21.9
TOTAL NUMBER OF OBS.	2,752	100	2,329	100

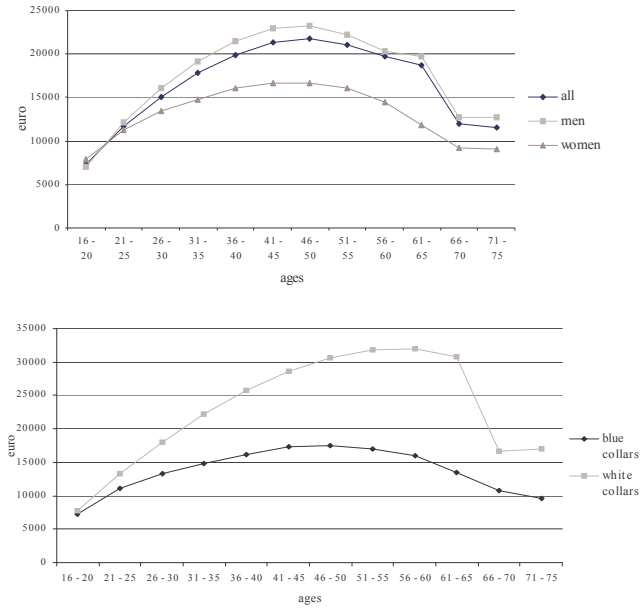

Figure 3: Average annual earnings by gender and type of occupation.

In Figure 4 we report the average amounts of the TFR stock by gender and type of occupation. Men have higher average severance pays than women, reflecting their higher earnings. The profile for white collars is much steeper than for blue collars, again as a consequence of much higher earnings.

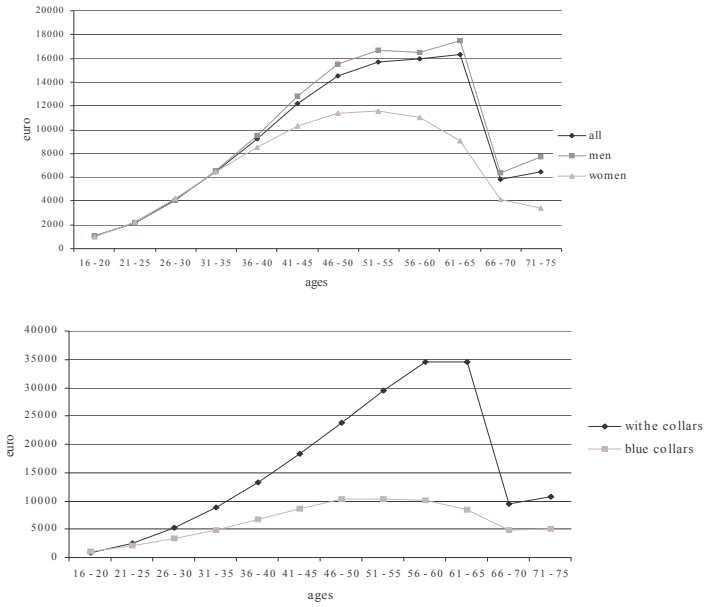

Figure 4: Average annual TFR stocks by gender and type of occupation.

5 Empirical results

We now record the results of the empirical analysis carried out with the Italian data set described in the previous section. We present results for the Buffer-TFR from the duration analysis (both non-parametric and parametric) and for the Liquidity-TFR from the logistic model. We also carry out some formal tests and compare our findings with the ones in the existing literature. The Retirement-TFR is not going to be analysed directly, as this component is the complement of the Buffer-TFR and the Liquidity-TFR. For a better understanding of duration models, the interested reader may refer to Cox and Oakes (1984).

5.1 Results for the Buffer-TFR

As available data covers the period between 1985 and 1996, the estimation of the duration model is severely affected by both left and right censoring. Here, the influence of censoring is limited by considering the duration spells of jobs "alive"

at February 1991. In particular, only workers that were aged between 20 and 50 years at the beginning of the current job (we made three age classes: 20-29, 30-39, 40-50) are considered. The subsample counts 21,725 individuals (only full-time workers are considered), of which 69% are men and 31% are women. Blue collars represent 63% and white collars represent 37%. Table 5 shows the summary statistics for the Buffer-TFR subsample. The only difference with respect to the whole sample (see Table 1) concerns the firm's dimension: this subsample contains a greater number of small firms.

Table 5: *Summary statistics for the Buffer-TFR sub-sample.*

Variable	**Mean**	**Std.Dev.**	**Min.**	**Max**	**N.Obs.**
Age	31.75	6.14	20	50	21,275
Tenure	5.64	3.07	0.25	11.84	21,275
Gender	0.69	0.46	0	1	21,725
Job qualification	1.36	0.48	1	2	21,275
Sector of activity	1.84	0.93	1	3	21,725
Geographic area	2.18	1.1	1	4	21,725
Firm's Dimension	1.86	1	1	4	21,725
TFR (amounts in €)	7,019.21	5,318.175	297.114	72,500.52	18,938

The top chart in Figure 6 plots the empirical hazard evaluated with the Kaplan-Meier estimator against the length of job spells. It is important to stress that the hazard is a conditional probability, so that the graph displays the probability of a job spell "alive" at time t conditioned on it being "alive" until time $t-1$. The decreasing shape of the hazard rate implies that the probability of a job dismissal is an inverse function of the job tenure: the conditional probability of a dismissal for a two-year tenure job is twice as big as for an eleven-year tenure job. This is line with our expectations. Job relationships are much more unstable at their start, while they become more and more stable as the tenure gets longer.

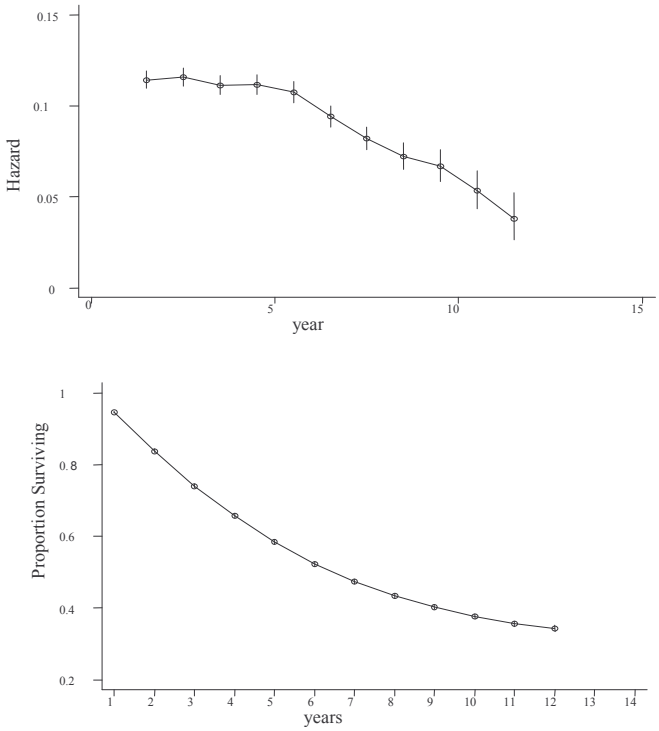

Figure 6: Empirical hazard function and surviving function for the Buffer-TFR.

The bottom chart in Figure 6 shows, at each time t, an empirical estimate of surviving beyond time t, obtained multiplying the survival probabilities in t and those of the preceding periods. The univariate analysis, based on the Kaplan-Meier curves for the categorical variables considered, enables to have a preliminary evaluation of the shape of the survival function for each group of workers. We found that for all the covariates (gender, job qualification, sector of activity, geographic area, average dimension of firm and age at starting the current job), the survival functions are not equivalent among groups, meaning that all characteristics may be relevant in explaining the job spells duration. This result is confirmed by the log-rank test about the assumption of equality of survival function among groups. At 5% level the workers grouped according to the categorical variables considered do not have the same survival function, implying that all the variables mentioned above can potentially be included in the model to be estimated.

We then consider two Weibull regressions separately for blue and white col-

lars, as according to the Akaike criterion the Weibull is the distribution that turns out to better fit the data among the parametric models.[9] Moreover, as standard duration models may not capture all the information from the data, we estimate the two Weibull models assuming a Gamma distribution for the unobserved heterogeneity. We find that the unobserved heterogeneity is a relevant phenomenon for both blue and white collars. In Table 6 and Table 7 we report the results for the two models considered. The values of all estimated parameters, except the one for the dummy associated to North-Western regions, are significant at the 1% level. The estimated hazard ratios denote how much the hazard rate changes with a unit change in the corresponding explanatory variable. When dummies are considered, the ratios provide a measure of the difference in the hazard with respect to the reference group.

Table 6: *Estimation results for blue collars (Weibull model with Gamma distribution for unobserved heterogeneity)*

Variable	**Hazard Ratios**	**Robust errors**	**z**
Gender	.782	.032	5.93
Age	1.345	.049	8.13
Age squared	.995	.01	8.56
North west	.956	.047	.91
North east	1.17	.058	3.16
South	1.275	.067	4.66
Less than 19 employees	2.321	.049	13.1
20-199 employees	1.469	.048	5.79
1000 employees and more	.561	.053	6.1
Building sector	2.208	.108	16.18

For both blue and white collars, the covariates have the same qualitative impact on the hazard of job spells. Only the geographic area plays a different role in the two cases, as it turns out to be insignificant for the job duration of white collars. For both blue and white collars a quadratic polynomial in age

[9] Other distributions have been considered, namely Gompertz and Log-logistic.

Table 7: *Estimation results for white collars (Weibull model with Gamma distribution for unobserved heterogeneity)*

Variable	**Hazard Ratios**	**Robust errors**	**z**
Gender	.875	.046	2.55
Age	1.54	.082	8.14
Age squared	.993	.01	7.95
Less than 19 employees	2.55	.021	11.4
20-199 employees	1.493	.126	4.76
1000 employees and more	.486	.047	7.42
Building sector	1.643	.147	5.54

at the starting of the job spells has a significant impact on the hazard. The hazard of job termination is increasing with age till 23 years for blue collars and 29 years, then it decreases. The dismissal hazard for men is lower than for women, the gender effect is more pronounced for blue collars than white collars. Women are thus more likely to encounter discontinuous careers, especially in low skilled jobs. Not surprisingly, as in Leombruni and Quaranta (2002), the probability of dismissal is monotonically decreasing with the dimension of the firm, shorter tenures are more frequent in small firms and become longer as the average dimension increases. Job mobility in the building sector is higher than in the manufacturing and the services sector. Taking Central regions as the reference group, blue collars in the North-Eastern and Southern regions are more mobile, having an hazard rate higher by 17% and 27% respectively; workers in the North -Western region are less mobile (the hazard is about 5% lower). These results confirm the evidence reported by Leombruni and Quaranta (2002), who show that Northern Western and Central regions are those with longer job relations, while shorter tenures characterize jobs in the South.

Venturini and Villosio (2002), using the same dataset, study the probability of job dismissal for Italian workers (and immigrants) in Italy. They estimate a logit model for job separations in 1996 and find that the probability of dismissal is a concave function of age. In particular, the probability falls down with ageing and it decreases at an increasing rate with years of tenure. Women have a

slightly higher probability of dismissal than men. Moreover, the probability of job dismissal falls for more qualified workers. Our results are in line with the empirical analysis of Venturini and Villosio (2002) with respect to the impact of the sector of activity and geographic area. As for the sector of activity, we find the same relative effects for manufacturing, construction and services.[10] With respect to the geographic area, we find that working in North Eastern, Central and Southern regions significantly increases the probability of dismissal with respect to North Western regions. In their work the coefficient for central region is insignificant. Moreover, an apparent opposite conclusion may be induced for the impact of the dimension of firm. They consider the logarithm and the squared logarithm of the average dimension of firms, and they find significant positive and negative coefficient, respectively, meaning that the probability of dismissal is increasing at a decreasing rate as the dimension of firm grows. However as they note, the coefficient for the squared term is so high compared to the first one that the negative relation fast prevails.

5.2 Results for the Liquidity-TFR

In this section we consider the individuals who have continuous job careers and cash out (part of) their TFR. The corresponding sub-sample is described in Table 8. The number of observations is 104,122 and differs from the number corresponding to withdrawals in Table 4 (14,734). The reason for that is the following: there are 14,734 cases of withdrawals, but in order to analyse such cases one has to study the complete history of those who have cashed out, thus one has to consider also the years following the withdrawals.

The large majority of workers do not take withdrawals and the TFR is accumulated over time (in 94.57 percent of cases). Over the years considered in the panel, only approximately 5.4% of workers with a job tenure longer than eight years takes a withdrawal from the accumulated TFR[11]. In fact, the TFR can be cashed-out under particular conditions, namely:

- the worker has to have a job tenure longer than eight years with the same employers;
- the worker can ask up to 70 percent of her cumulated TFR;

[10] However, they also consider public services and transports, and the agricultural sector.
[11] We consider withdrawals from the TFR only for amounts above 500 euro's.

Table 8: *Summary statistics for the Liquidity-TFR sub-sample.*

Variable	**Mean**	**Std.Dev.**	**Min.**	**Max**	**N.Obs.**
Age	42.29	8.56	22	60	104,122
Tenure	11.03	1.10	8.01	11.92	104,122
Gender	0.71	0.45	0	1	104,122
Job qualification	1.42	0.49	1	2	104,122
Sector of activity	1.76	0.94	1	3	104,122
Geographic area	2.11	1.09	1	4	104,122
Firm's Dimension	2.5	1.16	1	5	104,122
TFR	16,6672.92	10,392.16	304.73	69,432.09	102,986

- the worker can ask to cash out her TFR only once during a certain job relation;
- the TFR may be asked for any of the following reasons: home purchase for the worker or her sons, ordinary/extrordinary repairs of the principal home for herself or her sons, medical expenses for herself or her sons.

These restrictive conditions on the TFR withdrawals explain the difference between the percentage of the workers who do not take withdrawals and for which the TFR is accumulated over time (94.57 percent) and the percentage of no withdrawals in Table 4 (60.3 percent).

Patterns of withdrawals show a slightly hump-shaped age profile. Younger workers are more likely to cash out than older individuals. This evidence can be seen as confirming the precautionary nature of anticipated withdrawals which serve against borrowing constraints (namely high down payments level for mortgages), which more likely bind at young ages. As already mentioned, the average proportion of withdrawals is 5.4%, starting from the minimum 1.47%, at age 22,[12] it increases with age and reaches the maximum, 6.8%, at 35 years. Significant differences are showed to exist between men and women, blue and white collars and sectors of activity. For the blue and white collars aged between 22 and 60 years, Figure 7 shows the observed and fitted proportion of withdrawals by age

[12] These individuals have started to work when they were 14 years old.

(upper panel), and by age and gender (lower panel).

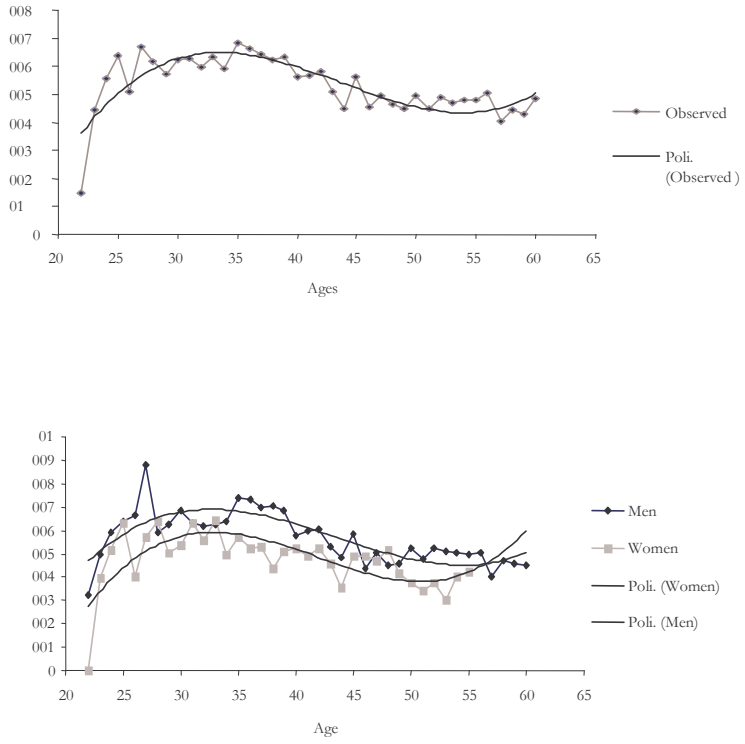

Figure 7: Observed and fitted proportion of withdrawals by age and by age and gender

In Table 9 results from the logistic regression of modelling the withdrawals decision based on the sub-sample of data in Table 8 are reported. Both the logistic coefficients and the odds ratios are recorded. Data are better fitted by considering a cubic polynomial in age, and dummies for gender (women as the reference group), type of activity (white collars as the reference group) and for sectors. In particular, for this analysis we group workers in the construction and non-construction sector (manufacturing and services). All coefficients are

significant at 1% level.[13] The cubic polynomial function fits well the hump-shaped age profile of withdrawals at young ages, when the TFR is most probably used to finance home purchases and when people are most likely to face liquidity constraints. The probability of taking a withdrawal is increasing with age untill 32 years, then it decreases and slightly increases at older ages. Considerably fewer women than men withdraw from their TFR; on average blue collars are less likely to withdraw than white collars. The sector of activity is significantly relevant in order to disentangle which group of workers is more likely to withdraw from their TFR. The data show that, with respect to workers employed in the sector of construction, those who work in the non-construction sector (manufacturing and services) are less likely to take a withdrawal.

As already mentioned, from an economic point of view the fact that a worker asks to cash out her TFR reflects that she is very probably liquidity contrainted. It is thus interesting to relate our results on TFR withdrawals to the ones on credit market imperfections. Since our dataset does not allow to implement such comparisons, we look at the empirical evidence on liquidity constraints in the existing literature.

Table 9: *Logistic model estimation results for the Liquidity-TFR*

Variable	**Coeff.**	**Std.Err.**	**Odds Ratio**	**Std.Err.**	**z**
Age	0.340939	0.100369	1.406267	0.141146	3.4
Age2	-0.00846	0.00244	0.991578	0.002419	3.47
Age3	0.0000649	0.0000193	1.000065	0.00001923	3.36
Gender	0.186765	0.032321	1.205344	0.038957	5.78
Blue collars	-0.1077	0.02847	0.897898	0.025563	3.78
Building sector	0.426375	0.052182	1.547089	0.08731	8.36
Constant	-7.1483	1.344738			5.32

We thus find that according to the information from the Bank of Italy 1991 Household Survey (SHIW), more than 3% of households, with an employee as

[13] We also estimated the model with dummies for years, but the results are not significantly changed.

head of household, started a mortgage. In Figure 8 we provide the age profile of the demand for new mortgages, which seems to reproduce the one for withdrawals shown in previous figures. However, the proportion of households who started a mortgage in 1991 is lower than the value we find on withdrawals (around 5%). This is not surprising if we consider that our results are based on workers' behaviour, while data from SHIW refers to households which sum individual members' behaviour.

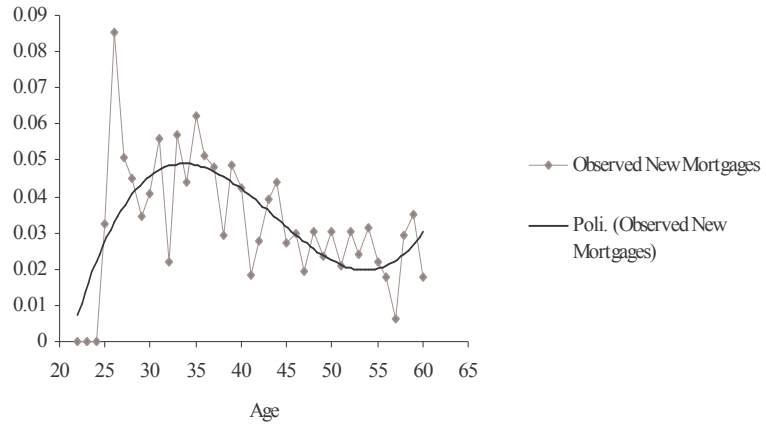

Figure 8: Observed and fitted proportion of new mortgages in year 1991 for blue and white collars. Source SHIW, 1991.

Guiso, Jappelli and Terlizzese (1994) show that the size of the consumer credit market, a crude measure of its imperfections, is much smaller in Italy than in the main OECD countries. In 1988 the G7 average consumer credit ratio to private consumption expenditures was 14% while in Italy it was about 4%. More recently, Magri (2002) shows that the share of households sampled in SHIW who, in 1998, was in debt is 19.1% and with mortgages 9%, while for 1989 the shares are 11.5% and 6% respectively. Fabbri and Padula (2001) find that, in three SHIW waves (1989, 1995 and 1998), 7.86% of the households applied for a loan and that 30% of them were liquidity constrained (which corresponds to 2.44% of households in the sample). Moreover, during the period considered the average proportion of households in debt for house purchase was 10.74%.

Despite the small size of the Italian mortgages market, a substantial fraction of Italian households own a house: at the beginning of the eighties, 59% of Italian households were home owners, a value which is exactly in line with the average for G7 countries (Guiso, Jappelli and Terlizzese, 1994). Mortgage market imperfections likely prevent young people from borrowing, so that thay are not able to become home owners. Guiso, Jappelli and Terlizzese (1994) show that the Italian mortgage market is characterized by high down payments (40-50% on average, while 20% in the US and Canada, 15% in the UK, 20% in Finland and Sweden, and 35% in Japan), higher interest rate spreads and shorter maturities (10-15 years on average). The impact of these imperfections can be observed in the age profiles of home ownership. From SHIW data, in 1987, the fraction of owners aged less than 25 years is 25%, it increases at 34% for ages between 25 and 29; after 34 years old the half of people is home owner and the proportion increases until about 70% at ages between 55 and 59 (Jappelli and Pagano, 1994). Moreover, the economic literature shows that young people are most likely to have a debt and in particular a mortgage, so that the Liquidity-TFR plays the strongest role when people need cash, in particular for home purchase. In fact, Magri (2002) finds that age has a positive effect on the demand of debt until 29 years old and on the probability of being subscriber of a mortgage, which is increasing with age until 37 years. In particular, she finds that the probability of asking for a loan is increasing with age until 29 years and then decreases (at around 55 the probability is a half with respect to its maximum). Also in Fabbri and Padula (2001) age has a significant concave effect on the probability of applying for a loan. Consistent with the theoretical predictions young people try to smooth their consumption paths over the life cycle through borrowings against expected future income growth.

Taking the qualification at work as a proxy of the level of education attained we can reconcile our results with the empirical evidence on the impact of education on both the debt market participation and on the probability of being liquidity constrained. Magri (2002) provides evidence that the level of education has a significant positive effect on the probability of having a mortgage. Fabbri and Padula (2001) find that the probability of having a debt is positively related with the level of education, and that better educated people are more likely to face binding liquidity constraints. Better educated people are those who can expect a steeper income profile, which increases the desire of anticipating consumption (impatience) and consequently the demand for loans at younger ages.

6 The expected evolution of the TFR

In this section we evaluate the implications for the age-profile of the expected TFR distribution, in order to disentangle the proportion of the three TFR components – retirement, buffer and liquidity. For each job relation and at each period the expected distribution of the TFR among the three components is derived from the cumulative probability distribution associated to the events described at the beginning of section 3 and represented in Figure 1:

1. continuity of job and no withdrawal (Retirement-TFR);
2. continuity and withdrawal (Liquidity-TFR);
3. dismissal from the current job (Buffer-TFR).

The cumulative probability distributions are obtained from the estimated annual transition probabilities of dismissal and withdrawals[14]. The methodology used to build the expected TFR distribution is the following. We refer to the representative workers modelled combining individual and occupational characteristics- summarized in Table 10 and Table 11.

Table 10: *Relevant individual and occupational characteristics for the probability of job dismissal*

Gender	Men, Women
Qualification	Blue collars, White collars
Initial age	24 years
Geographic area	North West, North East, Centre and South
Average dimension of firm	Less than 20 employees, 20-199, 200-999, 1000 and more
Sector of activity	Manufacturing and Services, and Construction

[14]The yearly transition probabilities used here are only an approximation of the continuous estimated probabilities.

Table 11: *Relevant individual and occupational characteristics for the probability of withdrawal*

Gender	Men, Women
Qualification	Blue collars, White collars
Initial age	24 years
Geographic area	North West, North East, Centre and South
Average dimension of firm	Less than 20 employees, 20-199, 200-999, 1000 and more
Sector of activity	Manufacturing and Services, and Construction

The representative workers are assumed to start the job career when they are 24 years old, and are observed until they reach the age of 34.[15] The expected percentage of the accumulated TFR which is available for retirement provision (Retirement-TFR), and the part that is used for precautionary motives (Liquidity-TFR and Buffer-TFR) are computed according to the definitions provided in section 3. Table 12[16] reports the expected mean values and the expected standard deviation of the single components (retirement, liquidity and buffer TFR) of the expected distributions. Tables 13 and Table 14 report the whole expected distributions for the first eleven years of the job spell, for blue collars and white collars, respectively. In particular, the column corresponding to Retirement-TFR reports the expected probabilities (seen at time 0, i.e. when the representative workers are 24 years old) of surviving with the same employer. Similarly, the column corresponding to Buffer-TFR reports the expected probabilities of quitting in any of the previous years. Note that once a worker quits her job (for whatever reason), we don't consider her in the future any longer, not even if she starts a new job with a new employer.

[15] As the data used for the duration analysis covers employees' working histories for eleven years, we follow the representative workers during the first eleven years of their job careers.

[16] In Table 12 we present the results relative to the proportion of the accumulated TFR during the job careers, for men and women, who belong to the working groups with the lowest and the highest degree of job mobility. In particular, for blue collars, we present the results on the simulated accumulation of the TFR about those who are employeed in firms with less than 20 employees and work in the sourthern regions, and about those who work in firms with more than 1000 employees and work in north western regions. For white collars we present the results about those who work in the smallest and the largest firms, respectively.

Table 12: *Expected percentage distribution of TFR between the retirement (R), the liquidity (L) and the buffer (B) components (percentages).*

BLUE COLLARS						
	South;<20 empl.			NW;>1000 empl.		
	R-TFR	L-TFR	B-TFR	R-TFR	L-TFR	B-TFR
Women						
Mean	35.42	0.29	64.28	54.82	0.57	44.61
St.dev.	20.15	0.48	19.86	20.22	0.93	19.57
Men						
Mean	38.98	0.38	60.64	59.20	0.74	40.06
St.dev.	20.66	0.62	20.27	19.56	1.19	18.70
WHITE COLLARS						
	<20 empl.			>1000 empl.		
	R-TFR	L-TFR	B-TFR	R-TFR	L-TFR	B-TFR
Women						
Mean	43.63	0.43	55.94	62.07	0.74	37.20
St.dev.	20.63	0.70	20.18	19.17	1.19	18.30
Men						
Mean	45.51	0.54	53.95	64.10	0.92	34.97
St.dev.	20.80	0.88	20.23	18.85	1.50	17.74

Table 12 shows that the Liquidity-TFR accounts for a small proportion of the accumulated TFR for all representative workers. Men, white collars employed in the largest firms show the highest values: along their job career, the Liquidity-TFR account for the 0.9 per cent with a standard deviation of 1.5 per cent of total TFR. The Buffer-TFR and the Retirement-TFR display basically the same dispersion, as both range from 35 to 64 percent. The dispersion of the Buffer-TFR across workers may be explained by differences in job mobility. The variation is almost explained by the average dimension of the firm. *Ceteris paribus*, the expected Buffer-TFR for workers employed in big firms (with more than 1000 employees) is about 50 percent less than for employees of small firms (with less than 20 employees).[17] In large firms the buffer component is always on average lower than 45% of total TFR and it represents the largest fraction of the accumulated TFR for workers employed in smaller firms, given the differences explained by other individual and occupational characteristics. Differences among men and women range between 2.5 and 4 percent; these differences are negatively correlated with the firm dimension and are higher for blue collars than white collars, given that the difference due to qualification is about 4%.

These results suggest that there is a potential relevant role for the Buffer-TFR, which is stronger for the young, the women and the blue collars who work for small firms operating in the less developed geographic areas. However, in the present work we estimated the importance of the buffer TFR due to job separations. This is only an approximation of the role of the TFR as precautionary wealth as separation from firm does not necessarily imply unemployment and the consequent need to reduce wealth to smooth consumption. More accurate predictions on the potential role of the TFR as a precautionary wealth against negative income shocks can be derived considering the time needed to find a new job by those who experience a job separation. Leombruni and Quaranta (2002) found that, between 1985-1996, on average, about 51% of those who separate find a new job within 12 months. Of course, even during this period of unemployment, the TFR may play a crucial role as a buffer stock. Moreover they claim that for the 28-30% of workers aged between 25-35 years the average time is zero, i.e. they

[17] For women employed in firms with 1000 employees and more, the average Buffer-TFR is 37 percent, versus 64 percent for women employed in firms with less than 20 employees.

For men employed in firms with 1000 employees and more, the average Buffer-TFR is 35 percent, versus 61 percent for women employed in firms with less than 20 employees.

shift to a new job into one month from the last occupation. The fraction of these direct shifting increases to 37% for workers who are aged between 35-44. White collars more likely experience a direct shift than blue collars. This evidence is drawn on the same dataset as ours, which is obtained from the INPS archive for employees in the private sector only, so the time between job separations and new job associations is only a proxy of the unemployment spells.

Table 13: *Expected distribution of TFR between the retirement (R), the liquidity (L) and the buffer (B) components (percentages) - blue collars.*

BLUE COLLARS						
	South;<20 empl.			NW;>1000 empl.		
	R-TFR	L-TFR	B-TFR	R-TFR	L-TFR	B-TFR
Women						
Age: 25	76.8	.00	23.2	90.1	.00	9.9
26	59.2	.00	40.8	79.6	.00	20.4
27	46.8	.00	53.2	70.0	.00	30.0
28	38.1	.00	61.9	61.6	.00	38.4
29	31.7	.00	68.3	54.4	.00	45.6
30	26.9	.00	73.1	48.4	.00	51.6
31	23.2	.00	76.8	43.3	.00	56.7
32	19.2	1.1	79.7	36.8	2.2	61.0
33	17.1	.9	82.0	33.5	1.9	64.7
34	15.3	.8	83.9	30.5	1.7	67.8
Men						
Age: 25	80.1	.00	19.9	91.9	.00	8.1
26	63.8	.00	36.2	83.0	.00	17.0
27	51.5	.00	48.5	74.4	.00	25.6
28	42.5	.00	57.5	66.6	.00	33.4
29	35.8	.00	64.2	59.7	.00	40.3
30	30.6	.00	69.4	53.8	.00	46.2
31	26.6	.00	73.4	48.6	.00	51.4
32	21.9	1.5	76.6	41.3	2.8	55.9
33	19.5	1.2	79.2	37.9	2.4	59.7
34	17.5	1.1	81.4	34.7	2.2	63.1

Table 14: *Expected distribution of TFR between the retirement (R), the liquidity (L) and the buffer (B) components (percentages) - white collars.*

WHITE COLLARS						
	South;<20 empl.			NW;>1000 empl.		
	R-TFR	L-TFR	B-TFR	R-TFR	L-TFR	B-TFR
Women						
Age: 25	83.7	.00	16.3	93.5	.00	6.5
26	68.7	.00	31.3	85.5	.00	14.5
27	56.8	.00	43.2	77.3	.00	22.7
28	47.8	.00	52.2	69.7	.00	30.3
29	40.9	.00	59.1	62.9	.00	37.1
30	35.6	.00	64.4	56.9	.00	43.2
31	31.3	.00	68.7	51.7	.00	48.3
32	26.3	1.6	72.1	44.5	2.8	52.8
33	23.7	1.4	74.9	40.9	2.4	56.7
34	25.6	1.2	77.2	37.7	2.2	60.1
Men						
Age: 25	85.1	.00	14.9	94.2	.00	5.8
26	70.9	.00	29.1	86.9	.00	13.1
27	59.3	.00	40.7	79.4	.00	20.6
28	50.2	.00	49.8	72.1	.00	27.9
29	43.2	.00	56.8	65.5	.00	34.5
30	37.7	.00	62.3	59.6	.00	40.4
31	33.3	.00	66.7	54.4	.00	45.6
32	27.6	2.1	70.3	46.4	3.5	50.1
33	25.1	1.7	73.2	42.9	3.0	54.1
34	22.8	1.6	75.7	39.7	2.7	57.6

7 Conclusions

In this work we provide some evidence on the extent to which having the entire TFR invested in retirement account may not be satisfactory because of discontinuity in job careers and binding liquidity constraints. Retirement-TFR is associated with continuous careers and with no anticipated cashes out. If workers experience unemployment spells or need liquidity to finance specific expenses, then the TFR acts as precautionary wealth (Buffer -TFR and Liquidity-TFR). We evaluate the weight of the three components considering a probabilistic model in which the accumulation of the TFR (and so the portion of Retirement-TFR) at each period is conditional on continuity in job careers and on no withdrawals.

The inputs of the probabilistic model are the annual transition probabilities of dismissal of careers and of withdrawing approximated by estimates from a duration and a logistic model, respectively. Estimation results enable to disentangle the impact of individual and occupational characteristics on job duration and on the probability of withdrawing.

The empirical analysis on the determinants of withdrawals points out that only a minority of workers cashes out their TFR during the working life. Our results seem to be consistent with those on the demand of mortgages and on home ownership. Withdrawals from TFR may help individuals to face strong down payment requirements to obtain a new mortgage or to pay off the already existent one. However, there is a lack of explicit evidence on the extent to which the severance payments are useful to overcome mortgage market imperfections.

We use the impact of job mobility to evaluate the proportion of the TFR which is paid on job separations. The Buffer-TFR can overcome Retirement-TFR if the probability of dismissal is high, as it happens for workers employed in firms of lower dimension: our estimates suggest that working in small firm -with less than 20 employees- increases the probability of job separations by almost three times. These findings are consistent with previous estimates of the effects of demographic and occupational characteristics on the probability of job separation. Venturini and Villosio (2002) find a strong impact of the firm dimension in determining job separation.

In the final section we evaluate the expected amount of the TFR that, for a representative worker at each age, is liquidated due to dismissal.

However, our results can provide only an approximation of the role of TFR as precautionary wealth, as not all workers who separate from a given job will

experience unemployment and will need to consume the whole TFR in order to smooth consumption. In particular, the role of the Buffer-TFR would be more accurately evaluated combining job duration with unemployment duration analysis. As showed in Leombruni and Quaranta (2002), on average, about 51% of employees who separate find a new job within 12 months. Moreover, in this work consumption and saving decisions are not considered, nor how TFR obtained at dismissal is spent, so no direct implications of the impact of uncertainty on the accumulation of wealth can be derived.

Further research which combines job duration with a deeper analysis of unemployment duration may enable to provide more accurate predictions on the role of TFR as buffer stock used during the working life to satisfy needs that are different from providing for retirement.

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A Archives' description

A.1 The employers anagraphic archive

Each employer is assigned a personal code by INPS, serving as the access key to the other archives. Normally, each individual has a unique personal code. However, multiple correspondences (one worker, multiple personal codes) may be found, in case, for instance, of job change if the employer is given a new code because of lack of communication among the employer, the employee and INPS. In these cases, the identification occurs by means of one of the multiple codes, called "primary code".

Example.

Personal code	Name	Gender	Date of birth	Primary code
AAA00AA01	Rossi Mario	M	1953/10/20	AAA00AA01
AAA00AA02	Rossi Mario	M	1953/10/20	AAA00AA01

Mario Rossi has two personal codes, but the unique primary code allows her to be univoquely identified.

A.2 The employees related archive (O1M archive)

This archive consists of the yearly modules provided by the employer for each employee. Multiple modules for one person are generated because of job transformations that change the contributive regime[18] and employer changes. Other than a part containing the identifying codes of both the workers and the firms ("intestazione"), the module is made of four sections:

- Section A contains the personal details of the workers (name, gender) and of their residence place
- Section B provides information on the working characteristics: length of the working period (months, weeks, days), annual earnings, job qualification and type of contract, contract code and employment level, insurances covering the employees
- Section C contains special retributions not included in Section B

[18] I.e. from part time to full time (or viceversa), from temporary to permanent job

- Section D analyzes possible periods of absence from work, due to illness, accidents, maternity leaving or unemployment, during which the worker has received reduced wages.

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