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Higher education in non-standard wage contracts

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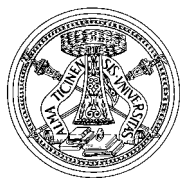
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Quaderni di Dipartimento

Higher education in non-standard wage contracts

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Higher education in non-standard wage contracts¹

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Abstract

By applying Markovian analysis to Italian labor market transition matrices we verify whether higher education increases the likelihood of young workers moving from non-standard to standard wage contracts. As we find evidence for the so-called stepping stone hypothesis, we expect graduates to be more likely to pass from non-standard to standard wage contracts than non-graduates, because the signaling effect of education is enhanced by the stepping stone effect of non-standard wage contracts. Nevertheless, we find that non-standard wage contracts of graduates are more likely to be terminated as bad job/worker matches.

1. Introduction

Labor relationships between employers and employees are changing. Continuous full-time work (regulated by standard wage contracts) is becoming less frequent in Italy as it is in almost all European countries, particularly in those with higher levels of employment protection.² Instead, flexible forms of employment, such as fixed-term contracts and temporary work, are gaining in importance, both as a share of total wage employment³ and as a focus of labor market policy reforms⁴. The most recent classification of non-standard labor contracts drawn up by Istat (the Italian Statistical Institute) identifies 48 different patterns of non-standard employment arrangements in the present regulation of the Italian labor market (Tronti *et al.* 2004).

¹ - The authors would like to acknowledge the financial support of Fondazione CARIPLO.

² - See the June 2002 issue of the *Economic Journal* for an overview.

³ - The growth of atypical work in the period 1996-2003 accounted for 52 percent of additional wage employment in the non-agricultural private sector (Tronti *et al.* 2004).

⁴ - See the European Commission (2006) Green Paper on “Modernising labour law to meet the challenges of the 21st century”.

In this paper we define as non-standard wage contracts all those agreements that do not establish a standard working relationship, such as: fixed-term contracts, temporary contracts, work-and-training contracts and apprenticeship contracts. Our data refer to the period 1997-2003⁵ and consider graduates and non-graduates aged 15-29. Our purpose is to investigate the informative role of both education (*signaling*) and non-standard wage contracts (*screening*)⁶, and in particular whether higher education raises the probability of young workers moving from non-standard to standard wage contracts, since the share of non-standard wage contracts is highest among young people.

There is a growing empirical literature which tests whether the probability of moving to a permanent job is higher for individuals who start from a temporary job rather than from a non-working condition. Many studies find evidence that temporary contracts provide a stepping stone to a permanent job (Booth *et al.* 2002; Zijl *et al.* 2004; Ichino *et al.* 2005; Addison and Surfield 2006), but the advantage of our dataset over those of previous studies is that it comprises information that enables us to separate graduates from non-graduates.

In modern labor markets, both investing in higher education and entering a non-standard wage contract may have the same enhancing effect on the individual's probability of obtaining a standard wage contract: both of them may improve the labor-market status of non-employed workers either by increasing their human capital or by informing about their innate ability (productivity). As we find empirical evidence of the informative role of non-standard wage contracts, we expect the likelihood of passing from non-standard to standard

⁵ - In June 1997 the Treu Law was enacted to promote flexibility in the Italian labor market. The main reforms implemented were the introduction of temporary contracts, the creation of temporary work agencies, the regulation of fixed-term contracts, and the extension of the age limit for the application of apprenticeship contracts from 22 to 24. Not considered here is the Biagi Law (Law 30/03), which is the most recent change in labor market regulation, because our data refer to the period 1997-2003.

⁶ - Weiss (1995) uses the term "sorting" to refer to both the signaling and screening of workers.

wage contracts to be higher? for graduates than for non-graduates, because the signaling effect of education (if any) is enhanced by the screening effect of non-standard wage contracts. But on the contrary, our data show a negative correlation between higher education and the probability of moving from a non-standard wage contract to a standard one. An explanation for this finding is that it may be more difficult to infer the productivity of tertiary-educated individuals than it is for lower-educated workers (Peesers 2000). As a consequence, the average quality of job/worker matches may be lower for graduates than for non-graduates, so that tertiary-educated individuals are more likely to be terminated after the match quality between acquired and required skills has been assessed.

2. The informative role of higher education: signaling

Modern labor markets are characterized by heterogeneity on both the demand and supply sides. The heterogeneity of agents yields the advantages of specialization, but it raises the problem of the assortative matching of workers to suitable jobs (Sattinger 1993). The allocation of workers among jobs is optimal if each worker is matched to a job in which s/he performs better than all other workers. The degree of fit between required and acquired skills determines the productivity level and earnings in a job. In the absence of any information about workers' productivity, the market will pay an identical amount to all individuals. If ascertaining the quality of individuals is difficult and costly, each worker will receive remuneration equal to the average pay of those with whom s/he is *grouped*. Consequently, more productive individuals will be underpaid, while less productive ones will be overpaid. If, however, the more productive agents can be identified, they will be paid a larger amount, equal to the expected value of their marginal output conditional on the information available to those who hire them. The problem is identifying and labeling

workers' productivity. The process of identification is called 'selection' or 'sorting'. The higher wage is the private return on selection. The cost of selection consists in the difficulty of communicating private information because, it is argued, "words are cheap" and may not be believed (Spence 1976, p. 593). However, uninformed agents may infer information from the observable actions of the other party. The economic literature shows that education is often used to draw inferences about unobserved characteristics of individuals: if the abilities that are correlated with schooling positively affect productivity on the job, education may be a good signal of a worker's productivity. Sorting models of education (Arrow 1973; Spence 1973; Stiglitz 1975; Riley 2001) suggest that schooling may act as a filter which separates more able individuals from less able ones. This is the informative role of higher education; in the next section we focus on the informative role of non-standard wage contracts.

3. The informative role of non-standard wage contracts: screening

Non-standard wage contracts as well as higher education may improve the labor-market status of non-employed individuals both by increasing their human capital through work experience and by informing about the worker's ability (productivity) (Larsson *et al.* 2005). In the presence of asymmetric information, a non-standard wage contract may be a self-selection device which enables the worker to inform the employer about his/her ability (productivity). In screening models, the uninformed employer seeks to discriminate between high ability (high productivity) individuals and low ability (low productivity) ones by offering a range of alternative contractual conditions (standard and non-standard). Firms do not know the type of the worker with which they are matched before hiring, and they

may use non-standard wage contracts as a probationary stage during which they can observe workers' performance (Loh 1994; Wang and Weiss 1998; Booth *et al.* 2002).

Employers post vacancies with low initial earnings⁷ and steep wage growth in order to generate positive self-selection by applicants. High-productivity individuals will select themselves into non-standard wage contracts because they are less likely to face job loss after the match quality has been assessed. By contrast, low-ability (low-productivity) individuals, who are more likely to turn out to be bad matches, will search for standard wage contracts because these employment relationships can be dissolved less quickly. Therefore, we consider non-standard wage contracts to be costly investments that young workers may undertake order to signal their productivity to potential employers, thereby increasing their probability of finding a standard job.

If non-standard wage contracts act as a filter of high productivity individuals, the expected probability that a non-standard wage contract will be transformed into a standard one is higher for such individuals than it is for individuals starting from a non-employment condition. Many studies concerned with the European labor market find evidence of this stepping-stone effect toward a permanent job (Segal and Sullivan 1997; Booth *et al.* 2002; Zijl *et al.* 2004). Recent studies on the Italian labor market also seem to confirm this hypothesis: Ichino *et al.*(2005) show that temporary employment acts as a springboard to permanent jobs, and Gagliarducci (2005) finds that the likelihood of obtaining a permanent job increases with temporary contract duration, but decreases with the number of temporary contract experiences, particularly if interrupted by unemployment spells.

⁷ - Recent research has found out that non-standard wage contracts earn significantly less than standard wage contracts (Booth *et al.* 2002, Brown and Sessions 2003, Gagliarducci 2005)

4. Database

In this study we consider graduates and non-graduates aged 15-29, and we analyze their transitions (average gross flows) between five labor-market states: 1) Standard Wage Employment; 2) Non-Standard Wage Employment; 3) Self-Employment; 4) Unemployment; 5) Inactivity. Data on these states are collected by Istat for its Quarterly Labor Force Survey, and they are produced by combining the individual records of subjects who have been interviewed twice over time (i.e. in the same month of two successive years). Available at present are six consecutive annual matrices referring to the period 1997/98-2002/03. From these data we constructed an average six-year transition matrix in order to neutralize the random elements and obtain information better suited to long-period analysis. Also available for this average matrix were disaggregations by sex and by educational level (graduates and non-graduates). The minimum number of individual data collected was 1,358 in the graduate male matrix; the maximum number was 84,971 in the general matrix (males and females, graduates and non-graduates).

5. Hypotheses

The purpose of this paper is to find empirical evidence for the following hypotheses:

1) – Since education enhances individuals' productivity (regardless of whether it signals or augments it), employment probabilities should increase with schooling. We therefore expect graduate (high-productivity) individuals to be more likely to enter and remain in employment, either on standard or non-standard labor contracts, than non-graduate (low-productivity) individuals.

2) – Since non-standard wage contracts improve the labor-market status of non-employed individuals (regardless of whether they provide human capital through work experience or act as a screening device), we expect the likelihood of getting a standard wage contract to be higher for individuals starting from non-standard wage contracts than for non-employed persons.

3) – Since self-employed persons have no need to signal their ability (productivity) to an employer (as they are employers of themselves), the benefits of obtaining a non-standard wage contract for individuals in transition from non-standard wage contracts to self-employment are nothing but true returns to human capital and work experience.⁸ If the screening hypothesis holds, then we expect signalling high productivity to have benefits: that is, the increase in the probability of passing from non-standard to standard wage contracts (compared to other starting conditions as unemployment and inactivity) is higher than the increase in the probability of passing from non-standard wage contracts to self-employment (compared to other initial conditions as unemployment and inactivity).

4) - If non-standard wage contracts signal high productivity, we expect the likelihood of passing from non-standard to standard wage contracts to be no lower for graduates than for non-graduates, because the signaling effect of education (if any) is enhanced by the screening effect of non-standard wage contracts.

6. Empirical Evidence

The gross flows of the six-year transition matrix (97/98-02/03) for males and females aged 15-29, graduates and non-graduates, are shown in Table I. The horizontal coefficients of

⁸ - See Wolpin 1977, Riley 1979, Brown and Sessions 1998.

the matrices in Table II can be read as a finite Markov chain, that is, a stochastic process which describes the transition from one state to another over time. At each point in time t , we have a transition matrix which represents the probabilities of moving from state i at time t to state j at time $t+1$. The probability of transition to any state i at time t is considered to be conditioned only at the state reached at the instant $t-1$ immediately prior to the present one, so that the individual's less recent history is omitted (Kemeny and Snell 1960).

According to our first hypothesis, tertiary-educated individuals are expected to be more likely to enter and remain in employment?. Overall, our data indicate that education facilitates entry into employment in the cases of both standard and non-standard labor contracts. The likelihood of passing from unemployment to a standard wage contract is 12.4 percent for graduates and 9.2 percent for non-graduates, and the likelihood of passing from unemployment to a non-standard wage contract is 14.3 percent for graduates and 7.3 percent for non-graduates. Moreover, the likelihood of passing from inactivity to a standard wage contract is 12.8 percent for graduates and 3.8 percent for non-graduates, and the likelihood of passing from inactivity to a non-standard wage contract is 11.6 percent for graduates and 2.5 percent for non-graduates. Our data also indicate that the probability of tertiary-educated individuals moving from both standard and non-standard wage employment to non-employment (unemployment and non-participation) is lower than for non-graduates. The likelihood of passing from a standard wage contract to unemployment is 1.1 percent for graduates and 2.2 percent for non-graduates, and the likelihood of passing from a non-standard wage contract to unemployment is 6.2 percent for graduates and 8.3 percent for non-graduates. Furthermore, the likelihood of passing from a standard wage contract to inactivity is 2.1 percent for graduates and 3.0 percent for non-graduates, and the likelihood of passing from a non-standard wage contract to inactivity is 7.6 percent for graduates and 8.7 percent for non-graduates. As expected, the data show that obtaining a

degree increases the likelihood of remaining in employment, on both standard and non-standard wage contracts. These findings are similar for males and females, and they provide some empirical support for our first theoretical hypothesis, namely that education enhances employment probabilities (regardless of whether it signals or augments an individual's productivity).

According to our second hypothesis, being employed on a non-standard wage contract is expected to increase the probability of obtaining a standard wage contract. Overall, our data indicate that being employed on a non-standard wage contract significantly facilitates access? to a standard wage contract compared to other initial conditions (self-employment, unemployment and inactivity). The likelihood of moving to a standard wage contract is 39.6 percent for individuals starting from a non-standard wage contract, but it is only 8.0 percent for individuals starting from self-employment, only 9.4 percent for individuals starting from unemployment, and only 4.0 percent for individuals starting from inactivity. We may conclude that, as expected, being employed on a non-standard wage contract increases the probability of obtaining a standard wage contract (for both males and females). These findings provide some empirical support for our second theoretical hypothesis, namely that non-standard wage contracts improve the labor-market status of non-employed individuals and act as stepping stones to permanent jobs (regardless of whether they signal or augment individual's productivity).

According to our third hypothesis, self-employed individuals should have no benefits from the signalling effect of non-standard wage contracts. It is therefore to be expected that being employed on these contracts does not facilitate entering self-employment (compared to other initial conditions like unemployment and inactivity) as much as it facilitates the transition from non-standard to standard wage contracts (compared to other initial conditions like unemployment and inactivity). Our data indicate that the likelihood of passing from a non-standard wage contract to self-employment (3.3 percent) and the

likelihood of passing from unemployment to self-employment (3.6 percent) are nearly the same (for both men and women, and for both graduates and non-graduates). Moreover, the likelihood of passing from a non-standard wage contract to self-employment (3.3 percent) is only slightly higher than the likelihood of entering self-employment starting from inactivity (1.9 percent). By contrast, being employed on a non-standard wage contract significantly increases the likelihood of obtaining a standard wage contract (39.6 percent) compared to other initial conditions like unemployment (9.4 percent) and inactivity (4.0 percent). These findings provide some empirical support for our third hypothesis, namely that non-standard wage contracts have a screening function and signal high productivity.

According to our fourth hypothesis, tertiary-educated individuals are more likely to pass from non-standard to standard wage contracts than are their lower-educated counterparts. However, our data show that education reduces the likelihood of passing from a non-standard to a standard wage contract (from 40.7 to 30.4) and raises the rate of persistence in non-standard wage contracts (from 39.5 to 47.8). On breaking the data down by gender, no substantial differences emerge between men and women. These first results seem not to confirm our fourth hypothesis, and call for further investigation based on Markovian analysis of the transition matrices.

7. Markovian Analysis of the Transition Matrices

For our present purposes, the most interesting results yielded by application of Markov chains to the transition matrixes concern the *limiting vector*, the *limiting correlations matrix*, the *mean first passage time matrix* and the *fundamental matrix* Z (Kemeny and Snell 1960). The *limiting vector* represents the equilibrium point of a transition matrix of a finite Markov chain. If we let the process run for an indefinite time span, we end up in an

equilibrium state called the stationary distribution. This is made up of the fixed probabilities of belonging to the states of the system in the long period. The data (Table III) show that, in the long period, the probability of having a standard wage contract is higher for graduates (57.9 percent) than it is for non-graduates (43.5 percent), for both males and females. Moreover, the probability of having a non-standard wage contract is higher for graduates (10.3 percent) than it is for non-graduates (5.5 percent). By contrast, the probabilities of being in unemployment and inactivity are lower for graduates (respectively 4.2 and 9.6 percent) than for non-graduates (respectively 5.9 and 31.1 percent). These results show that, in the long period, the likelihood of entering and remaining in employment, on both standard and non-standard wage contracts, is higher for graduates than it is for non-graduates, and confirm our first hypothesis.

We now examine the *limiting correlations matrix*. The generic element c_{ij} in the matrix measures the correlation between the time spent by the process in the i -th and j -th states. Since a long period spent in a state i implies a short one spent in a state j , it is logical to expect negative values outside the diagonal; the presence of positive values may instead indicate a process that passes rapidly from state i to state j and vice versa. For example, we observe in Table IV a positive correlation between non-standard wage contracts and unemployment for both males and females, graduates and non-graduates. We also observe a positive correlation between non-standard wage contracts and standard wage contracts for men (both graduates and non-graduates) and for non-graduate women, but not for female graduates. By contrast, we observe rapid transitions for female graduates from non-standard wage contracts to inactivity. Overall, these results confirm the stepping stone hypothesis, but gender differences in the correlation between non-standard wage contracts and non-employment conditions seem to indicate that, when non-standard wage contracts are used as probationary periods, they are more likely to be terminated as bad matches for female than for male graduates.

The *mean first passage time matrix* (MFPT) is a measure of the distance between the states of a system. The idea behind this concept is that if it is possible to re-enter each state at any point in time, one can compute the average number of transitions needed to arrive from origin i to the destination j for the first time. These distances take account not only of the direct flows between any pair of states, but also of all possible indirect flows. The data in Table VI show that, owing to education, the average distance between inactivity or unemployment and non-standard wage contracts becomes shorter for both men and women, and this confirms our first hypothesis. Also to be noted is that the average time taken to reach a standard wage contract starting from non-employment is more than two times longer than the time taken to reach a standard wage contract starting from a non-standard wage contract, and this confirms our second hypothesis. Moreover, the data show that the average time taken to reach self-employment by individuals starting from non-standard wage contracts is nearly the same as the time taken to reach self-employment by individuals starting from non-employment conditions, for both men and women, and for both graduates and non-graduates. By contrast, being employed on a non-standard wage contract significantly reduces the average time taken to reach standard wage contracts (for both men and women, and for both graduates and non-graduates). These findings confirm our third hypothesis on the screening role of non-standard wage contracts.

We also observe, for both men and women in the graduates matrix, that the average time taken to reach a standard wage contract starting from a non-standard wage contract is only slightly less than the time taken to reach a standard wage contract starting from a non-employment condition. Therefore, our fourth hypothesis is definitely rejected: owing to education, the average distance between non-standard and standard wage contracts becomes longer.

The *fundamental matrix* Z (Table V) enables, for broad values of n , calculation of the expected number of times the individual will visit the destination states (arranged in the

columns) for different states of departure (arranged in the rows). The entry z_{ij} thus measure how many times the individual reaches j in the first t steps when starting from i . How many times do individuals starting from non-standard wage contracts visit a standard wage contract? The number of times is higher for non-graduates than it is for graduates. Moreover, the number of times that individuals starting from non-standard wage contracts visit a non-standard wage contract one more time is higher for graduates than for non-graduates. This means that non-standard wage contracts of tertiary-educated individuals are more likely to be rejected as bad job/worker matches: again, our fourth hypothesis is rejected.

8. Conclusions

The purpose of this paper has been to find empirical evidence on whether higher education increases the likelihood of young workers moving from non-standard to standard wage contracts. Investing in higher education and obtaining a non-standard wage contract may improve the labor-market condition of non-employed individuals both by increasing their human capital and by informing about their abilities. By using Markovian analysis of the transition matrices, we have found empirical evidence for the informative role performed by non-standard wage contracts (the so-called stepping stone-hypothesis). As a consequence, one would expect graduates to be more likely to pass from non-standard to standard wage contracts than non-graduates, because the signaling effect of education, if any, may only be enhanced by the screening effect of non-standard wage contracts. By contrast, we have found that education reduces the likelihood of passing from non-standard to standard wage contracts, and raises the rate of persistence in non-standard wage contracts, for both male and female graduates. Moreover, we have observed in the *limiting*

correlation matrix rapid transitions from non-standard wage contracts to inactivity for female graduates, and we have noted in the *mean first passage time matrix* that the average distance between non-standard and standard wage contracts becomes longer for tertiary-educated individuals. Also the *fundamental matrix Z* shows that the number of times that individuals starting from non-standard wage contracts visit a standard wage contract is lower for graduates than for non-graduates. All these results converge to indicate that education increases the likelihood that non-standard wage contracts will be rejected as bad job/worker matches. An explanation for these results is that it may be more difficult to infer the productivity of tertiary-educated individuals than of lower-educated workers (Peeters 2000). In modern labor markets, employment contracts are often incomplete and implicit, and what is expected of employees is not clearly defined (Lazear 1998). This applies especially to highly educated workers, who often occupy apical positions where a bad match has great potential damage (Rosen 1992). As a consequence, the average quality of job/worker matches may be lower for graduates than for non-graduates, so that tertiary-educated individuals may have a higher probability of being terminated after the match quality between acquired and required skills has been assessed.

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Table. I – Gross flows (in thousand) of the six-year transition matrix 97/98-02/03 (age 15-29).

MF graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	2208869.0	97729.1	69572.5	53707.5	73503.0
NSWE	221437.0	225261.0	18532.8	45173.5	48224.6
SE	60646.2	15093.4	591658.0	23657.8	65277.1
U	111973.0	92266.6	43028.4	656068.0	291231.0
N	201142.4	132704.5	96815.1	422092.6	4174929.5

M graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	1287411.1	52908.4	48595.7	30781.6	40619.9
NSWE	116121.0	115433.0	11212.8	24354.2	25341.4
SE	40862.9	8360.1	417703.0	16281.9	30820.2
U	61634.4	44509.7	26213.7	324598.0	122931.0
N	120055.1	72669.3	55131.8	197454.0	1815331.5

F graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	921458.0	44820.8	20976.9	22925.8	32883.1
NSWE	105316.0	109827.0	7320.0	20819.3	22883.1
SE	19783.3	6733.4	173956.0	7375.9	34456.9
U	50338.2	47756.9	16814.6	331470.0	168300.0
N	81087.3	60035.2	41683.3	224638.6	2359597.9

MF graduates matrix

	SWE	NSWE	SE	U	N
SWE	113136.0	5784.8	5078.2	1457.9	2628.1
NSWE	17230.5	27104.3	4544.5	3528.8	4332.0
SE	5643.5	2879.2	41403.8	1888.0	2895.5
U	9585.1	11053.2	6629.7	36492.2	13410.9
N	11932.6	10822.4	5718.7	17188.8	47595.2

M graduates matrix

	SWE	NSWE	SE	U	N
SWE	47426.5	1699.9	2424.7	264.3	1172.2
NSWE	5575.4	7515.2	1975.4	939.4	1298.3
SE	3229.9	1221.0	23376.2	1093.9	703.5
U	4483.5	4535.3	3077.4	12545.7	4165.3
N	6677.5	6124.4	2881.2	6344.0	20542.8

F graduates matrix

	SWE	NSWE	SE	U	N
SWE	65709.2	4085.0	2653.5	1193.6	1455.9
NSWE	11655.1	19589.1	2569.1	2589.5	3033.7
SE	2413.6	1658.2	18027.5	794.0	2191.9
U	5101.6	6517.9	3552.2	23946.6	9245.6
N	5255.2	4698.0	2837.5	10844.8	27052.5

MF non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	2095733.3	91944.3	64494.3	52249.6	70874.9
NSWE	204207.0	198156.0	13988.3	41644.7	43892.5
SE	55002.7	12214.2	550255.0	21769.9	62381.7
U	102387.0	81213.4	36398.7	619576.0	277820.0
N	189209.8	121882.1	91096.4	404903.8	4127334.2

M non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	1239984.6	51208.5	46170.9	30517.3	39447.7
NSWE	110545.2	107918.2	9237.4	23414.8	24043.1
SE	37632.9	7139.0	394326.4	15188.0	30116.7
U	57150.9	39974.3	23136.3	312052.6	118766.0
N	113377.7	66544.9	52250.6	191110.0	1794788.8

F non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	855749.0	40735.8	18323.4	21732.3	31427.2
NSWE	93661.4	90238.3	4750.9	18229.9	19849.4
SE	17369.7	5075.2	155928.0	6581.9	32264.9
U	45236.6	41239.0	13262.4	307523.0	159054.0
N	75832.2	55337.2	38845.8	213793.8	2332545.5

Legend: Standard Wage Employment: SWE; Non-Standard Wage Employment: NSWE; Self-employment: SE; Unemployed persons: U; Non active persons: N. Source: our calculations on ISTAT data.

Table. II – Horizontal coefficients of the six-year transition matrix 97/98-02/03 (age 15-29).

MF graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	0.8824	0.0390	0.0278	0.0215	0.0294
NSWE	0.3964	0.4032	0.0332	0.0809	0.0863
SE	0.0802	0.0200	0.7823	0.0313	0.0863
U	0.0937	0.0772	0.0360	0.5492	0.2438
N	0.0400	0.0264	0.0193	0.0840	0.8304

M graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	0.8816	0.0362	0.0333	0.0211	0.0278
NSWE	0.3970	0.3947	0.0383	0.0833	0.0866
SE	0.0795	0.0163	0.8126	0.0317	0.0600
U	0.1063	0.0768	0.0452	0.5598	0.2120
N	0.0531	0.0321	0.0244	0.0873	0.8030

F graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	0.8834	0.0430	0.0201	0.0220	0.0315
NSWE	0.3957	0.4126	0.0275	0.0782	0.0860
SE	0.0816	0.0278	0.7179	0.0304	0.1422
U	0.0819	0.0777	0.0274	0.5393	0.2738
N	0.0293	0.0217	0.0151	0.0812	0.8528

MF graduates matrix

	SWE	NSWE	SE	U	N
SWE	0.8833	0.0452	0.0396	0.0114	0.0205
NSWE	0.3037	0.4777	0.0801	0.0622	0.0763
SE	0.1032	0.0526	0.7568	0.0345	0.0529
U	0.1242	0.1432	0.0859	0.4729	0.1738
N	0.1280	0.1160	0.0613	0.1843	0.5104

M graduates matrix

	SWE	NSWE	SE	U	N
SWE	0.8950	0.0321	0.0458	0.0050	0.0221
NSWE	0.3222	0.4343	0.1142	0.0543	0.0750
SE	0.1090	0.0412	0.7891	0.0369	0.0237
U	0.1556	0.1574	0.1068	0.4355	0.1446
N	0.1569	0.1439	0.0677	0.1490	0.4826

F graduates matrix

	SWE	NSWE	SE	U	N
SWE	0.8750	0.0544	0.0353	0.0159	0.0194
NSWE	0.2955	0.4967	0.0651	0.0657	0.0769
SE	0.0962	0.0661	0.7187	0.0317	0.0874
U	0.1055	0.1348	0.0734	0.4951	0.1912
N	0.1037	0.0927	0.0560	0.2140	0.5337

MF non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	0.8823	0.0387	0.0272	0.0220	0.0298
NSWE	0.4069	0.3948	0.0279	0.0830	0.0875
SE	0.0784	0.0174	0.7843	0.0310	0.0889
U	0.0916	0.0727	0.0326	0.5545	0.2486
N	0.0383	0.0247	0.0185	0.0821	0.8364

M non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	0.8811	0.0364	0.0328	0.0217	0.0280
NSWE	0.4018	0.3922	0.0336	0.0851	0.0874
SE	0.0777	0.0147	0.8140	0.0314	0.0622
U	0.1037	0.0725	0.0420	0.5663	0.2155
N	0.0511	0.0300	0.0236	0.0862	0.8092

F non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	0.8841	0.0421	0.0189	0.0225	0.0325
NSWE	0.4131	0.3980	0.0210	0.0804	0.0875
SE	0.0800	0.0234	0.7178	0.0303	0.1485
U	0.0799	0.0728	0.0234	0.5430	0.2809
N	0.0279	0.0204	0.0143	0.0787	0.8587

Legend: See Table I

Table III – Limiting vectors of the six-year transition matrix 97/98-02/03 (age 15-29).

	SWE	NSWE	SE	U	N
MF graduates + non-graduates	0.4442	0.0579	0.1073	0.0942	0.2964
M graduates + non-graduates	0.4728	0.0561	0.1476	0.0902	0.2334
F graduates + non-graduates	0.4093	0.0596	0.0642	0.0988	0.3681
MF graduates	0.5787	0.1032	0.1717	0.0645	0.0818
M graduates	0.6084	0.0768	0.2138	0.0423	0.0588
F graduates	0.5501	0.1200	0.1400	0.0858	0.1041
MF non-graduates	0.4349	0.0550	0.1030	0.0962	0.3109
M non-graduates	0.4641	0.0544	0.1437	0.0929	0.2448
F non-graduates	0.3997	0.0554	0.0588	0.0998	0.3864

Legend: See Table I

Table. IV – Limiting correlations matrix 97-03 (age 15-29).

MF graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.0000	0.0382	-0.2903	-0.4527	-0.8020
NSWE	0.0382	1.0000	-0.1263	-0.0181	-0.2106
SE	-0.2903	-0.1263	1.0000	-0.1200	-0.1877
U	-0.4527	-0.0181	-0.1200	1.0000	0.2058
N	-0.8020	-0.2106	-0.1877	0.2058	1.0000

M graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.0000	-0.0174	-0.4104	-0.4377	-0.7065
NSWE	-0.0174	1.0000	-0.1705	0.0158	-0.1223
SE	-0.4104	-0.1705	1.0000	-0.1381	-0.2139
U	-0.4377	0.0158	-0.1381	1.0000	0.2135
N	-0.7065	-0.1223	-0.2139	0.2135	1.0000

F graduates +non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.0000	0.1180	-0.1923	-0.4533	-0.8775
NSWE	0.1180	1.0000	-0.0745	-0.0553	-0.3115
SE	-0.1923	-0.0745	1.0000	-0.0822	-0.1211
U	-0.4533	-0.0553	-0.0822	1.0000	0.1860
N	-0.8775	-0.3115	-0.1211	0.1860	1.0000

MF graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.0000	-0.3689	-0.6741	-0.4976	-0.5140
NSWE	-0.3689	1.0000	-0.1038	0.0968	0.0807
SE	-0.6741	-0.1038	1.0000	-0.0143	-0.0305
U	-0.4976	0.0968	-0.0143	1.0000	0.3463
N	-0.5140	0.0807	-0.0305	0.3463	1.0000

M graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.0000	-0.3471	-0.7914	-0.4234	-0.3719
NSWE	-0.3471	1.0000	-0.0745	0.1464	0.1567
SE	-0.7914	-0.0745	1.0000	0.0290	-0.0856
U	-0.4234	0.1464	0.0290	1.0000	0.2935
N	-0.3719	0.1567	-0.0856	0.2935	1.0000

F graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.0000	-0.3587	-0.5794	-0.5654	-0.6099
NSWE	-0.3587	1.0000	-0.1023	0.0412	0.0054
SE	-0.5794	-0.1023	1.0000	-0.0238	0.0170
U	-0.5654	0.0412	-0.0238	1.0000	0.3828
N	-0.6099	0.0054	0.0170	0.3828	1.0000

MF non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.0000	0.0639	-0.2712	-0.4467	-0.8118
NSWE	0.0639	1.0000	-0.1295	-0.0233	-0.2244
SE	-0.2712	-0.1295	1.0000	-0.1252	-0.1920
U	-0.4467	-0.0233	-0.1252	1.0000	0.1971
N	-0.8118	-0.2244	-0.1920	0.1971	1.0000

M non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.0000	0.0042	-0.3908	-0.4359	-0.7176
NSWE	0.0042	1.0000	-0.1735	0.0088	-0.1365
SE	-0.3908	-0.1735	1.0000	-0.1451	-0.2188
U	-0.4359	0.0088	-0.1451	1.0000	0.2080
N	-0.7176	-0.1365	-0.2188	0.2080	1.0000

F non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.0000	0.1473	-0.1764	-0.4433	-0.8869
NSWE	0.1473	1.0000	-0.0800	-0.0583	-0.3253
SE	-0.1764	-0.0800	1.0000	-0.0841	-0.1178
U	-0.4433	-0.0583	-0.0841	1.0000	0.1744
N	-0.8869	-0.3253	-0.1178	0.1744	1.0000

Legend: See Table I

Table. V – Fundamental matrix Z 97-03 (age 15-29).

MF graduates+ non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	3.55	-0.01	-0.27	-0.41	-1.86
NSWE	0.88	1.57	-0.26	-0.11	-1.08
SE	-1.98	-0.14	3.76	-0.16	-0.48
U	-1.73	0.09	-0.28	2.08	0.84
N	-2.73	-0.07	-0.45	0.34	3.91

M graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	3.14	-0.03	-0.49	-0.35	-1.28
NSWE	0.57	1.54	-0.46	-0.04	-0.61
SE	-2.20	-0.16	4.02	-0.15	-0.51
U	-1.63	0.11	-0.43	2.14	0.81
N	-2.45	-0.01	-0.65	0.37	3.74

F graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	4.13	0.04	-0.11	-0.47	-2.58
NSWE	1.34	1.61	-0.08	-0.18	-1.69
SE	-1.78	-0.11	3.16	-0.13	-0.14
U	-1.77	0.06	-0.11	2.02	0.80
N	-2.92	-0.14	-0.21	0.31	3.96

MF graduates matrix

	SWE	NSWE	SE	U	N
SWE	2.18	-0.18	-0.55	-0.22	-0.24
NSWE	-0.62	1.68	-0.21	0.07	0.07
SE	-2.19	-0.04	3.08	0.06	0.09
U	-1.65	0.29	-0.07	1.94	0.49
N	-1.66	0.25	-0.18	0.57	2.03

M graduates matrix

	SWE	NSWE	SE	U	N
SWE	2.14	-0.14	-0.74	-0.15	-0.12
NSWE	-0.66	1.64	-0.19	0.09	0.11
SE	-2.33	-0.01	3.26	0.11	-0.03
U	-1.48	0.38	-0.09	1.81	0.38
N	-1.44	0.37	-0.29	0.44	1.92

F graduates matrix

	SWE	NSWE	SE	U	N
SWE	2.27	-0.19	-0.41	-0.30	-0.36
NSWE	-0.54	1.68	-0.17	0.02	0.01
SE	-2.08	-0.04	2.84	0.04	0.23
U	-1.76	0.21	-0.03	2.02	0.56
N	-1.84	0.13	-0.10	0.68	2.13

MF non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	3.67	0.00	-0.25	-0.42	-2.00
NSWE	1.03	1.56	-0.27	-0.12	-1.20
SE	-1.97	-0.15	3.82	-0.17	-0.53
U	-1.72	0.08	-0.30	2.09	0.85
N	-2.73	-0.08	-0.45	0.33	3.93

M non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	3.23	-0.02	-0.46	-0.36	-1.38
NSWE	0.67	1.54	-0.47	-0.05	-0.69
SE	-2.19	-0.17	4.08	-0.17	-0.55
U	-1.63	0.10	-0.45	2.16	0.82
N	-2.47	-0.02	-0.65	0.36	3.78

F non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	4.30	0.05	-0.10	-0.48	-2.77
NSWE	1.57	1.59	-0.10	-0.19	-1.87
SE	-1.79	-0.12	3.19	-0.14	-0.14
U	-1.76	0.05	-0.11	2.02	0.79
N	-2.91	-0.13	-0.19	0.28	3.95

Legend: See Table I

Table. VI – Mean first passage time matrix 97-03 (age 15-29).

MF graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	2.25	27.18	37.55	26.41	19.46
NSWE	6.02	17.26	37.39	23.21	16.82
SE	12.45	29.48	9.32	23.76	14.78
U	11.89	25.52	37.63	10.62	10.33
N	14.13	28.29	39.20	18.43	3.37

M graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	2.12	28.05	30.55	27.58	21.51
NSWE	5.45	17.83	30.38	24.16	18.64
SE	11.30	30.41	6.78	25.41	18.21
U	10.08	25.51	30.19	11.09	12.58
N	11.83	27.72	31.66	19.60	4.28

F graduates + non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	2.44	26.35	50.96	25.21	17.76
NSWE	6.82	16.77	50.48	22.23	15.33
SE	14.45	28.74	15.57	21.76	11.12
U	14.41	25.97	50.90	10.13	8.57
N	17.22	29.29	52.43	17.31	2.72

MF graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.73	17.98	21.10	33.41	27.68
NSWE	4.83	9.69	19.14	28.93	23.87
SE	7.54	16.66	5.82	29.17	23.68
U	6.62	13.42	18.33	15.50	18.77
N	6.62	13.88	19.00	21.28	12.22

M graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.64	23.12	18.70	46.44	34.67
NSWE	4.60	13.02	16.13	40.69	30.74
SE	7.35	21.42	4.68	40.37	33.26
U	5.95	16.42	15.68	23.66	26.20
N	5.89	16.47	16.60	32.61	17.02

F graduates matrix

	SWE	NSWE	SE	U	N
SWE	1.82	15.59	23.23	27.05	23.92
NSWE	5.11	8.33	21.52	23.24	20.36
SE	7.90	14.27	7.14	23.09	18.21
U	7.32	12.21	20.53	11.65	15.06
N	7.47	12.93	21.01	15.55	9.61

MF non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	2.30	28.21	39.52	26.14	19.08
NSWE	6.08	18.18	39.69	22.97	16.50
SE	12.97	31.01	9.71	23.56	14.32
U	12.40	26.90	39.96	10.40	9.91
N	14.71	29.72	41.42	18.37	3.22

M non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	2.15	28.72	31.62	27.16	21.08
NSWE	5.52	18.37	31.69	23.77	18.25
SE	11.68	31.48	6.96	25.08	17.67
U	10.46	26.53	31.52	10.76	12.11
N	12.27	28.79	32.92	19.35	4.08

F non-graduates matrix

	SWE	NSWE	SE	U	N
SWE	2.50	27.74	55.87	25.09	17.41
NSWE	6.84	18.06	55.86	22.16	15.07
SE	15.24	30.77	17.01	21.66	10.60
U	15.15	27.75	56.17	10.02	8.18
N	18.04	31.13	57.46	17.42	2.59

Legend: See Table I