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Self-employment among Italian female graduates

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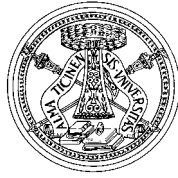
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Quaderni di Dipartimento

Self-employment among Italian female graduates

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Self-employment among Italian female graduates

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Abstract

We investigate gender differences among Italian self employed graduates focusing on flow data from a ten-year labor market transition matrix (1993-2003). Our data show that tertiary education increases the share of self employment in total employment for male workers but reduces the share for female workers. We argue that the disappointment provoked by the gender wage gap in paid employment may induce some female graduates with low entrepreneurial ability to set up on their own, but once in self employment they have lower survival rates than both men in self employment and women in paid employment. Applying Markovian analysis to labor market transitions we confirm our hypothesis: female graduates rarely move from paid employment to self employment, but the reverse is often the case. Thus, what we observe overall, is that education reduces the percentage of women in self employment, and increases the percentage of women in paid employment.

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Introduction

Why do some individuals and not others become self employed?¹ Why do some individuals manage to continue in business while others fail? We know from the theoretical literature on entrepreneurship (Lucas 1978) that those who choose self employment are all individuals for whom the use of their ability in entrepreneurial functions guarantees earnings higher than they would otherwise receive. As a consequence, people in self employment are related to both entrepreneurial ability and outside options. All else equal, individuals with relatively high entrepreneurial abilities have a comparative advantage in self employment, and will prefer this situation to wage work (or unpaid work).

The empirical literature on entrepreneurship indicates some personal characteristics other than ability that may facilitate entry into self employment such as, education, gender, age, ethnic background, family background, previous work experience, risk taking propensity, job satisfaction, and so on. In this paper we focus our analysis on education and gender alone: more specifically, we investigate the gender impact of education on the probability of entering and remaining in self employment. Education may either enhance individual entrepreneurial ability, thereby increasing the probability of choosing self employment, or education may increase opportunities for subordinate employment, thereby

¹ The definition of self-employment most suitable for our purposes in this paper is that people in self employment are *employers* of themselves and sometimes of others. The feature shared by self-employers and other-employers is their economic status as non-dependent workers. In our data, individuals are classified as self employed or wage employed on the basis of a direct question related to their current job.

reducing the likelihood of becoming an entrepreneur. As a consequence, the effect of education on entrepreneurship cannot be determined *a priori* (Le 1999), and it is not surprising that empirical results on the effect of education on self-employment selection are not robust.²

In this paper we provide additional empirical evidence regarding the Italian graduates labour market. Our aggregate data confirms that the effect of education on *being* self employed is neither positive nor strongly negative.³ But when these data are broken down by gender, a more intriguing finding emerges: education significantly increases the share of self employment in total employment for male workers and significantly reduces the share of self employment for female workers.⁴ In explanation of this finding, we argue that the cut-off level of ability may be of substantial importance for the entrepreneurial performance of female graduates.

² A meta-analysis of 94 academic studies conducted by Van der Sluis, van Praag and Vijverberg (2003) reaches the conclusion that the effect of education on entrepreneurship is neither positive nor negative.

³ Calculations on the data in Table I show that the share of self employed workers in total employment for tertiary educated individuals is only slightly less than that in the total population (respectively 27.3 percent for graduates and 28.3 percent for total population).

⁴ Calculations on the data in Table I show that the share of self employed workers in total employment for tertiary educated males is higher than that of total population (respectively 34.9 percent for male graduates and 31.6 percent for males in total population). By contrast, the share of self employed workers in total employment for tertiary educated females is lower than that of females in the total population (respectively 17.2 percent for female graduates and 22.4 percent for females in the total population).

Our contention is that the gender wage gap in paid employment lowers the opportunity cost of the entrepreneurial choice for female graduates (relatively to male graduates). As a consequence, the cut-off level of entrepreneurial ability for which the self employed are separated from employees is lower for female graduates than it is for male graduates. Since earnings in self employment are related to entrepreneurial ability, and since survival in self employment is related to earnings, our empirically verified hypothesis in this paper is that self employed female graduates will have lower survival rates than self employed male graduates.

By applying Markovian analysis to labor market transition matrices we verify the following hypothesis: education increases the probability of entering self employment for both male and female individuals, but the survival rates in self employment are lower for female graduates than they are for male graduates. Owing to their lesser ability, female graduates run less profitable businesses and earn lower incomes than male graduates. As a consequence, after a short period spent in self employment, many of them leave entrepreneurship and move to paid employment. Thus, what we observe overall, is that education reduces the percentage of women in self employment activities, and significantly raises the percentage of women in paid employment.

This paper has two advantages over previous research. The first is that in Italy self-employment is a clear alternative to paid employment because the share of self-employment in total employment is above 28 percent (Eurostat 2004). Among graduate workers, the self-employment rate is above 26 percent, the highest rate in Europe and more

than double that in Denmark, France, Spain, Portugal, Sweden, Netherlands and Finland (Eurostat 2002).⁵

The second advantage of this paper is that our data enable us to shift the focus of the relationship between education and entrepreneurship from the probability of *being* self employed to the probability of *entering* and *surviving* in this condition. As pointed out by Evans and Leighton (1989), stock data depict self employed workers as individuals who enter self employment and remain self employed until the time of data collection. But as a result, entry and exit decisions are mixed. Instead, looking at those who enter self employment, at how long they stay self employed, and at what they do afterwards is important to gain understanding of the role performed by self employment in the labor market. Flow data on entries into and exits from self employment are therefore of substantial importance.

Who becomes self employed?

Individuals differ in their entrepreneurial abilities. When in employment, individuals can be either self employed or employees, but not both at the same time. Each person must

⁵ In our data, the share of self-employment in total employment is 31.6 percent for men and 22.4 percent for women. In most previous studies on entrepreneurship, the share of self employment is lower than in our data. For example, in Moore (1983) the self employment rates were only 6.7 percent for men and 2.5 percent for women; in Devine (1994) 12.8 percent for men and 5.8% for women; in Clain (2000) 10.6 percent for men and 5.2 percent for women.

decide whether to be an employer (of him/herself and perhaps of others) or an employee. If people choose paid employment they receive a wage which is independent of their entrepreneurial ability. If people choose self employment they receive a return which is increasing in their entrepreneurial ability. Which sector people choose is determined by the utility of working in each employment condition. One determinant of this utility is the expected level of earnings. A higher amount of earnings in self employment should, all else equal, make the entrepreneurial choice more likely. By contrast, a higher amount of wages in paid employment should, all else equal, reduce the likelihood of a person's becoming an entrepreneur.

Since employees earn wages independent of their entrepreneurial ability and the self employed receive earnings that increase according to their entrepreneurial ability, there must be a unique cutoff level of ability at which, in equilibrium, individuals with equal or higher ability are entrepreneurs and the rest are employees. This means that, in equilibrium, self employed workers must receive returns on their entrepreneurial ability at least as high as the wage they would receive in paid employment. As a consequence, people in self employment are related to both entrepreneurial ability and wages in paid work. All else equal, individuals expecting lower wages in paid work will prefer self employment activities; all else equal, individuals with higher entrepreneurial ability will prefer self employment to paid work.

As in Blanchflower (2004), we find that the probability of *being* self employed is lower among highly educated workers; but our flow data show that the opposite is the case when the probability of *entering* self employment is considered. Examining transitions among the self employment, paid employment, unemployment, and out of the labor force

conditions reveals that education increases the probability of *entering* self employment for individuals from whatever origin, and for both male and female graduates.

As in Moore (1983), Devine (1994) and Clain (2000), we find that the probability of *being* self employed is lower for females than for males, both for the total population and for tertiary educated individuals. Furthermore, our data reveal a significantly lower persistence in self employment for women than for men, both in the total population and among graduated persons. These results provide additional evidence on the relationship between performance and gender in self employment. They aid understanding of the link between motivation (which is different for females than for males), entrepreneurial ability (which is lower for females than for males), and performance (which is lower for females than for males).

The previous literature on gender and entrepreneurship suggests that female and male entrepreneurs may differ in their motivations, and that these differences may be related to female performances in entrepreneurship. Scherer, Brodzinski and Wiebe (1990) report that males have a higher preference for entrepreneurship than females; Matthews and Moser (1996) report that female university graduates have less interest in owning small businesses than do male graduates; Scott (1986) finds that women choose entrepreneurship in order to achieve a balance between career and personal life/family. Buttner and Moore (1997) highlight the desire of women to pursue entrepreneurship for career advancement as well: they suggest that women are motivated to choose entrepreneurship either because of traditional entrepreneurial motivations or because they experience gender related barriers to their career advancement in paid employment.

Our assumption on observing the flow data is consistent with previous studies on entrepreneurial motivations that focus on barriers to career paths for females in paid

employment. Our contention is that the disappointment provoked by lower wage offers induces female graduates to become entrepreneurs whether or not they possess entrepreneurial ability. This lack of entrepreneurial skills, in its turn, provides insights into the possible reasons for gender differences in management patterns and business performance (Chaganti and Parasuraman 1996; Fasci and Valdez 1998), that is, in this paper, lower survival rates in self employment. Other reasons for female underperformance in self employment may be the stereotypes about women which affect their roles as entrepreneurs in businesses (Chaganti 1986; Fagenson and Marcus 1991).

Who lasts in self employment, and who leaves it?

On leaving university, female graduates search for jobs and ask employers about employment conditions, wages and career prospects. According to previous studies, men are more likely to be employed in senior management positions than are compared to women with the same educational levels. Hence female graduates receive proposals of lower status jobs, lower wages, and worse career prospects than those offered to their male counterparts, even if their educational performances are better than those of male graduates (Istat 2004).⁶

The lack of opportunities for wage and salary employment is an important determinant of self employment (Evans and Leighton 1989). People with the same

⁶ The average net monthly income of individuals who graduated in 2001, and who were full-time employees three years later, is 1,295.3 euros for males and 1,131.8 for females (Istat 2004).

educational level compare themselves to others; and lower earnings, especially if the difference is considered unfair, may induce female graduates to seek other opportunities in order to gain higher rewards for their skills.

When in self employment, female graduates either realize that they do not possess the characteristics necessary for successful entrepreneurship or they find it difficult to overcome the prejudices of lending institutions concerning female entrepreneurs. According to previous studies, stereotypes about female entrepreneurship are pervasive in society, and the charging of higher interest rates and higher collateral requirements to women is a recurring theme in the economic literature on capital constraints (Coate and Tennyson 1992; Carter and Rosa 1998; Coleman 2000; Orhan 2001).

Because some female graduates are pushed into self employment even if they are not particularly skilled entrepreneurs, and because they encounter the same gender stereotypes and difficulties as in dependent employment once they have entered self employment, their business performances may be lower than those of males, and women-owned businesses are more likely to fail than those started up by men (Chaganti 1986; Rosa, Carter and Hamilton 1996; Fasci and Valdez 1998; Du Rietz and Henrekson 2000; Watson 2003). As a consequence, many female entrepreneurs flow out of self-employment, and some of them enter paid employment, thereby increasing the percentage of female graduates in paid employment and reducing the percentage of women in entrepreneurial activities. We verify this hypothesis by analysing the labor market flow matrices produced by the Italian Institute of Statistics (Istat).

The Flow Data

Entries to or exits from a condition or state can be studied using a method based on longitudinal data: that is, data collected from subjects who have been interviewed repeatedly over time. In Italy, it is possible to obtain information of this type from the three-monthly labor force survey conducted by Istat. These data enable the construction of flow matrices, quarterly and annual, between the states of the labor market by re-interviewing a proportion of the individuals in the sample.

We examined ten annual matrices, produced by Istat but not published, which refer to the period 1993/94-2002/03 (the individual data collected amount to more than 62,000).⁷ Available at present are ten consecutive annual matrices from which we constructed an average matrix in order to neutralize the random elements and provide information better suited to long-period analysis. Also available for each of these matrices are disaggregations by sex for both the total population (general matrices) and tertiary educated persons

⁷ The survey method used is to interview the same subjects on several occasions over time following the rotation of the households in the sample constructed for the labor force survey. The matrices discussed here are relative to the average annual flows obtained by combining the individuals records relative to the same cohort of persons subjected to two corresponding surveys (i.e. conducted in the same month of two successive years). The minimum number of individual data collected is 62,907 in the 1984/1985 matrix; the maximum number of individual data collected is 73,348 in the 1996/1997 matrix.

(graduates matrices). These disaggregations are still reliable, because they concern a large portion of the sample (the individual data collected amount to more than 3,000).⁸

The data in Table I show the gross flows among four states (Self-Employment; Dependent Employment; Unemployment and Out of labor force) for the general matrix and the graduates matrix. The table illustrates the magnitude of the gross flows into and out of self employment. The two most substantial gross flows among states in both the general matrix and in the graduates matrix are those connecting self employed workers and employees. Every year, more than 290,000 individuals move from self employment to paid employment, and more than 311,000 individuals leave their employer and become self employed, out of a stock of 6.0 million self employed and an employment total of 22.5 million (Istat 2005). As regards graduates, every year, about 40,000 tertiary educated persons move from dependent employment to self employment, and another 40,000 move from self employment to paid employment, out of a stock of 3.3 million graduates in employment (Istat 2005). Table I shows that the most substantial gross flow into self employment consists of individuals moving from subordinate employment, followed by persons starting from inactivity, and then by previously unemployed persons, for both men and women, and in both the general matrix and the graduates one.

The data in Table I can be read as a finite Markov chain. A Markov chain is a stochastic process, which describes the transition from one state to another over time using probabilities. 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

⁸ The minimum number of individual data collected is 3,105 in the 1994/1995 matrix; the maximum number of individual data collected is 4,693 in the 2001/2002 matrix.

the instant $t-1$ immediately prior to the present one, so that the individual's less recent history is omitted (Kemeny and Snell 1960).

Table II presents the horizontal coefficients of the ten-year matrix for both the total population and tertiary educated persons. These coefficients can be read as the probabilities of transition among the states. Overall, the data indicate that education does facilitate entry into employment, but that it does not induce a much longer persistence in this state. The most significant horizontal coefficients show that the probability of remaining out of the labor force is lower for tertiary educated individuals (85 percent in the graduates matrix; 93 percent in the general matrix). Moreover, the probability of tertiary educated individuals moving from inactivity to both self employment and dependent employment is more than twice as high as that of the total population (respectively 1.1 percent and 2.3 percent in the general matrix; 2.9 percent and 6.1 percent in the graduates matrix).

However, the likelihood of graduates persisting in employment (for both the self employed and employees) is only slightly higher than that of the total population (respectively 94.2 percent for employees and 88.8 percent for the self employed in the graduates matrix; and 92.1 percent for employees and 87.0 percent for the self employed in the general matrix). Moreover, it is interesting to note that self employment is less stable than paid employment for both graduates and the total population. Self employed persons who change state are more likely to enter dependent employment (5.5 percent) than they are to pass to unemployment or inactivity, and this likelihood is even higher for tertiary educated persons (7.3 percent). That is to say, more than 65 percent of all graduates leaving self employment move to paid employment. Similarly, the exit flows from paid employment show that about half of all graduates leaving wage work start up a business on their own.

Breaking the data down by gender reveals substantial differences between male and female graduates. The data in Table II indicate a significantly lower persistence rate in self employment for female graduates than for male graduates (respectively 82.4 percent for females and 91.2 percent for males). By contrast, the persistence rate in paid employment is slightly higher for female graduates than it is for male graduates (respectively 94.5 percent for females and 93.8 percent for males). That is to say, the likelihood of male graduates persisting in self employment is nearly the same as in paid employment, while the likelihood of female graduates persisting in self employment is much lower than that in paid employment.

The composition ratios by sex in the gross flows (Table III) highlight that graduate women are not reluctant to set up on their own: they constitute, in fact, 47.1 percent of the gross flow from inactivity to self employment, and 48.7 percent of the gross flow from unemployment to self employment. But the crucial point here is that they are unable to continue in self-employment (only one out of every four survivors in self employment is a woman, even if women are one out of every two survivors in wage employment). Moreover, the sex ratios in the exit flows from self-employment to both unemployment and non-activity are higher than the exit flows from self-employment to paid employment (respectively 51.8 percent for the gross flow to unemployment, 42.4 percent for the gross flow to non-active persons and 41.6 percent for the gross flow to subordinate employment).

Furthermore, it is worth noting that education widens the gender gap between self employed workers and employees for individuals persisting in the same working condition. The percentage of women in graduate employment is 49.0 percent in the wage sector and 25.1 percent in the self employed sector. The percentage of women in total employment is 38.6 percent in the wage sector and 26.9 percent in the self employed sector. This means

that obtaining a degree increases the percentage of women in paid employment (from 38.6 percent to 49.0 percent) but reduces the percentage of women in self employment (from 26.9 percent to 25.1 percent).

Finally, it is interesting to note that female graduates are twice as likely to move from self employment to paid employment as male graduates (respectively 5.8 percent for male graduates and 11.3 percent for female graduates, in Table II). These first results seemed to confirm our initial hypothesis, and called for further investigation based on Markovian analysis of the transition matrices.

Markovian Analysis of the Transition Matrixes

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 *fundamental matrix Z* and the *mean first passage time matrix* (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 limiting vector was calculated for both the general matrix and for the graduates matrix (Table IV). The data establish that in the long period the probability of belonging to self employment is 0.18 for males and only 0.6 for females in the general matrix, and 0.29 for males and only 0.12 for females in the graduates matrix.

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 V that the negative correlation between self employment and paid employment is higher for males than for females in the graduates matrix (- 0.74 for males and - 0.47 for females), and it is low for males and insignificant for females in the general matrix (- 0.33 for males and - 0.04 for females).

The *fundamental matrix* Z (Table VI) 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 female graduates visit paid employment? The expected number of times is higher for individuals starting from unemployment and from self employment, thereby indicating a certain alternation between these states. The lowest number of times is instead for individuals starting from inactivity. How many times do female graduates visit self employment? The number of times is higher for individuals starting from unemployment and inactivity, thereby indicating a rapid alternation between these states, but differently from self employment, the lowest in the ranking are individuals starting from paid employment, which indicates that subordinate employment is a place of arrival for female 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. More specifically, its elements indicate the average time taken to reach a given destination for the first time starting from a certain origin. These distances take account not only of the direct flows between any pair of states, but also of all possible indirect flows. The results of the general matrix (Table VII) show that the average time taken to reach both self employment and paid employment is greater for females than for males whatever its origin may be, but the average time taken to reach inactivity is lower for females than for males from whatever origin.

Only one of these features changes as regards the graduate component. The average time taken to reach paid employment starting from inactivity is lower for female than for male graduates (12.3 for females and 13.5 for males). Owing to education, the average distance between inactivity (or unemployment) and paid employment becomes much shorter for females than for males, but this is not the case for the average time taken to reach self employment starting from inactivity, where the positions of males and females are (as usual) reversed (26.9 for males and 40.6 for females). Moreover, the data show that the average time taken to reach paid employment by individuals starting from self employment is much shorter for female graduates (9.8) than for male graduates (15.7). By contrast, the average time taken to reach self employment starting from paid employment is much longer for female graduates (43.5) than for male graduates (27.7).

These results confirm our hypotheses: female graduates rarely move from paid employment to self employment; on the contrary, they often move from self employment to paid employment. The data in Table VII show that the average time taken to reach self employment starting from paid employment is more than four times longer than the time taken by female graduates to reach paid employment starting from self employment.

Conclusions

This paper has investigated gender differences in the propensity for self employment of Italian graduates are investigated by conducting Markovian analysis of a ten-year transition matrix. It has found that graduate women who choose self employment have lower survival rates than men. It has also found that graduate women who choose self employment have lower survival rates than those who choose paid employment.

In explanation of these differences, we have argued that the cut-off level of ability may be of substantial importance for the entrepreneurial performance of female graduates. Our contention is that the disappointment provoked by the gender wage gap in paid employment may induce female graduates to become entrepreneurs whether or not they possess entrepreneurial ability. Because some female graduates are pushed into self employment even if they are not very skilled entrepreneurs, and because they encounter the same gender stereotypes and difficulties as in dependent employment once they have entered self employment, many of them switch occupations and enter paid employment.

We have verified this hypothesis by applying Markovian analysis to labor market transition matrices. We have found that graduate women are not reluctant to set up on their own, but after a short period spent in self employment they flow out of entrepreneurship and move to more enduring work positions in paid employment. Our data have shown that female graduates are twice as likely to move from self employment to paid employment as male graduates. We have also observed in the limiting correlation matrix that the negative correlation indicating stability (a long period spent in self employment implies a short one

spent in paid employment, and vice-versa) is lower for female graduates than for male graduates.

Moreover, calculation of the fundamental matrix Z has indicated that subordinate employment is perceived by female graduates as a place of arrival from which they rarely move again when in employment. Finally, calculation of the mean first passage time matrix has indicated that the average time taken to reach self employment starting from paid employment is more than four times longer than the time taken by female graduates to reach paid employment starting from self employment.

These results confirm our hypotheses: female graduates rarely move from paid employment to self employment; on the contrary, they often move from self employment to paid employment. Thus, what we observe overall, is that education reduces the percentage of women in self employment activities, and significantly increases the percentage of women in paid employment.

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Table. I – Gross flows (absolute values in thousand) of the ten-year transition matrix 93-03 (general matrix and graduates matrix).

MF general matrix

	SE	DE	U	N
SE	4596053.5	290455.7	65614.6	330398.5
DE	311625.8	12253345.1	231800.0	512228.6
U	89438.2	377076.3	1170303.9	610017.6
N	270043.3	523777.7	720607.6	21102474.2

M general matrix

	SE	DE	U	N
SE	3359865.4	197253.3	43388.7	168899.2
DE	223136.2	7518645.9	132750.0	285646.5
U	59282.2	212656.4	579191.9	223766.9
N	131325.1	264433.2	296857.7	7183756.5

F general matrix

	SE	DE	U	N
SE	1236188.2	93202.5	22226.0	161499.3
DE	88489.6	4734699.2	99050.0	226582.1
U	30156.0	164420.0	591112.0	386250.8
N	138718.3	259344.6	423749.9	13918717.7

MF graduates

	SE	DE	U	N
SE	485858.0	39966.6	4335.9	16673.1
DE	40080.0	1367990.3	11317.3	33415.8
U	11179.5	31092.3	65855.0	28033.2
N	15499.5	32464.8	29220.2	451305.0

M graduates

	SE	DE	U	N
SE	363894.0	23330.1	2090.5	9610.5
DE	25728.6	697349.0	3977.8	16277.2
U	5732.8	13052.2	23950.4	8580.3
N	8199.0	15983.8	10018.6	207016.0

F graduates

	SE	DE	U	N
SE	121964.0	16636.5	2245.4	7062.6
DE	14351.5	670641.0	7339.5	17138.6
U	5446.7	18040.1	41904.6	19452.9
N	7300.5	16481.0	19201.6	244290.0

Legend: Self-employed workers: SE; Dependent workers: DE; Unemployed persons: U; Non active persons: N. Source: our calculations on ISTAT data

Table. II – Horizontal coefficients (exit rates) of the ten-year transition matrix. 93-03 (general matrix and graduates matrix).

MF general matrix

	SE	DE	U	N
SE	0.8700	0.0550	0.0124	0.0625
DE	0.0234	0.9207	0.0174	0.0385
U	0.0398	0.1678	0.5209	0.2715
N	0.0119	0.0232	0.0319	0.9330

M general matrix

	SE	DE	U	N
SE	0.8914	0.0523	0.0115	0.0448
DE	0.0273	0.9214	0.0163	0.0350
U	0.0552	0.1978	0.5388	0.2082
N	0.0167	0.0336	0.0377	0.9121

F general matrix

	SE	DE	U	N
SE	0.8170	0.0616	0.0147	0.1067
DE	0.0172	0.9196	0.0192	0.0440
U	0.0257	0.1403	0.5044	0.3296
N	0.0094	0.0176	0.0287	0.9442

MF graduates

	SE	DE	U	N
SE	0.8885	0.0731	0.0079	0.0305
DE	0.0276	0.9416	0.0078	0.0230
U	0.0821	0.2284	0.4837	0.2059
N	0.0293	0.0614	0.0553	0.8540

M graduates

	SE	DE	U	N
SE	0.9122	0.0585	0.0052	0.0241
DE	0.0346	0.9381	0.0054	0.0219
U	0.1117	0.2544	0.4667	0.1672
N	0.0340	0.0663	0.0415	0.8582

F graduates

	SE	DE	U	N
SE	0.8246	0.1125	0.0152	0.0477
DE	0.0202	0.9453	0.0103	0.0242
U	0.0642	0.2126	0.4939	0.2293
N	0.0254	0.0574	0.0668	0.8504

Legend: See Table I

Table III – Ratios of composition by sex of the ten-year transition matrix 93-03 (general matrix and graduates matrix).

Ratios of composition by sex - general matrix

	SE	DE	U	N
SE	26,9	32,1	33,9	48,9
DE	28,4	38,6	42,7	44,2
U	33,7	43,6	50,5	63,3
N	51,4	49,5	58,8	66,0

Ratios of composition by sex - graduates

	SE	DE	U	N
SE	25,1	41,6	51,8	42,4
DE	35,8	49,0	64,9	51,3
U	48,7	58,0	63,6	69,4
N	47,1	50,8	65,7	54,1

Legend: See Table I

Table IV – Limiting vectors of the ten-year transition matrix 93-03 (general matrix and graduates matrix).

	SE	DE	U	N
MF general matrix	0.1205	0.3317	0.0484	0.4994
M general matrix	0.1822	0.4011	0.0488	0.3679
F general matrix	0.0638	0.2685	0.0482	0.6194
MF graduates	0.2128	0.5768	0.0312	0.1792
M graduates	0.2947	0.5291	0.0203	0.1558
F graduates	0.1187	0.6307	0.0438	0.2068

Legend: See Table I

Table. V – Limiting correlations matrix 93-03 (general matrix and graduates matrix).

MF general matrix

	SE	DE	U	N
SE	1.0000	-0.1366	-0.1230	-0.4062
DE	-0.1366	1.0000	-0.1404	-0.8330
U	-0.1230	-0.1404	1.0000	0.0211
N	-0.4062	-0.8330	0.0211	1.0000

M general matrix

	SE	DE	U	N
SE	1.0000	-0.3334	-0.1601	-0.3981
DE	-0.3334	1.0000	-0.1622	-0.7125
U	-0.1601	-0.1622	1.0000	0.0821
N	-0.3981	-0.7125	0.0821	1.0000

F general matrix

	SE	DE	U	N
SE	1.0000	-0.0370	-0.0729	-0.3221
DE	-0.0370	1.0000	-0.1044	-0.9172
U	-0.0729	-0.1044	1.0000	-0.0535
N	-0.3221	-0.9172	-0.0535	1.0000

MF graduates

	SE	DE	U	N
SE	1.0000	-0.6464	-0.1072	-0.2050
DE	-0.6464	1.0000	-0.2791	-0.5981
U	-0.1072	-0.2791	1.0000	0.2810
N	-0.2050	-0.5981	0.2810	1.0000

M graduates

	SE	DE	U	N
SE	1.0000	-0.7440	-0.1185	-0.2648
DE	-0.7440	1.0000	-0.1647	-0.4368
U	-0.1185	-0.1647	1.0000	0.2306
N	-0.2648	-0.4368	0.2306	1.0000

F graduates

	SE	DE	U	N
SE	1.0000	-0.4718	-0.0431	-0.1018
DE	-0.4718	1.0000	-0.4298	-0.8066
U	-0.0431	-0.4298	1.0000	0.3073
N	-0.1018	-0.8066	0.3073	1.0000

Legend: See Table I

Table. VI – Fundamental matrix Z 93-03 (general matrix and graduates matrix).

MF general matrix

	SE	DE	U	N
SE	6.1230	-1.4270	-0.2250	-3.4710
DE	-0.2891	6.3730	-0.2015	-4.8820
U	-0.4129	-0.3847	1.9510	-0.1536
N	-1.0040	-3.1870	0.0959	5.0950

M general matrix

	SE	DE	U	N
SE	6.3640	-2.5720	-0.2458	-2.5470
DE	-0.9385	5.1940	-0.1960	-3.0590
U	-0.7299	-0.4134	2.0380	0.1049
N	-1.5360	-3.2430	0.1977	5.5820

F general matrix

	SE	DE	U	N
SE	4.8780	-0.5678	-0.1576	-3.1520
DE	0.0027	7.4280	-0.1720	-6.2580
U	-0.1344	-0.2690	1.8780	-0.4749
N	-0.3904	-2.7070	0.0224	4.0750

MF graduates

	SE	DE	U	N
SE	5.8030	-3.8970	-0.1147	-0.7910
DE	-1.4040	3.7000	-0.1489	-1.1470
U	-0.5444	-1.6100	1.9700	1.1840
N	-1.0880	-3.7850	0.4469	5.4270

M graduates

	SE	DE	U	N
SE	5.9950	-4.0990	-0.0836	-0.8118
DE	-2.1760	4.1930	-0.0896	-0.9267
U	-0.9415	-0.7874	1.8860	0.8433
N	-1.9350	-2.9860	0.3470	5.5730

F graduates

	SE	DE	U	N
SE	4.5760	-2.9750	-0.0791	-0.5229
DE	-0.5904	3.2070	-0.2227	-1.3940
U	-0.0150	-2.3290	2.0170	1.3270
N	-0.2492	-4.5320	0.5096	5.2710

Legend: See Table I

Table. VII – Mean first passage time matrix 93-03 (general matrix and graduates matrix).

MF general matrix

	SE	DE	U	N
SE	8.30	23.51	44.97	17.15
DE	53.22	3.01	44.49	19.98
U	54.25	20.37	20.66	10.51
N	59.16	28.82	38.34	2.00

M general matrix

	SE	DE	U	N
SE	5.49	19.36	46.84	22.09
DE	40.09	2.49	45.82	23.48
U	38.94	13.98	20.51	14.88
N	43.37	21.03	37.75	2.72

F general matrix

	SE	DE	U	N
SE	15.66	29.77	42.21	11.67
DE	76.35	3.72	42.50	16.68
U	78.50	28.66	20.73	7.35
N	82.51	37.74	38.47	1.61

MF graduates

	SE	DE	U	N
SE	4.70	13.17	66.92	34.70
DE	33.87	1.73	68.02	36.69
U	29.83	9.21	32.09	23.68
N	32.39	12.98	48.89	5.58

M graduates

	SE	DE	U	N
SE	3.39	15.67	96.82	40.99
DE	27.72	1.89	97.11	41.73
U	23.53	9.41	49.17	30.36
N	26.90	13.57	75.65	6.42

F graduates

	SE	DE	U	N
SE	8.42	9.80	47.89	28.02
DE	43.52	1.59	51.17	32.23
U	38.68	8.78	22.85	19.07
N	40.65	12.27	34.44	4.84

Legend: See Table I