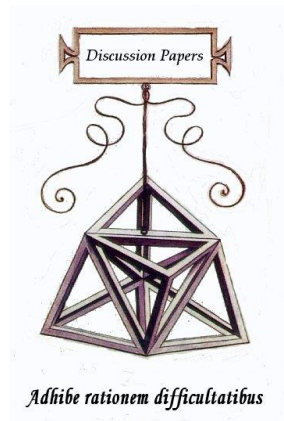




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Paola Meozzi

Labour Market and Flexibility

A logistic regression model to estimate the likelihood of being atypical for a woman employed in Pisa

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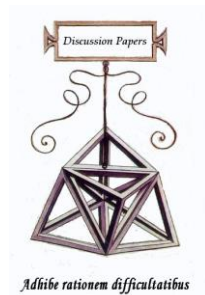
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Discussion Paper
n. 189



Paola Meozzi

Labour Market and Flexibility

A logistic regression model to estimate the likelihood of being atypical for a woman employed in Pisa

Abstract

Labour Market and Flexibility

A logistic regression model to estimate the likelihood of being atypical for a woman employed in Pisa

How do demographic and educational factors affect a woman's occupational status? How common is non standard employment for different labour force groups and in different sectors of the labour market? This paper aims at analysing the impact of different "structural variables" in terms of risk for a woman working in the province of Pisa to be employed with a non-standard contract. Determinants of women's atypical employment in Pisa are studied using microdata for approximately 425.000 women employed in Pisa. Section 1 summarizes previous literature. Section 2 shows some descriptive evidence and the incidence patterns that exist for different demographic groups. In Section 3 regression methods are used to explore the association between particular worker characteristics and the likelihood of being employed in atypical jobs. Multivariate analyses conducted on administrative microdata during the economic crisis (2008-2013) show that some structural variables (citizenship, age and educational level) affect the type of employment stability. Moreover some female atypical workers have a higher probability of working in some sectors rather than some other ones, providing support to the horizontal occupational hypothesis.

Classificazione JEL: J08, J15, J16, J24, J71

Keywords: labour market, flexibility, atypical employment, women employment, precarious work, labour market institutions

1 Introduction¹

Atypical work is usually associated with the following types of employment: part-time employment, self-employment, temporary work, on call work, fixed-term work and other types of contracts. All of these forms of employment are related in that they depart from the standard or “typical” employment relationship². Flexibility in the marketplace and in employment relationships has resulted in the increase of women in the workplace as well as the rise of precarious work (Berton, F. 2008, Berton, F., M. Richiardi and S. Sacchi, 2009). The growth of precarious employment during the economic crisis has had major consequences on women and young workers, thus enhancing gender differences with respect to occupational status, career opportunities, occupational segregation and earnings (Isfol, 2013). According to the literature, many factors can be accounted for gender gaps in earnings, careers and occupations (Barbieri, P. and S. Scherer, 2008). Gender gaps are systematic differences in the outcomes that men and women achieve in the labour market (such as the percentages of men and women in the labour force, the types of occupations they choose, their relative wages, etc.). Economic gender gaps may be the consequence of individual behaviour both on the labour supply side due to education, job experience, hours of work, time spent in child care and in the home and so on (theories on human capital, gender socialization and family) and on the labour demand side (statistical discrimination, vertical and horizontal occupational segregation). Theoretical models explain differences within occupations between men and women, different rates of participation, the reason why younger and more educated women have few opportunities in their careers in relation to comparable groups of men. Economic gender gaps may originate at institutional level (Addabbo T. and Favaro D. 2007, Rosti L. 2006a, Rosti L. 2006b, Pissarides C., Garibaldi P., Olivetti C., Petrongolo B. and Wasmer E., 2005). Furthermore the diffusion of different types of rigidities (job protection measures, the presence of union in work bargaining in some countries as of the early 1980s, etc.) has contributed to the growth of various types of gender gaps and the persistently high level of unemployment (Boeri, T., 2011)³. Work regulations can either reinforce the differences between standard and non standard employment or they can serve to lessen these differences by increasing the protections

¹ The present paper was presented at the XXIX AIEL National Conference of Labour Economics held in Pisa on the 11th and 12th September 2014 (parallel session “Women and Gender in Labour Market”).

² Atypical work refers to models of contracts which are not conforming to the standard model of full-time, regular, open-ended contracts with a single employer over a long time span.

³ Boeri, T. (2011) provides evidence of the presence in Italy of a dual market: the insiders, who are hired permanently and enjoy a wide range of benefits, and the outsiders, who work on atypical contracts and face lower wages and reduced benefits. Tealdi, C. (2010) using a search and matching model draws similar conclusions.

afforded to precarious workers. A heated debate has grown around the question of whether inside power and the ensuing severity of protection clauses run counter to the flexibility required to guarantee labour market efficiency. Other theoretical explanations apply such as the ‘adjustment costs models’ and the market imperfection theory (second best). These issues have given rise to a growing corpus of empirical research. A rather large set of empirical studies confirm the theory. The empirical studies examined point to the greater impact of job protection measures on the dynamics and composition of unemployment rather than on its rate. The effect of these measures would seem that of prolonging the expected duration of unemployment spells and marginalization phenomena. The macroeconomic outcome is the emerging of dual economies with their inherent problems of equity and undermining inefficiencies. The changes in employment protection legislation (EPL) on fixed term workers and the increase in the share of temporary jobs have had a negative impact on both the level of productivity and the growth rate (Jona-Lasinio C. and Vallanti G., 2011). Specifically, the reforms seem to have negatively affected the allocative capacity of the economy, by reducing the re-allocative contribution to aggregate growth of high re-allocative sectors⁴. There is an important gender dimension to the debate on atypical work, as men are disproportionately represented in standard employment relationships and increasing numbers of women in the labour force work under atypical conditions and are concentrated in professions and specific industries as a consequence of the introduction of flexibility in the labour market. Tealdi C. (2011) confirms this hypothesis by showing that sequences of short-term contracts and cycles of unemployment and temporary employment are more and more common after the reforms. Previous studies, such as Nunziata L. and Staffolani S. (2001) and Nannicini T. (2004) show that lower EPL in Italy has led to the substitution of permanent employment with temporary employment with an insignificant net effect on total employment.

2. Who is most likely to work in a temporary job? Incidence patterns

The following figures set out the gender dimension of employment dynamics in Pisa from 2008 to 2012. As we can see, although the effects of the recession were delayed for one year compared to the national patterns, men and women are suffering the effects of this recession in a very different way and intensity. During these years of recession, the main indicators referred to local economic performance have highlighted positive results in terms of gender inequalities. Gender gap in

⁴ For evidence on the impact of different contracts on LMP, please see Cappellari L., Dell’Aringa C. and Leopardi M. (2011). Other studies support the hypothesis that a higher proportion of temporary employees at regional level, or a negative subjective expectation regarding the probability of getting a permanent contract, discourages atypical workers from producing a high level of effort (Ghignoni, E. 2009).

unemployment rates was closing down, and thus gender inequalities have been reduced. Although it is true that aggregate gender gaps in employment indicators - simply measured by the difference between male and female rates in activity, employment or unemployment- have improved in this recession, it is important to state that this progress has been achieved only by faster declines in male employment in the first years of the crisis and a levelling down of the male position in the labour market.

[Figure 1]

We may be going back to 2009 to show a labour market that pushes out women (Figure 2) when there are labour shortages. If we analyze the evolution of labour supply by gender, we find a slightly different behaviour for men and women.

[Figure 2]

Although the activity rate has been falling since the beginning of the crisis (2008) due to a discouraged worker effect caused by the high and increasing unemployment both for men and women, female labour participation went up till the end of 2010 and was steeper if compared to male labour participation. This added worker effect for females affected mainly married women over 45 years-old whose husbands had become unemployed, as we will point out in Section 3. In 2010, 43,4% women stopped looking for a job (Figure 4), while 71,6% men entered the labour force (Figure 1). However, 2012 was a turning point, with more women than men going from activity to inactivity.

[Figure 3]

The reduction of wage inequalities associated with employment conditions is nevertheless of critical importance. Women's opportunities to find a job have been reduced since economic crises usually increase the needs for a family provision of goods and services as they are not any longer provided by the State due to public budget cuts or because they cannot be purchased in the market due to the deterioration of household incomes. This intensification of unpaid domestic and care work falls on women because of the still uneven distribution of care responsibilities between men and women, reducing women's opportunities to go out from unemployment. As we can see in Figure 1, the employed population in Pisa has started to increase since 2010, but more for women than for men. Nevertheless, this increase does not correspond to an increase of standard employment. In fact, an increasing numbers of women in the labour force have started to work under atypical conditions (Figure 5).

[Figure 4]

Variations in the incidence of atypical work across population and labour force groups are shown in Figure 6. Females were more likely than males to be working in non standard jobs during the economic crises: their overall incidence rate was approximately 91 percent, the percentage being 3 to 4 points higher than males in all years except 2010.

[Figure 5]

The number of atypical workers in Pisa is 38.552 women and 34.424 in 2008 and it has decreased by 4.199 men and by 3.950 women in 2012.

[Figure 6]

3 A logistic regression model to estimate the atypical occupational status for women employed in Pisa. Results and comments

The logistic regression estimates compare female atypical workers and female permanent workers in Pisa since 2008 using a dataset of “administrative data” provided by the Public Employment Services (IDOL)⁵. The model includes a range of “structural variables”, such as citizenship, educational level, age, a time variable and a variable referred to economic activity⁶. Although looking at the bivariate results on the incidence of atypical work is interesting, when considering the relationship between any particular characteristic and atypical work, it is important to control for other factors that may also be influencing the probability of holding an atypical job. Binomial logistic regressions were estimated to explore the association between particular individual characteristics and non standard employment. These regression models use information on the personal characteristics of individuals to predict the likelihood of being in a temporary rather than a permanent job. Using the model estimates, the impact (or marginal effect) of a change in one characteristic on the chance of participating, while holding all other measured characteristics constant, can be estimated. The models were estimated for approximately 425.000 women working in Pisa in the period 2008-13. Extending the basic model, separate models were estimated using

⁵ To classify the *dataset* for the logistic regression I have used the “non restrictive” definition of “atypical employment” provided by Tronti and Ceccato (2005) which includes part-time, open-ended contracts as “partially atypical” and the classification based on the Multiregional Standard Classification of administrative data (please see Table 1 and Table 2 in the “Table and Figures” Section).

⁶ The time variable is introduced here as a “process” which allows to evaluate the effects of time on the event analyzed (standard or non standard employment) that change during the chosen course of spells.

stratas. These were treated as separate outcomes because the results indicated there are substantial differences in the characteristics of women doing different types of atypical work for each strata⁷.

The logistic regression model refers to the probability of a woman working in Pisa to be an atypical worker. The estimates capture the association between personal characteristics and the likelihood of working in a specific type of non standard work as opposed to permanent full-time work.

Referring to the general model, the equation is:

$$\text{logit}(p) = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \dots + \beta_kx_k = X\beta \quad (1)$$

Where (1) refers to multiple explanatory variables and the above expression can be revised to (2).

$$\text{logit}(p) = \ln \left(\frac{p}{1-p} \right) \quad (2)$$

Then when this is used in the equation relating the logged odds of a success to the values of the predictors, the linear regression will be a multiple regression with m explanators; the parameters β_j for all $j = 0, 1, 2, \dots, m$ are all estimated here.

The formula illustrates that the probability that the dependent variable equalling a case is equal to the value of the logistic function of the linear regression expression. The regression model is here specified for a woman working in Pisa in the period 2008-2013. The binary dependent variable is a *dummy* that takes the value 0 (typical) or 1 (atypical) to indicate the absence or presence of some categorical effects chosen to define a worker. The dataset refers to 425.195 communications of job placements of women in Pisa from 2008 to 2013.

The following variables were included as explanatory variables: age; ethnic group; educational level; structural breaks: (2008-2010) and (2011-13).

$$\Pr (Y_a = 1/X_s, X_i, X_c, X_e, X_p) = F (\beta_0, \beta_1 X_s, \beta_2 X_i, \beta_3 X_c, \beta_4 X_e, \beta_5 X_p) \quad (3)$$

where:

Y_a = atypical worker (temporary, fixed term job, part-time job,);

X_i = level of educational attainment (elementary/middle school, secondary school, university degree)

X_c = citizenship (Italian/foreign)

⁷ Although we will point out at extended models results, for the sake of brevity we shall not discuss them at length here (please see tables 18,19, 21, 22, 23, 24 and 25 in the 'Figures and Tables' Section).

X_e = age (15-30, 31-45, 46+)

X_p = working period (2008-10, 2011-13)⁸

The model (3) is then stratified on industry or business activities⁹, on different aged groups of women and on different levels of education. The microdata employed were collected by Centro Direzionale per l'Impiego, the office district of the Public Employment Services (P.E.S.) based in Pisa. They refer to communication flows of women employed from 2008 to 2013 in the province of Pisa¹⁰.

The χ^2 test is used to determine whether there is a significant relationship between two categorical variables. The test has produced significant relationships for the variables considered¹¹. The regression coefficients are usually estimated using maximum likelihood estimation, but estimation of the coefficient is easier if we refer to odds ratio (OR). Therefore the estimates are expressed in term of OR. Given that the logit ranges between negative infinity and positive infinity, it provides an adequate criterion upon which to conduct linear regression and the logit is easily converted back into the odds¹².

The descriptive results of the univariate analysis, the bivariate analysis and the multivariate analysis are set out in figures 3,4 and 5. Figure 3 shows that 90,06% of women had atypical contracts from 2008 to 2013, which means that 382.930 communications of job placements of women in Pisa are non standard contracts, whereas 42.265 (9,94%) are referred to full-time, open ended contracts¹³.

[Table 3]

⁸ The temporary dimension is here introduced in the explanatory variables as “a process” that affects the probability of the events typical and atypical. During the period considered, the risk may increase or decrease depending on structural breaks. Temporal explanatory variables are usually introduced in particular logistic regression models, such as discrete-time event history analysis, where the binary dependent variable depends on time.

⁹ The economic activities are classified according to ATECO 2007. Starting from 1st January 2008 Istat has adopted the new Ateco 2007 classification of economic activities, which is the national version of Nace Rev. 2, the European nomenclature adopted with Regulation (EC) no.1893/2006 of the European Parliament and of the Council of 20th December 2006. The migration of economic statistics to the new classification follows a shared plan set out at the European level which will see data expressed in the two separate classifications used conjointly for a number of years to come. The present analysis uses a joint reconstruction of the ATECO economic activities: C) Manufacturing; G) Business; (I+J+K+L): Services (publishing industry and telecommunications//finance and insurance companies/hotels and tourism/ real estate industry; M) Professional, scientific and technical activities.

¹⁰ The numbers of records collected are influenced by the data collection strategy, the type of *variable*, the *accuracy* required. The total observations in the dataset are 425.195; the variable “citizenship” has 2.002 missing values (0,5%); there are no missing values for the variable “level of education”; for the variable “age” there were 1.031 missing values and 75.666 (12,8%), which have been excluded being the age under 15 and above 65.

¹¹ Significant level equals to 0,05.

¹² The odds of the dependent variable equalling a case is equivalent to the exponential function of the linear regression expression. This illustrates how the logit serves as a link function between the probability and the linear regression expression.

¹³ The panel is composed by 425.195 communications of job placements contracts, of which:

- total open ended : 104.510 (24,6%)
- total *part-time*: 157.870 (37,1%)
- open ended and *part-time part-time*: 62.245 (14,6%).

Figure 4 highlights that women aged 31-45 years are more likely to be working in a casual job, although flexibility is associated to all groups of age. This may be interpreted as a gendered effect of the economic crisis.

[Table 4]

Figure 5 shows that the majority of atypical women hold a high school diploma (34,62%) and secondary school certification (30,90%), the 30,90% an elementary or secondary school certification and only 16,44% a degree.

[Table 5]

Turning to citizenship, approximately 8 in ten employees (81,20%) who were working in non standard jobs in from 2008 to 2013 were Italian, whereas 2 (18,75) were foreigners¹⁴.

[Table 6]

Under different assumptions regarding the presence of a *structural break* occurring in the periods (2008-10) and (2011-13), a decrease of job placements flows may be pointed out (-14,28% from 2011 to 2012).

[Table 7]

Turning to bivariate analysis, the majority of women aged from 31 to 45 years work in non-standard employment (39,94%). Since the P-value (0.0001) is less than the significance level (0.05), we cannot accept the null hypothesis. Thus, we conclude that there is a relationship between age and type of employment¹⁵.

[Table 8]

[Table 9]

¹⁴ 0,05% are missing values.

¹⁵ If the sample findings are unlikely, given the null hypothesis, we reject the null hypothesis. Typically, this involves comparing the P-value to the significance level, and rejecting the null hypothesis when the P-value is less than the significance level

Table 10 highlights that the majority of women working in atypical jobs holds a high school diploma (42,45%), 37,60% an elementary or high school certificate, whereas only 19,95% has a degree. The chi-squared test allows us to reject the null hypothesis, therefore there is a relationship between the educational level and type of employment (Table 11).

[Table 10]

[Table 11]

Citizenship is positively associated to atypical employment since the P-value is less than (0.0001). Table 10 points out that 89,65% of Italian women employed in Pisa from 2008 to 2013 were in non standard jobs whereas 10,35% had permanent full-time contracts; 91.83% of foreign women employed in Pisa from 2008 to 2013 were in non standard jobs whereas only 18,17% had permanent full-time contracts. The 19,13% of atypical contracts refer to foreign women, whereas 89,87% of atypical employment is referred to Italian women.

[Table 12]

[Table 13]

During the second phase of the economic crises, non standard jobs increased (90,99%), as they were 89,26% if we consider the first break. On the contrary, standard contracts were 10,74% in the first period whereas 9,01% in the second one.

[Table 14]

[Table 15]

We shall now turn to multivariate analysis to investigate the relationship of atypical status with the specified variables. We have run a multivariate analysis including the variables identified in model (1) which were significant at the univariate level. Note that we have looked for variables that have statistical significance using p-values and 95% confidence intervals. The full results of the logistic regressions are set out in tables 16 and 17. Having introduced a tractable way for estimating the

possible effects of economic crisis by measuring the impact of an increase in atypical employment risk on time-use patterns, we have found that there is a higher probability of being atypical (26%) during the second phase of the crisis (OR = 1,26). Furthermore, there is a strong positive relationships between working on a temporary basis and young age (15-30). A young woman has a higher risk of becoming atypical. Degree qualifications are a significant predictor of working in a fixed-term job. The adjusted OR values show the increased risk attributable to one risk factor, all other factors held constant¹⁶. When the other factors are controlled for, the probability of a foreign woman to be in a temporary job turns from 30% to 62%. The adjusted values returned higher risks of being atypical for all the considered variables, as shown in Table 17.

3 Conclusions

The results of the regression analysis show the characteristics that are positively and significantly associated with working in an atypical job. If we choose an over 45 Italian woman employed from 2008 to 2010, holding a university degree, having no qualifications and working in Pisa as a reference, we are now able to quantify the predictive risk be employed with an atypical contract rather than a full-time, permanent one. In a multivariate analysis of factors influencing the probability of working in a non standard job, life-cycle stage (being at the start or end of the working age range) and other demographic characteristics such as citizenship, together with educational attainment were identified as the characteristics most strongly associated with a higher likelihood of atypical employment. During the second phase of the economic recession, the risk of being atypical has increased by 26%, as more of women were in precarious jobs. The risk for younger women aged 15 to 30 is 20% higher if compared to an over 45 and having attained a lower level of education (high school) results in having a 10% risk higher than a graduate. Citizenship represents a risk factor; in fact being a foreigner means having a higher probability (62%) of being in atypical jobs. The results obviously may change if we consider different economic sectors or activities. Referring to the results of the model stratified on economic activities, if we choose the service sector, which is statistically more feminised¹⁷, tertiary educated employees have a higher rate of employment in fixed-term jobs than those with lower levels of education. Employees with low levels of educational attainment (elementary/secondary school) are more likely to be employed

¹⁶ To interpret the adjusted OR values for each statistically significant variable, we should remind that if it close to 1 there is no association between the outcome variable and the independent variable, if it is grater than 1 there is a positive association, whereas if it is less than 1, there is a negative association. To sum up:

- OR=1 Exposure does not affect odds of outcome (“being atypical”)
- OR>1 Exposure is associated with higher odds of outcome (“being atypical”)
- OR<1 Exposure is associated with lower odds of outcome (“being atypical”)

¹⁷ The Service sector TFT = $(f_i/t_i) * 100$ equals 83%.

in casual or temporary jobs (78%). Young women aged between 15 and 30 have a risk 30% higher than over 45. Youth employees have the highest rate of non standard contracts. Age, education attainment and citizenship are critical risk factors commonly associated with dual economies. Workers hired on atypical contracts tend to be penalized in terms of social security and welfare protection compared to workers hired on a permanent basis. As a result, the placement of atypical contracts side by side with the unchanged rigid permanent contract has created a dual labour market of insiders and outsiders, who are currently secluded in the local economy. This evidence prove that, although atypical employment may have brought an increase in the employment rate, not only women have remained “clustered” in precarious jobs and economic activities during the economic crisis, but risk factors of being in atypical jobs have increased. Our finding support the argument that economic crisis reinforce the pre-existing inequalities in terms of employment segregation, discrimination and social benefits. This seems to suggest that more reforms need to be implemented to ameliorate the current situation.

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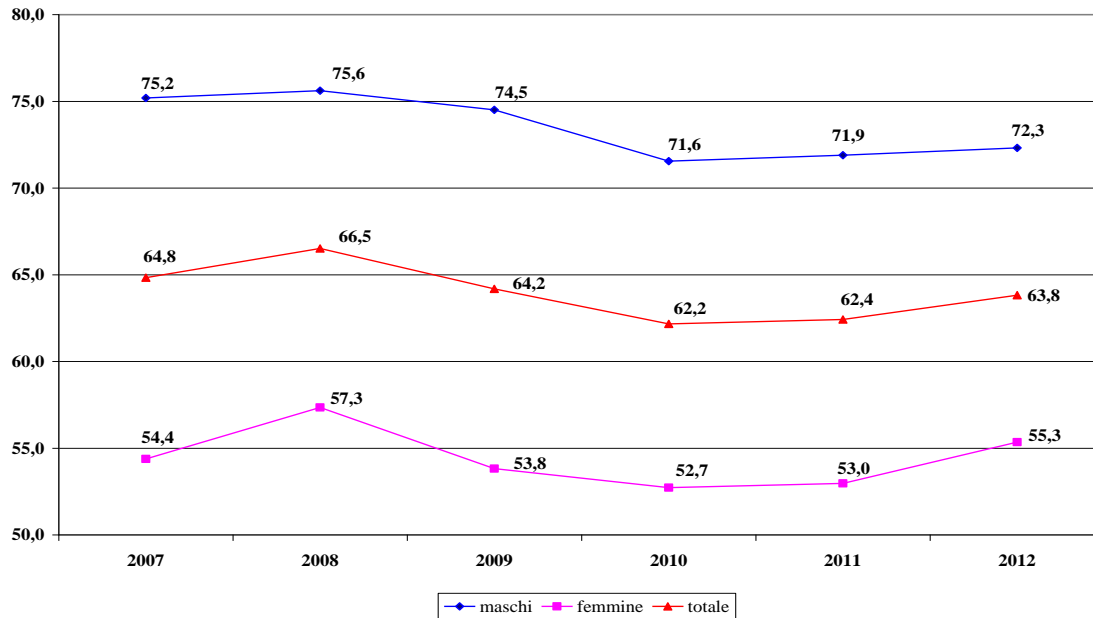
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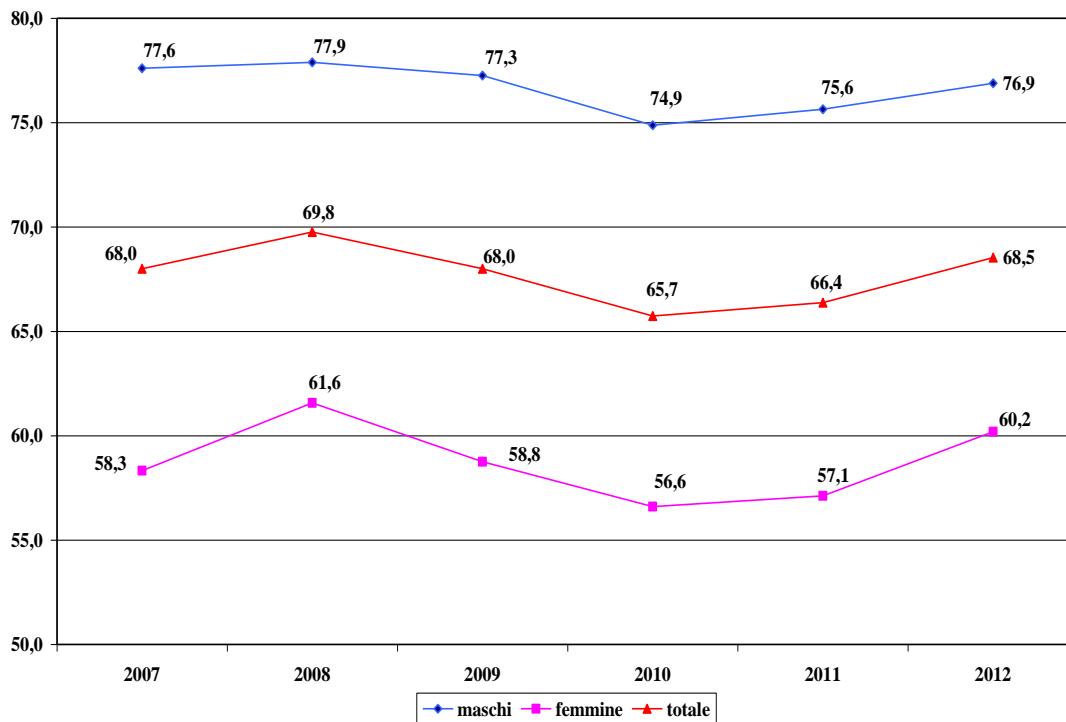
5 Tables and Figures

Figure 1: Employment rate by gender, Province of Pisa (2007-2012)



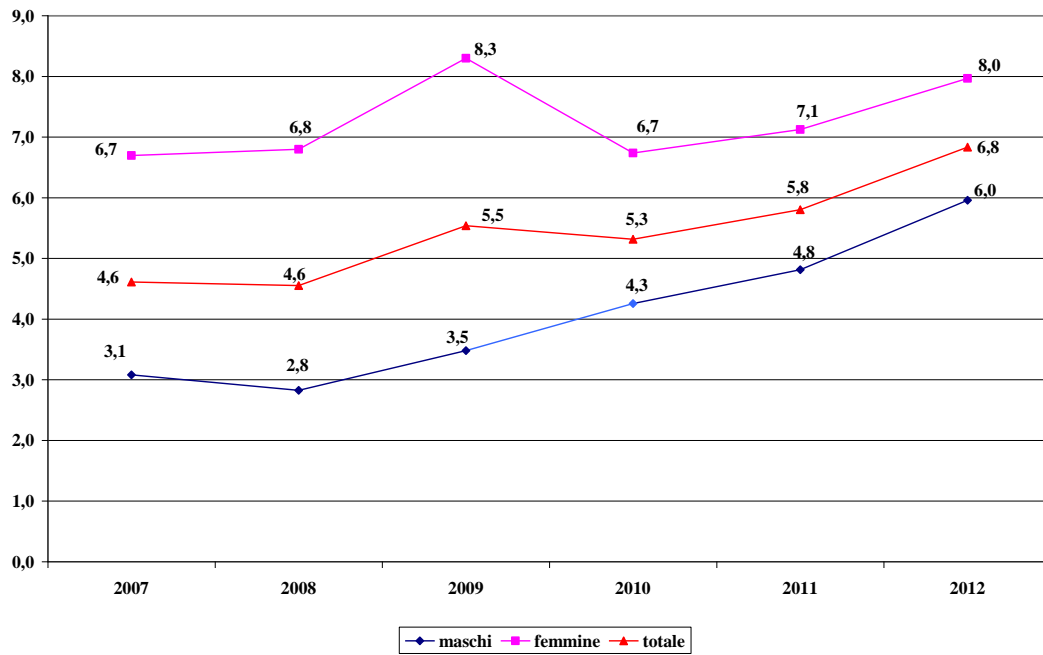
Source: Own Elaborations on Labour Force Survey (www.istat.it)

Figure 2: Activity rate by gender, Province of Pisa (2007-2012)



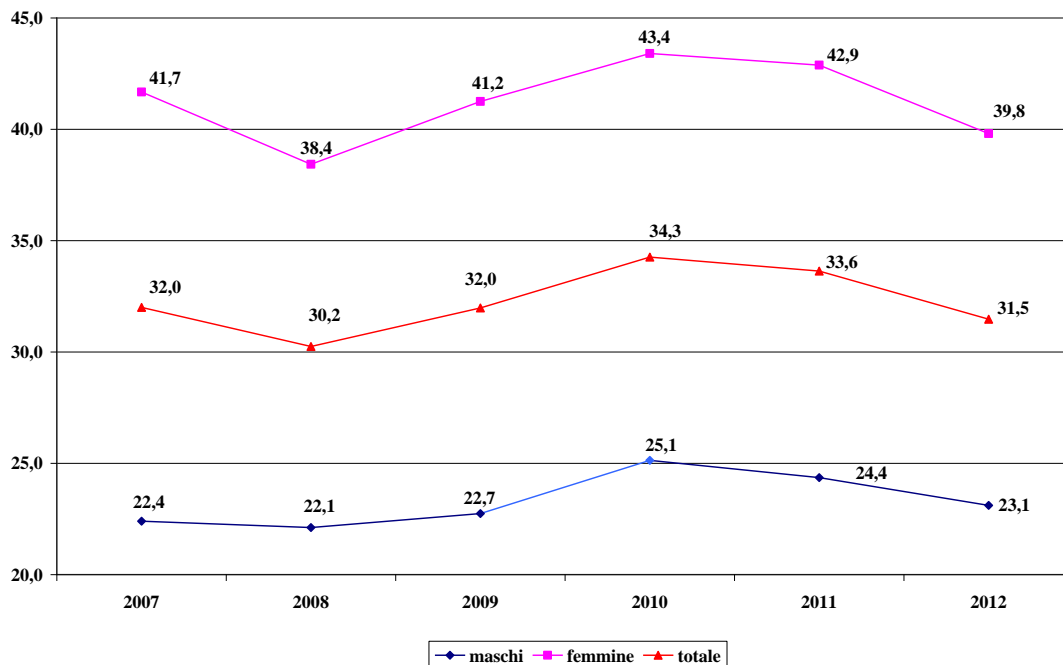
Source: Own Elaborations on Labour Force Survey (www.istat.it)

Figure 3: Unemployment rate by gender, Province of Pisa (2007-2012)



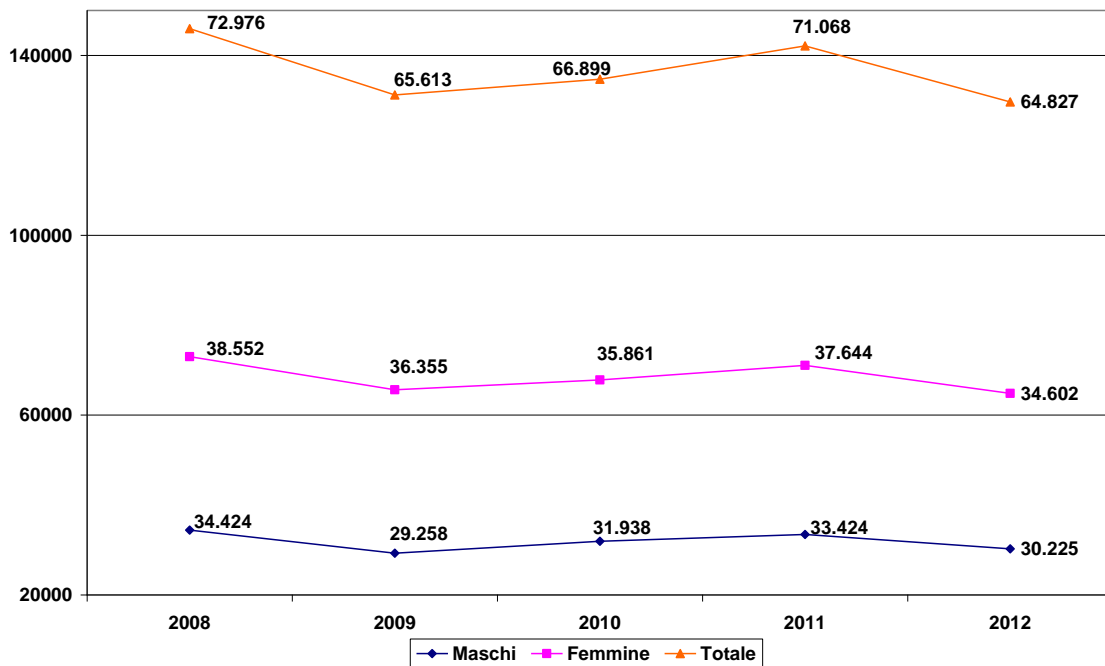
Source: Own Elaborations on Labour Force Survey (www.istat.it)

Figure 4: Inactivity rate by gender, Province of Pisa (2007-2012)



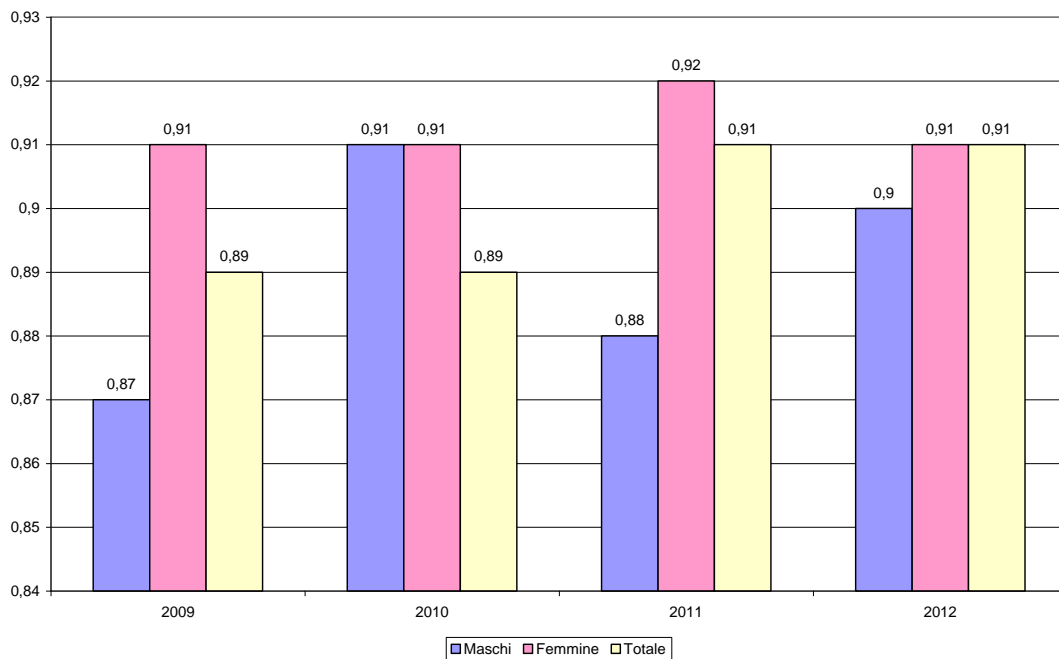
Source: Own Elaborations on Labour Force Survey (www.istat.it)

Figure 5: Atypical employment – Communication flows of job placements, Province of Pisa (2007-2012)



Source: Own Elaborations on SIL data (Osservatorio Regionale Mercato del lavoro)

Figure 6: Incidence of Atypical Employment by gender, Province of Pisa (2009-2012)



Source: Own Elaborations on SIL data (Osservatorio Regionale Mercato del lavoro)

Table 1: Classification of “atypical employment” (ISTAT)*

(sample data)

Job stability	Working time regime	Social Rights entitlements (**)	Reduced Employee	Self-employed		
Permanent	Full-time	Full Employee				
		<ul style="list-style-type: none"> - Interinale (<i>Agency contracts</i>) - Contratti di somministrazione (<i>Staff-leasing</i>) - Lavoro a domicilio (<i>Homeworking</i>) - Telelavoro (<i>Teleworking</i>) 				
	Part-time		<ul style="list-style-type: none"> - Interinale (<i>Agency contracts</i>) - Contratti di solidarietà esterna (<i>Jobs-creation agreements – short time work schemes</i>) - Contratti di somministrazione (<i>Staff-leasing</i>) - Lavoro intermittente (<i>Job on call</i>) - Job sharing - Part-time a tempo indeterminato (<i>Open-ended part-time</i>) - Lavoro a domicilio (<i>Homeworking</i>) - Telelavoro (<i>Teleworking</i>) 			
		Full-time	<ul style="list-style-type: none"> - Interinale (<i>Agency contracts</i>) - Contratto di formazione e lavoro (<i>Youth work-and-training contract</i>) - Contratto a tempo determinato (<i>Fixed term contract</i>) - Contratti di somministrazione (<i>staff-leasing</i>) - Lavoro a domicilio temporaneo (<i>temporary teleworking</i>) - Lavoro stagionale (<i>Seasonal working</i>) - Telelavoro a termine (<i>Temporary teleworking</i>) 	<ul style="list-style-type: none"> - Stage (<i>Traineeship</i>) - Contratto di inserimento (<i>Work insertion contract</i>) - Tirocinio estivo di orientamento (<i>Summer paid training contract</i>) - Apprendistato (<i>Apprenticeship</i>) 	<ul style="list-style-type: none"> - Collaborazione coordinata e continuativa (<i>Co-ordinated, long term free-lance contracts</i>) - Collaborazione occasionale (<i>Occasional collaboration</i>) - Associati in partecipazione (<i>Association “en participation”</i>) - Lavoro a progetto (<i>Project contract of employment</i>) 	
			Part-time	<ul style="list-style-type: none"> - Interinale (<i>Agency contracts</i>) - Contratto di formazione e lavoro (<i>Youth work-and-training contract</i>) - Lavoro intermittente (<i>job on call</i>) - Contratti di somministrazione (<i>staff leasing</i>) - Contratto a tempo determinato (<i>Fixed term contract</i>) - Job sharing - Lavoro a domicilio (<i>teleworking</i>) - Lavoro stagionale (<i>seasonal working</i>) - Telelavoro (<i>teleworking</i>) 	<ul style="list-style-type: none"> - Stage (<i>Traineeship</i>) - Tirocinio estivo di orientamento (<i>Summer paid training contract</i>) - Lavori socialmente utili (<i>Socially useful projects</i>) - Lavori di pubblica utilità (<i>Public utility projects</i>) - Contratto di inserimento (<i>Contract of insertion</i>) - Piani di inserimento professionale (<i>Training vocational contracts</i>) - Apprendistato (<i>Apprenticeship</i>) 	<ul style="list-style-type: none"> - Collaborazione coordinata e continuativa (<i>Co-ordinated, long term free-lance contracts</i>) - Collaborazione occasionale (<i>Occasional collaboration</i>) - Associati in partecipazione (<i>Association “en participation”</i>) - Lavoro a progetto (<i>Project contract of employment</i>) - Prestazioni accessorie (<i>Secondary jobs</i>)
				Part-time		
Temporary	Part-time					

Source: Tronti L. e Ceccato F. (2005)

* Based on the Italian Fixed Term Employees Regulation (2004), partially atypical contracts are in blue

**Only Social Security rights

Table 2: Classification of “atypical employment” (IDOL)

(administrative data)

Categories of atypical employment	Sub-categories of atypical employment	
1. Apprenticeship	1.1 Apprendistato professionalizzante 1.2 <i>Apprendistato per il diritto-dovere di istruzione e formazione</i> 1.3 Apprendistato per l’acquisizione di diploma o per percorsi di alta formazione 1.4 Apprendistato ex art. 16 L. 196/97 1.5 Contratti di inserimento lavorativo 1.6 Contratto di formazione e lavoro	Dependent contracts: Apprenticeship, fixed-term contracts, training vocational contracts as CFL (Youth work-and-training contracts), apprenticeship and work insertion contracts (contratti di inserimento)
2. Fixed term employment	2.1 Lavoro a tempo determinato 2.2 Lavoro dipendente nella P.A. a tempo determinato 2.3 Lavoro ripartito a tempo determinato 2.4 Lavoro a domicilio a tempo determinato 2.5 Lavoro nello spettacolo a tempo determinato 2.6 Lavoro marittimo a tempo determinato 2.7 Lavoro a tempo determinato per sostituzione 2.8 Lavoro in agricoltura a tempo determinato	
3. Temporary agency work	3.1 Lavoro interinale (o di somministrazione) a tempo determinato 3.2 Lavoro interinale (o di somministrazione) a tempo indeterminato	Other dependent contracts: agency contracts, job on call, job sharing, short-term labour administration contracts, accessory job
4. Job on call	4.1 Lavoro intermittente a tempo determinato 4.2 Lavoro intermittente a tempo indeterminato	
5. Domestic work	5.1 Lavoro domestico a tempo determinato 5.2 Lavoro domestico a tempo indeterminato	
6 Self employed/semi-or quasi-self-employed	6.1 Collaborazione occasionale 6.2 Collaborazione coordinata continuativa 6.3 Associazione in partecipazione a tempo determinato 6.4 Associazione in partecipazione a tempo indeterminato 6.5 Lavoro autonomo nello spettacolo 6.6 Contratto di agenzia a tempo determinato 6.7 Contratto di agenzia a tempo indeterminato	Self –employed: Co-ordinated, long term free-lance contracts/ Project contracts of employment (COCOCO/ COCOPRO), occasional collaboration

Table 3: Frequency distribution of female atypical employment in Pisa by types of contract (2008-2013)

Frequency distribution for Atipycal				
Atypical	Frequency	Percentage	Cumulative frequency	Cumulative percentage
No	42.265	9.94	42.265	9.94
Si	382.930	90.06	425.195	100.00

Source: Own Elaborations on IDOL data

Table 4: Frequency distribution of female atypical employment in Pisa by age (2008-2013)

Frequency distribution for Atipycal				
Age	Frequency	Percentage	Cumulative frequency	Cumulative percentage
15-30	160.417	37.73	160.417	37.73
31-45	187.432	44.08	347.849	81.81
46+	75.344	17.72	423.193	99.53
missing	2.002	0.47	425.195	100.00

Source: Own Elaborations on IDOL data

Table 5: Frequency distribution of female employment in Pisa by education level (2009- 2013)

Education	Frequency distribution for Atypical			Cumulative percentage
	Frequency	Percentage	Cumulative frequency	
Elementary - Secondary School	131.390	30.90	131.390	30.90
High School	147.187	34.62	348.498	81.96
University degree	69.921	16.44	201.311	47.35
missing	76.697	18.04	425.195	100.00

Source: Own Elaborations on IDOL data

Table 6: Frequency distribution of female employment in Pisa by age and citizenship (2009- 2013)

Citizenship	Frequency distribution for Atypical			Cumulative percentage
	Frequency	Percentage	Cumulative frequency	
Italian	345.259	81.20	345.259	81.20
Foreigner	79.724	18.75	424.983	99.95
missing	212	0.05	425.195	100

Source: Own Elaborations on IDOL data

Table 7: Frequency distribution of female employment in Pisa by working period (2009- 2013)

Working period	Frequency distribution for Atypical			Cumulative percentage
	Frequency	Percentage	Cumulative frequency	
2008-10	228.952	53.85	228.952	53.85
2011-13	196.243	46.15	425.195	100.00

Source: Own Elaborations on IDOL data

Table 8: Frequency distribution of female employment in Pisa by age and type of employment (2009- 2013)

Frequency Percentage Row Pct Column Pct	Atypical	Employment by age			Total
		Age	15-30	31-45	
	No	15.298	18.424	8.419	42.141
		3.61	4.35	1.99	9.96
		36.30	43.72	19.98	
		9.54	9.83	11.17	
	Yes	145.119	169.008	66.925	381.052
		34.29	39.94	15.81	90.04
		38.08	44.35	17.56	
		90.46	90.17	88.83	
	Total	160.417	187.432	75.344	423.193
		37.91	44.29	17.80	100.00

Source: Own Elaborations on IDOL data

Table 9: Chi-squared results by age and type of employment*

Statistics	DF	Value	Prob
Chi-squared	2	159.5114	<.0001

* Sample size = 423.193

Table 10: Frequency distribution of female employment in Pisa by level of education and type of employment (2009- 2013)

Frequency Percentage Row Pct Column Pct	Atypical	Employment by level of education			Total
		Level of Education	Elementary/ Secondary school	High School	
	No	14.009	14.671	7.624	36304
		4.02	4.21	2.19	10.42
		38.59	40.41	21.00	
		10.66	9.97	10.90	
	Yes	117.381	132.516	62.297	312.194
		33.68	38.02	17.88	89.58
		37.60	42.45	19.95	
		89.34	90.03	89.10	
	Total	131.390	147.187	69.921	348.498
		37.70	42.23	20.06	100.00

Source: Own Elaborations on IDOL data

Table 11: Chi-squared results by age and type of employment*

	DF	Value	Prob
Chi-squared	2	58.0667	<.0001

* Sample size = 423.193

Table 12: Frequency distribution of female employment in Pisa by citizenship and type of employment (2009- 2013)

Frequency Percentage Row Pct Column Pct	Atypical	Employment by citizenship		Total
		Foreign	Italian	
	No	6.514	35.732	42.246
		1.53	8.41	9.94
		15.42	84.58	
		8.17	10.35	
	Yes	73.210	309.527	382.737
		17.23	72.83	90.06
		19.13	80.87	
		91.83	89.65	
	Total	79.724	345.259	424.983
		18.76	81.24	100.00

Source: Own Elaborations on IDOL data

Table 13: Chi-squared results by citizenship and type of employment*

	DF	Value	Prob
Statistics			
Chi-squared	1	343.3933	<.0001

* Sample size = 423.193

Table 14: Frequency distribution of female employment in Pisa by working period and type of employment (2009- 2013)

Frequency Percentage Row Pct Column Pct	Atypical	Employment by working period		
		2011-13	2008-10	Total
	No	17.683	24.582	42.265
		4.16	5.78	9.94
		41.84	58.16	
		9.01	10.74	
	Yes	178.560	204.370	382.930
		41.99	48.07	90.06
		46.63	53.37	
		90.99	89.26	
	Total	196.243	228.952	425.195
		46.15	53.85	100.00

Source: Own Elaborations on IDOL data

Table 15: Chi-squared results by citizenship and working period*

Statistics	DF	Value	Prob
Chi-squared	1	351.6402	<.0001

* Sample size = 423.193

Table 16: Logistic regression estimates expressed by OR values*

Variable	Level	Odds Ratio	Pvalue	IC 95%	
				Inf.	Sup.
Period	2011-13	1.26	<.0001	1.23	1.29
	2008-10	1	.	1	1
Education	Elementary- Secondary	1.00	0.8789	0.97	1.03
	High School	1.10	<.0001	1.07	1.13
	Degree	1	.	1	1
Age	15-30	1.18	<.0001	1.15	1.22
	31-45	1.16	<.0001	1.12	1.20
	46+	1	.	1	1
Citizenship	Foreign	1.62	<.0001	1.56	1.70
	Italian	1	.	1	1

*Dependent variable: Atypical employment

Explicative variables: Working period, Age, Educational level, Citizenship

Table 17: Logistic regression estimates expressed by simple and adjusted OR values*

Variable	Level	Simple OR		Adjusted OR	
		OR	IC 95%	OR	IC 95%
Period	2011-13	1,21	1.19 - 1.24	1,26	1.23 - 1.29
	2008-10	1	.	1	.
Education	Elementary-Secundary	1,03	1.00 - 1.06	1,00	0.97 - 1.03
	High School	1,11	1.07 - 1.14	1,10	1.07 - 1.13
	Degree	1	.	1	.
Age	15-30	1,19	1.16 - 1.23	1,18	1.15 - 1.22
	31-45	1,15	1.12 - 1.19	1,16	1.12 - 1.20
	46+	1	.	1	.
Citizenship	Foreign	1,30	1.26 - 1.33	1,62	1.56 - 1.70
	Italian	1	.	1	.

***Dependent variable: Atypical employment**
Explicative variables: Working period, Age, Educational level, Citizenship

Table 18: Results of Logistic regression stratified on economic activity expressed by adjusted OR values - (Business)

Variable	Level	Odds Ratio	Pvalue	IC 95%	
				Inf.	Sup.
Period	2011-13	1.18	<.0001	1.10	1.26
	2008-10	1	.	1	1
Education	Elementary-Secundary	0.90	0.0982	0.79	1.02
	High School	0.68	<.0001	0.60	0.77
	Degree	1	.	1	1
Age	15-30	1.68	<.0001	1.51	1.87
	31-45	1.53	<.0001	1.38	1.71
	46+	1	.	1	1
Citizenship	Foreign	0.93	0.3519	0.80	1.08
	Italian	1	.	1	1

Table 19: Results of Logistic regression stratified on economic activity expressed by adjusted OR values - (Manufacturing)

Variable	Level	Odds Ratio	Pvalue	IC 95%	
				Inf.	Sup.
Period	2011-13	1.28	<.0001	1.22	1.34
	2008-10	1	.	1	1
Education	Elementary-Secundary	1.12	0.0173	1.02	1.24
	High School	1.46	<.0001	1.33	1.62
	Degree	1	.	1	1
Age	15-30	1.17	<.0001	1.10	1.25
	31-45	1.26	<.0001	1.19	1.34
	46+	1	.	1	1
Citizenship	Foreign	1.88	<.0001	1.72	2.06
	Italian	1	.	1	1

Table 20: Results of Logistic regression stratified on economic activity expressed by adjusted OR values - (Services)

Variable	Level	Odds Ratio	Pvalue	IC 95%	
				Inf.	Sup.
Period	2011-13	0.83	<.0001	0.78	0.87
	2008-10	1	.	1	1
Education	Elementary-Secondary	1.78	<.0001	1.62	1.97
	High School	1.44	<.0001	1.31	1.58
Age	Degree	1	.	1	1
	15-30	1.33	<.0001	1.23	1.45
	31-45	1.10	0.0211	1.01	1.20
Citizenship	46+	1	.	1	1
	Foreign	1.55	<.0001	1.43	1.69
	Italian	1	.	1	1

Table 21: Results of Logistic regression stratified on economic activity expressed by adjusted OR values - (Services)

Variable	Level	Odds Ratio	Pvalue	IC 95%	
				Inf.	Sup.
Period	2011-13	1.26	<.0001	1.14	1.39
	2008-10	1	.	1	1
Education	Elementary-Secondary	2.17	<.0001	1.89	2.49
	High School	0.99	0.7779	0.89	1.09
Age	Degree	1	.	1	1
	15-30	1.29	0.0003	1.12	1.48
	31-45	1.13	0.0737	0.99	1.30
Citizenship	46+	1	.	1	1
	Foreign	1.56	0.0003	1.23	1.97
	Italian	1	.	1	1

Table 22: Results of Logistic regression stratified on education expressed by adjusted OR values – (Elementary/ Secondary School)

Variable	Level	Odds Ratio	Pvalue	IC 95%	
				Inf.	Sup.
Period	2011-13	1.16	<.0001	1.12	1.20
	2008-10	1	.	1	1
Age	15-30	1.11	<.0001	1.06	1.16
	31-45	1.15	<.0001	1.10	1.20
	46+	1	.	1	1
Citizenship	Foreign	1.47	<.0001	1.39	1.55
	Italian	1	.	1	1

Table 23: Results of Logistic regression stratified on education expressed by adjusted OR values – (High School)

Variable	Level	Odds Ratio	Pvalue	IC 95%	
				Inf.	Sup.
Period	2011-13	1.25	<.0001	1.20	1.29
	2008-10	1	.	1	1
Age	15-30	1.10	0.0009	1.04	1.16
	31-45	1.06	0.0271	1.01	1.12
	46+	1	.	1	1
Citizenship	Foreign	2.07	<.0001	1.89	2.26
	Italian	1	.	1	1

Table 24: Results of Logistic regression stratified on education expressed by adjusted OR values – (Degree)

Variable	Level	Odds Ratio	Pvalue	IC 95%	
				Inf.	Sup.
Period	2011-13	1.52	<.0001	1.44	1.59
	2008-10	1	.	1	1
Age	15-30	1.70	<.0001	1.57	1.84
	31-45	1.54	<.0001	1.42	1.65
	46+	1	.	1	1
Citizenship	Foreign	1.83	<.0001	1.60	2.10
	Italian	1	.	1	1

Table 25: Results of Logistic regression stratified on age expressed by adjusted OR values

Variable	Level	15-30		31-45		46+	
		OR	IC 95%	OR	IC 95%	OR	IC 95%
Period	2011-13	1,01	0.98-1.05	1,47	1.42-1.52	1,39	1.32-1.47
	2008-10	1	.	1	.	1	.
Education	Elementary/Secondary School	0,87	0.83-0.92	1,03	0.99-1.08	1,35	1.26-1.46
	High School	1,01	0.96-1.06	1,08	1.03-1.12	1,54	1.42-1.68
	Degree	1	.	1	.	1	.
Citizenship	Foreign	1,86	1.74-1.98	1,42	1.34-1.51	1,83	1.61-2.08
	Italian	1	.	1	.	1	.

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