# Gender Unemployment Catching-up: Empirical Evidence from Italian Regions

Marianna Belloc
Riccardo Tilli

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## Abstract

We study the persistence of the gender unemployment gap in the Italian regions in the 1992-2009 period. Results from unit-root tests analysis with structural break suggest that the process of gender catching-up in the unemployment rates is occurring in most of the regions but at different pace. Our findings indicate that there is substantial cross-region heterogeneity and the resulting picture does not match with that of a Center-North and South-and-Islands dichotomy in the Italian labour markets.

JEL-Code: C22, J16, J60.

Keywords: gender unemployment gap, regional disparities, unit-root tests with structural break.

*Marianna Belloc*
*Department of Economics and Law*
*Sapienza University of Rome*
*Via del Castro Laurenziano 9*
*Italy – 00161 Rome*
*marianna.belloc@uniroma1.it*

*Riccardo Tilli*
*Department of Economics and Law*
*Sapienza University of Rome*
*Via del Castro Laurenziano 9*
*Italy – 00161 Rome*
*riccardo.tilli@uniroma1.it*

# 1.    Introduction

Narrowing the gender unemployment gap in European countries is one of the goals of the European Union policy agenda. While significant progress has been made in this direction as shown by a recent strand of the labour economics literature (see below), substantial cross-country variation still characterizes the national dynamics among both old (e.g. Queneau and Sen, 2007) and new European Union member states (e.g. Bičǎkovà, 2010). Given that diversity in economic performance in general, and in the labour market outcomes in particular, has recently revealed to be very persistent also across regions within the same nation (Eurostat, 2009), one may expect cross-region variation in the unemployment gap dynamics to be important as well. This short paper looks at the Italian labour markets from this perspective and, to the best of our knowledge, is the first to empirically investigate the persistence of the gender unemployment gap by region. Our study covers nineteen Italian regions (excluding Valle d'Aosta) in the 1992-2009 period. Despite the conventional wisdom that suggests a considerable disparity between the better-performing Center-North and the backward South-and-Islands of Italy (the so-called Mezzogiorno), the picture our results hint at is multifaceted and does not match with that of a perfect Center-North and South-and-Islands dichotomy (e.g. Brunello, Lupi and Ordine, 2000). In particular, our findings indicate that catching up in the male and female unemployment rates is occurring faster in some regions like Veneto, Trentino Alto Adige and Sardegna, than in others like Calabria, Puglia and Toscana.

Most of the empirical contributions on the gender unemployment gap existing in the literature focus on the US labour market. Among the others, we refer the reader to Niemi (1974), DeBoer and Seeborg (1989), Johnson (1983), Fosu (2000). More recently, Queneau and Sen (2009a) empirically investigate both gender and race US unemployment gaps and find that, while the race unemployment gap is still persistent, female and male unemployment

rates have substantially converged over the last two decades. Queneau and Sen (2007, 2010) also study the gender unemployment gap in a sample of eight OECD countries and find mixed results that, however, point to convergence between male and female unemployment rates in most of the countries. Some other studies consider OECD and European countries. Yet, with the only exception of Azmat, Guell and Manning (2006) (OECD) and Koutentakis (2010) (Belgium, France, Greece, Italy, Portugal, Spain), they inspect the separate dynamics of female and male unemployment rates. Queneau and Sen (2008), considering a sample of eight OECD countries, show that, in most cases, men's and women's unemployment series exhibit low persistence. The authors in a more recent contribution (Queneau and Sen, 2009b) extend their previous analysis to a larger group of OECD economies and conclude that female unemployment tends to be more persistent than male one.

Finally Lanzafame (2009), using panel unit root tests, explores the nature of Italian unemployment by region testing the hypothesis of hysteresis versus that of linear or non-linear stationarity. His results, unlike conclusions reached by Brunello, Lupi and Ordine (2001), reject the hypothesis of pure hysteresis, supporting the idea that regional unemployment is a non-linear stationary process.

The reminder of this paper is organized as follows. Section 2 describes the data and briefly sketches the methodology, section 3 discusses results and section 4 draws concluding remarks.

## 2.    Data and methodology

We use quarterly data of the Italian unemployment rates by gender, obtained by the National Institute of Statistics (www.istat.it) over the sample period 1992/Q4-2009/Q3[1] and including

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[1] Longer time series, starting from 1977/Q1, were available. Yet, given that an important revision in the survey methodology and definitions used by ISTAT has been implemented in 1992, we have chosen to adopt a break-free sample period.

nineteen regions:[2] (the Center-North, and namely) Piemonte, Lombardia, Trentino Alto Adige, Veneto, Friuli Venezia Giulia, Liguria, Emilia Romagna, Toscana, Umbria, Marche, Lazio, Abruzzo, Molise, (the South-and-Islands, and namely) Campania, Puglia, Basilicata, Calabria, Sicilia and Sardegna.

**Table 1: Summary statistics**

| Region | n. of obs | mean | s.e. | min | max |
|---|---|---|---|---|---|
| Piemonte | 68 | 1.9397 | 0.3879 | 1.0896 | 2.8039 |
| Lombardia | 68 | 1.7667 | 0.2298 | 1.3333 | 2.3846 |
| Trentino Alto Adige | 68 | 2.4969 | 1.0608 | 1.4400 | 7.6736 |
| Veneto | 68 | 2.3912 | 0.4053 | 1.5641 | 4.0625 |
| Friuli Venezia Giulia | 68 | 2.9198 | 0.9064 | 1.0000 | 4.7143 |
| Liguria | 68 | 1.4315 | 0.7055 | 0.6444 | 3.5882 |
| Emilia Romagna | 68 | 2.2033 | 0.6860 | 1.0500 | 4.1667 |
| Toscana | 68 | 3.3148 | 1.3816 | 1.3958 | 9.8750 |
| Umbria | 68 | 1.7860 | 0.7040 | 0.7273 | 3.8947 |
| Marche | 68 | 1.5745 | 0.5678 | 0.6727 | 3.6000 |
| Lazio | 68 | 2.0399 | 0.4319 | 1.3016 | 3.1087 |
| Abruzzo | 68 | 1.5318 | 0.7475 | 0.7016 | 3.7027 |
| Molise | 68 | 1.8879 | 0.4321 | 1.1733 | 3.1087 |
| Campania | 68 | 1.9523 | 0.3140 | 1.2353 | 2.7340 |
| Puglia | 68 | 1.7387 | 0.1685 | 1.4113 | 2.1964 |
| Basilicata | 68 | 1.5786 | 0.4354 | 0.8182 | 2.9444 |
| Calabria | 68 | 1.5536 | 0.2099 | 1.1410 | 2.0930 |
| Sicilia | 68 | 1.6883 | 0.1640 | 1.2358 | 2.1765 |
| Sardegna | 68 | 1.8266 | 0.2673 | 1.1157 | 2.6429 |

We choose to measure the gender unemployment gap by using the ratio ($u_R$) between female and male unemployment rates ($u_F$ and $u_M$, respectively). The reason is that the ratio has been shown by Queneau and Sen (2007, 2009a) to be more suitable, as opposed to the difference

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[2] Data on unemployment by gender are also available for Valle d'Aosta. However, they look unreliable and so this region, that is the smallest of Italy (0.2% of the national population), has been excluded from the sample.

between the two series, for assessing the gender unemployment gap dynamics over time. Table 1 provides summary statistics. As one will notice the mean gender unemployment ratio is above 1 ($u_F > u_M$) in all the regions considered. The highest mean gender unemployment ratios over the sample period are registered in Toscana (3.3148), Fiuli Venezia Giulia (2.9198) and Trentino Alto Adige (2.4969).

In order to gauge the level of persistence in the gender unemployment gaps we perform a unit-root test analysis by region. Given the well-known weakness of the conventional ADF tests that may fail to reject the null hypothesis of a unit-root in the presence of a structural break in the series, we follow Queneau and Sen (2008) and implement Zivot and Andrews (1992) unit-root test that allows for the presence of a simultaneous structural break in the intercept and in the slope of the trend at an unknown point in time. Technically, given the sample period $t=1,2\ldots T$, the null hypothesis is $H_0 : y_t = \mu_0 + y_{t-1} + \varepsilon_t$, against the alternative

$$H_1 : y_t = \mu_0 + \mu_1 DU(\lambda) + \mu_2 t + \mu_3 DT_t(\lambda) + \alpha y_{t-1} + \sum_{j=1}^{k^*} c_j \Delta y_{t-j} + \varepsilon_t, \text{ where } \lambda = T_b / T \text{ is the}$$

break–fraction, $T_b$ is the break-date, while the intercept-break and slope-break dummy variables are defined, respectively, as $DU(\lambda) = 1$ if $t > T\lambda$ ($DU(\lambda) = 0$ otherwise) and $DT(\lambda) = t - T\lambda$ if $t > T\lambda$ ($DT(\lambda) = 0$ otherwise). $\lambda$ is determined by finding the minimum value for the one-sided $t$-statistic for testing $\alpha=1$ (for details see Zivot and Andrews, 1992). The number of lags $k^*$ is chosen by using a general-to-specific $t$-test procedure, that is $k^*$ is selected such that the last included lag in the equation regression is significant at least at the 10% significance level.

Failing to reject the null hypothesis that the series is a unit-root process is equivalent to saying that the gender unemployment gap is persistent, that is random shocks have permanent effects. A rejection of the null hypothesis, on the contrary, suggests that random shocks wield transitory effects on the series that tends to return to its trend path. In the latter case an

investigation of the trend-slope before $(\hat{\mu}_2)$ and after $(\hat{\mu}_2 + \hat{\mu}_3)$ the break provides information on whether the gender unemployment gap is widening, is shrinking or remains stable.

## 3.    Results

Table 2 reports our findings.[3] As one will notice the null hypothesis of unit-root is rejected in thirteen out of nineteen cases at the 1% significance level and in two cases at the 10% level, whereas it is not rejected in the four remaining cases. The group of regions for which the unit-root hypothesis is rejected is characterized by a large degree of heterogeneity. The sign of the after-break slope parameter is negative in all the regions indicating that the gender unemployment gap is decreasing in the most recent period. The degree at which this happens, however, varies from case to case. The (in absolute value) largest slope coefficients are found to be in Trentino Alto Adige (-0.0998), Veneto (-0.1268) and Sardegna (-0.0814). On the other extreme we find Calabria (-0.0061), Puglia (-0.0073) and Toscana (-0.0071) that present the (in absolute value) smallest slope coefficients. The remaining nine regions are placed in the between.

Furthermore, the group of non unit-root regions is heterogeneous as regards the sign of the before-break trend slope. Indeed, five regions, and namely Liguria, Umbria, Marche, Molise and Sardegna, present a negative trend slope both before and after the break. The estimated value of the trend slope is in all cases larger in absolute value after the break than before it. This indicates that the catching up process has started since the beginning of the sample period considered (1992), but has proceeded at a faster pace after the (endogenously selected) break. The remaining ten regions, and namely Piemonte, Trentino Alto Adige,

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[3] Our results are obtained using the econometric software RATS (Regression Analysis of Time Series) and are available from the authors upon request.

Veneto, Friuli Venezia Giulia, Emilia Romagna, Toscana, Abruzzo, Puglia, Basilicata and Calabria, on the contrary, manifest a switch in the slope sign, from positive (the gap is widening) to negative (the gap is shrinking). Yet, with the exception of Trentino Alto Adige (0.0217), Toscana (0.0535), Emilia Romagna (0.0766) and Piemonte (0.0129), the before-break coefficient is close to zero, and in particular smaller than 0.0053 (Puglia), testifying an almost stable trend. Surprisingly, thus, as it will be noticed, the before-break "least virtuous" regions (with positive and relatively greater $\hat{\mu}_2$) are located in the Center-North, rather than in the South-and-Islands as one would expect.

**Table 2: Unit root tests with unknown structural break**

| Region | $k^*$ | $\hat{T}_b$ | $t(\hat{\alpha})$ | $\hat{\mu}_2$ | $\hat{\mu}_2 + \hat{\mu}_3$ | $HL_{\alpha}$ |
|---|---|---|---|---|---|---|
| Piemonte | 0 | 2001/02 | -6.6247*** | 0.0129 | -0.0128 | 1.1541 |
| Lombardia | 2 | 2005/02 | -4.4820 | 0.0060 | -0.0091 | 0.9779 |
| Trentino Alto Adige | 0 | 2001/03 | -10.0622*** | 0.0217 | -0.0998 | 0.8686 |
| Veneto | 2 | 2006/02 | -8.1003*** | 0.0005 | -0.1268 | 0.7400 |
| Friuli Venezia Giulia | 2 | 2003/01 | -4.8712* | 0.0041 | -0.0245 | 0.9668 |
| Liguria | 2 | 2003/02 | -6.6600*** | -0.0116 | -0.0429 | 1.0102 |
| Emilia Romagna | 0 | 1997/04 | -7.5295*** | 0.0766 | -0.0190 | 1.0751 |
| Toscana | 1 | 2003/02 | -6.4183*** | 0.0535 | -0.0071 | 0.9524 |
| Umbria | 0 | 2003/02 | -6.2734*** | -0.0039 | -0.0078 | 1.2222 |
| Marche | 0 | 2003/03 | -6.0872*** | -0.0077 | -0.0383 | 1.2821 |
| Lazio | 2 | 2003/04 | -3.7769 | -0.0027 | 0.0054 | 1.6136 |
| Abruzzo | 0 | 2003/02 | -8.3936*** | 0.0011 | -0.0402 | 1.0677 |
| Molise | 0 | 2001/02 | -7.6420*** | -0.0119 | -0.0249 | 1.0475 |
| Campania | 2 | 2000/04 | -4.3998 | -0.0071 | -0.0165 | 1.3884 |
| Puglia | 0 | 1999/02 | -6.5307*** | 0.0053 | -0.0073 | 1.1786 |
| Basilicata | 2 | 2003/03 | -4.9766* | 0.0039 | -0.0204 | 1.1186 |
| Calabria | 0 | 1998/03 | -6.4036*** | 0.0012 | -0.0061 | 1.1908 |
| Sicilia | 2 | 2004/03 | -4.5651 | 0.0001 | -0.0147 | 1.3034 |
| Sardegna | 0 | 2007/01 | -8.0264*** | -0.0025 | -0.0814 | 1.0700 |

***: 1%, **: 5%, *: 10%. Critical values are obtained from Zivot and Andrews (1992, table 4): -5.57 (1%), -5.08 (5%), -4.82 (10%).

The unit-root regions are Lombardia, Lazio, Campania and Sicilia: one Northern, one Central and two Southern regions. A failure to reject the null hypothesis suggests that the gender unemployment gap tends to be persistent in these cases. Yet the degree of persistence varies from case to case. Again following, among the others, Queneau and Sen (2008, 2009a, 2009b), we have estimated the half-life ($HL_\alpha = \left|\log(1/2)/\log(\alpha)\right|$), that is the number of periods required for the impact of a unit shock on a time series to dissipate by half (see Andrews, 1993). Results are reported in column 7 of table 2. As one will notice the computed half-lives for Campania (1.3884) and Sicilia (1.3034) are very similar (slightly more than three months) and lie between the half-lives of Lazio (1.6136) and Lombardia (0.9779).

## 4.    Concluding remarks

In this paper, we have analyzed the persistence of the gender unemployment gap in nineteen Italian regions over the 1992-2009 period. Performing Zivot and Andrews (1992) unit-root test with unknown structural break, we have found that in fifteen out of the nineteen regions considered the gender unemployment gap is decreasing in the most recent period but at different pace: the catching up process is occurring faster in some regions like Trentino Alto Adige, Veneto and Sardegna, than in others like Calabria, Puglia and Toscana.

Our results suggest that Italy cannot be split, as conventional wisdom sometimes does, into two geographical and substantially homogeneous areas, Center-North and South-and-Islands. As a consequence, policy intervention aimed at reducing the gender unemployment gap should be designed and implemented by region rather than on a macro-territorial basis.

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