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Gender Inequality in Unemployment by Age in Spain, Switzerland and the European Union

Marina Faďoš
Comenius University in Bratislava, Faculty of Management, Slovakia
marina.fados@fm.uniba.sk

Mária Bohdalová
Comenius University in Bratislava, Faculty of Management, Slovakia
maria.bohdalova@fm.uniba.sk

Abstract. The paper analyses how unemployment gender inequality of Spain, Switzerland and the European Union, differs by distinct age categories. It is known that Spain is a country with very high and turbulent unemployment rates, Switzerland, on the other hand, had low and steady unemployment rates, while the European Union would represent countries with average unemployment rates, because of which we compare them. We have applied LM univariate unit-root test without a break, with one or two breaks which allowed us to reject the hysteresis hypotheses of gender unemployment inequality in these three territories. Dependence of unemployment gender inequality on different age categories was analysed by Pesaran Cross-dependence test, from which follows that dependence doesn't exist. Hysteresis hypotheses were also rejected for the country panel data by ILT test. Unemployment gender inequality series behaved as stationary process, when two breaks were included, and consequences from economic disturbances disappeared quickly. This implies that the policies leading toward gender equality are well established and economic disturbances have no impact on their accomplishments. Their straightforward behaviour was also proven with Wald test. Our conclusion is that the unemployment gender inequality decreases over time, but it is still present, and there is no evidence that it would disappear for completely.

Keywords: gender, inequality, unemployment, age

1 Introduction

When gender inequality in the labour market is mentioned, the first thing that most people think of, is wage. Therefore, there are many studies which deal with wage inequality worldwide. Lee and Wie (2017), Popli and Yilmaz (2017), discovered that improvement of women's qualifications led to decrease in the wage gap. He and Wu (2017) found, that the highest wage inequality, by gender, was in the private sector, then in the public companies and the lowest in the government institutions. Kutateladze and Lawson (2017) investigated inequality across six areas, such as Economy, Health, Housing, Education, Justice and Services, and across 96 indicators of inequality and came to conclusion that inequality is still present in all analysed areas. Kennedy, Rae, Sheridan and Valadkhani (2017) found out that the decrease of wage gender inequality could lead to an increase of productivity and output per capita in the long run.

Pastor, Peraita and Soler (2016) discovered that higher educational attainment reduces gender inequality in the Spanish labour market. Even with high performance at school, women were not preferred in the labour market, before men with low performance, according to Gokulsing and Tandrayen-Ragoobur (2014). Theodossiou and Zangelidis (2009) claimed that the most vulnerable in the labour market were lower educated women. Hysteresis in unemployment rates by gender was analysed among others, by Bakas and Papapetrou (2014), Peiró, Belaire-Franch and Gonzalo (2012) and Queneau and Sen (2009).

Inclusion of the young people to the labour market stumbled with few problems. Young people tend to have lack of engagement in employment, which leads to lower performance at work and subsequently lack of recognition. They don't think that the government would meet their needs, which also affects their behaviour. Finally, they tend to postpone their family formation to enter and make success on the labour market, which will result in ageing popularity (O'Reilly, et al. 2015). Young people were usually employed in part-time positions and they changed jobs very often (Maloney 2011). One of the goals of the European Union is to facilitate the entrance to the labour market for young people, by providing them adequate trainings and the opportunity to gain work experience abroad (Caliendo and Schmidl 2016).

Gender gaps in unemployment were defined by Queneau and Sen (2007) as a difference between the unemployment rate of men and women (unemployment rate of women– unemployment rate of men) and the ratio between them (unemployment rate of women/unemployment rate of men). Koutentakis (2015) constructed the steady-state unemployment gap and two gender gaps, one from job finding rates and one from job separate rates. His conclusion was that gender differences in separation rates are the main reasons for the occurrence of an unemployment gender gap. Inflow and outflow from unemployment by gender was also analysed by Ollikainen (2006), Rica and Rebollo-Sanz (2017) and Gonul (2014). In this paper, we present a new method of constructing gender gap which is based on Queneau and Sen (2007) but modified and weighted with unemployment rates.

Stationarity in the series was tested with the linear univariate stationarity test without break and with one or two breaks. We employ the methods that were used on the unemployment rates by Camarero, Carrion-I-Silvestre and Tamarit (2008), Khraief, Shahbaz, Heshmati and Azam (2015), Ayala, Cunado and Gil-Alana (2012) ,Fallahi and Rodriguez (2015) and Garcia-Cintado, Romero-Avila and Usabiaga (2015).

Our paper is structured as follows. In the first section, we describe used data and methods, in second section results from stationarity, cross-dependence and association are provided, in the last section we give our conclusion.

2 Data and methods

Annual data about unemployment by age and gender of Spain, Switzerland and the European Union, over the sample period 1996-2016, were obtained from the Eurostat database (2017). The data were divided into three categories according to age and gender. Data of the European Union were taken according to composition at the time, in years when new countries joined, we switch to unemployment rates calculated with the new countries included. Unemployment gender inequality series were computed as follows.

To explain the differences between genders in unemployment, one of the ways is to define gender differences as ratios of one to another, by following the inequality ratio calculation rules (Table 1), where u_t^irepresents the gender inequality ratio, $u_t^M$is the unemployment rate of men and u_t^F is the unemployment rate of women. If $u_t^i = 1$resp.-1, the unemployed were only men resp. women. If $u_t^i = 0$, the unemployment rate of men and women was equal.

Table 1: Inequality ratio calculation rules

1. $u_t^M = u_t^F \Longrightarrow u_t^i = 0$	2. $u_t^F < u_t^M \Longrightarrow u_t^i = \left((u_t^F/u_t^M) - 1\right) \times (-1)$
3. $u_t^M > 0 \wedge u_t^F = 0 \Longrightarrow u_t^i = 1$	4. $u_t^M < u_t^F \Longrightarrow u_t^i = (u_t^M/u_t^F) - 1$
5. $u_t^F > 0 \wedge u_t^M = 0 \Longrightarrow u_t^i = -1$	

Source: Own calculations

Ratios may vary depending on the level of unemployment. To avoid high differences in ratios and to connect them to the level of unemployment, we would weight inequality ratios with average unemployment rates. With this action, we would obtain unemployment gender inequality rate series, which we would analyse from now on. The unemployment gender inequality rate was denoted as

$$u_t^{inq} = u_t^i \times u_t, \tag{1}$$

where u_t represents an average unemployment rate. Weighting inequality ratios with average unemployment rates, will also eliminate high gender inequality when unemployment rates are low.

To measure unemployment gender inequality, the following intervals were set:

Table 2: Unemployment gender inequality intervals

$u_t^{wi} \in \langle -0.025; 0.025 \rangle$	Unemployment gender equality
$u_t^{wi} \in \langle -0.05; -0.025) \cup (0.025; 0.05 \rangle$	Low unemployment gender inequality
$u_t^{wi} \in \langle -0.1; -0.05) \cup (0.05; 0.1 \rangle$	Medium unemployment gender inequality
$u_t^{wi} \in \langle -1; -0.1) \cup (0.1; 1 \rangle$	High unemployment gender inequality

Source: Own calculations

Stationarity in univariate series was tested with method that corresponds to results from linearity test. Linearity was tested using the Wald test described by Liu, Xie, and Wang (2013) and denoted as

$$t_{Wald} = \left(\hat{\theta}_{r1} - \theta_{r0}\right)^* \left\{\left[I^{-1}\left(\hat{\theta}_1\right)\right]_{\theta_r \theta_r^*}\right\}^{-1} \left(\hat{\theta}_{r1} - \theta_{r0}\right), \tag{2}$$

where $\hat{\theta}_{r1}$ represents maximum likelihood estimate of θ_r under alternative hypothesis, value of θ_r under null hypothesis is represented by θ_{r0} and $\left\{\left[I^{-1}\left(\hat{\theta}_1\right)\right]_{\theta_r \theta_r^*}\right\}^{-1}$ stands for Schur complement of $I_{\theta_s \theta_s^*}$ evaluated at $\hat{\theta}_1$ denoted as $\left(I_{\theta_r \theta_r^*} - -I_{\theta_r \theta_s^*} I_{\theta_s \theta_s^*}^{-1} I_{\theta_s \theta_r^*}\right)\Big|_{\theta=\hat{\theta}_1}$ where $I(\theta)$ is Fisher information matrix

$$I(\theta) = \begin{bmatrix} I_{\theta_r \theta_r^*} & I_{\theta_r \theta_s^*} \\ I_{\theta_s \theta_r^*} & I_{\theta_s \theta_s^*} \end{bmatrix}. \tag{3}$$

Univariate linear series were tested for stationarity using LM Unit Root Test which considers next data generating process (Lee, Strazicich, & Meng, 2012)

$$y_t = \delta' Z_t + e_t, e_t = \beta e_{t-1} + \epsilon_t, \tag{4}$$

where Z_t represents exogenous variables from which composition depends what kind of model we would analyse. We analyse series for stationarity without break, with one break and with two breaks (Table 3).

Table 3: Model exogeneous variables specifications

Model	Exogeneous variables	Critical Values		
		1%	5%	10%
Without break	$Z_t = [1, t]'$	-3.63	-3.06	-2.77
With one break	$Z_t = [1, t, D_{1t}, DT_{1t}^*]'$	-4.239	-3.566	-3.211
With two breaks	$Z_t = [1, t, D_{1t}, D_{2t}, DT_{1t}^*, DT_{2t}^*]'$	-4.545	-3.842	-3.504
$D_{it} = 1$ if $t \geq T_{Bi} + 1, 0$ otherwise $(i = 1,2)$; $DT_{it}^* = t - T_{Bi}$ if $t \geq T_{Bi} + 1, 0$ otherwise $(i = 1,2)$				

Source: Table is based on Lee, Strazicich, & Meng (2012)
LM *t-statistic* was obtained from the regression

$$\Delta y_t = \delta' \Delta Z_t + \phi \tilde{S}_{t-1} + e_t \quad (5)$$

where $\tilde{S}_t = y_t - \tilde{\psi} - Z_t\tilde{\delta}$, $\tilde{\psi} = y_1 - Z_1\tilde{\delta}$, $t = 2, \dots, T$. $\tilde{\delta}$ is the coefficient of the exogenous variables in this regression. $\delta' = \delta_1$ for the model without a break, $\delta' = (\delta_1, \delta_2, \delta_3)$ for the model with one break and $\delta' = (\delta_1, \delta_2, \delta_3, \delta_4, \delta_5)$ for the model with two breaks. $\tilde{\tau}$ is the LM *t*-statistic for testing hypotheses $H_0: \phi = 0$. Break points T_{Bi} were determined from $LM_\rho = \inf_\lambda \tilde{\rho}(\lambda)$ and $LM_\tau = \inf_\lambda \tilde{\tau}(\lambda)$ when the *t*-statistic was minimized. Here $\tilde{\rho} = T.\tilde{\phi}$ and $\lambda = T_B/T$ (Khraief, et al. 2015).

Persistence of consequences from structural breaks was measured with a half-life estimator, which was denoted by Queneau and Sen (2009) as

$$HL_\rho = \frac{\log(0.5)}{\log(\rho)}. \quad (6)$$

To obtain ρ, we rewrite regression (5) as

$$y_t - y_{t-1} = \delta' \Delta Z_t + (\rho - 1)\tilde{S}_{t-1} + e_t, \quad (7)$$

and we obtain $\phi = \rho - 1$, $\rho = \phi + 1$.

Stationarity in panel data was tested using ILT Unit Root Test for the regression

$$\Delta Y_{i,t} = \gamma_i' \Delta Z_{i,t} + \delta_i \hat{S}_{i,t-1} + \varepsilon_{i,t}. \quad (8)$$

For each unit was calculated *t-statistic* (t^*) according to (9) for testing the hypothesis $H_0: \delta_i = 0$ which was used to calculate the ILT panel LM test statistic (10).

$$\bar{t} = \frac{1}{N}\sum_{i=1}^{N} t_i^* \quad (9)$$

$$LM(\bar{t}) = \frac{\sqrt{N}(\bar{t} - E(\bar{t}))}{\sqrt{V(\bar{t})}} \quad (10)$$

Both $E(\bar{t})$ and $V(\bar{t})$ were tabulated in paper of Im, Lee and Tieslau (2005). The critical values for the ILT LM *test statistic* are: -2.326 for 1%, -1.645 for 5% and -1.282 for 10% (Khraief, et al. 2015).

Country panel data were tested for cross dependence with Pesaran Cross-dependence test (Bakas and Papapetrou 2014):

$$CD = \sqrt{\frac{2T}{N(N-1)}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right)}, \quad (11)$$

where $\hat{\rho}_{ij}$ is the average of the pairwise correlation coefficients from the ADF regressions residuals.

Four categories were computed, to test for dependence between them. Composition of the categories will be explained further (Table 4).

Table 4: Category specification

Category	**Rule**	**Category Component**
Inequality Category	was computed based on the unemployment gender inequality intervals (Table 2)	
Gender Category	$u_t^F < u_t^M$	men
	$u_t^M < u_t^F$	women
	$u_t^M = u_t^F$	equality
Unemployment Category	$u_t \leq 5$	low
	$5 < u_t \leq 10$	moderate
	$10 < u_t \leq 15$	high
	$15 < u_t \leq 20$	very high
	$u_t > 20$	extreme
Age Category	qualitative data for each year and is the only category which has the same number of data in all category components	From 15 to 24 years
		From 25 to 44 years
		From 45+ years

Source: Own calculations

3 Results

3.1 Data representation

The unemployment rate of women was averagely higher than the unemployment rate of men, except for Switzerland, where during the observed period, unemployment among youth men was averagely higher than the unemployment rate of youth women. Averagely, the highest level of the unemployment gender inequality, when women were at a disadvantage, was in Spain. Specifically, in year 1998, was the level of the unemployment gender inequality of those aged from 25 to 44 years, almost at the border of the high inequality interval from our measurement scale of the unemployment gender inequality. In the European Union and Switzerland, were unemployment rates of women higher than the unemployment rates of men among those aged from 25 to 44 years, while in Spain was the highest among those older than 45 years (Table 5).

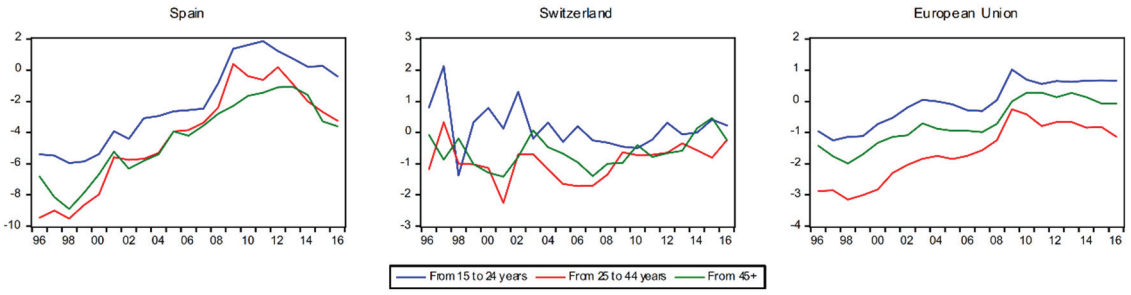
Table 5: Descriptive statistics

		Range	Min	Max	Mean	Std. Deviation
European Union	From 15 to 24 years	,02265	-,01248	,01017	-,00045	,00707
	From 25 to 44 years	,02892	-,03145	-,00253	-,01647	,00922
	From 45+	,02270	-,01992	,00278	-,00696	,00735
Spain	From 15 to 24 years	,07823	-,05958	,01865	-,02093	,02732
	From 25 to 44 years	,09918	-,09515	,00403	-,04267	,03254
	From 45+	,07831	-,08894	-,01063	-,04360	,02456
Switzerland	From 15 to 24 years	,03498	-,01374	,02125	,00158	,00716
	From 25 to 44 years	,02590	-,02257	,00332	-,00949	,00580
	From 45+	,01885	-,01417	,00468	-,00623	,00514

Source: Own calculations

In the European Union, among unemployed from 25 to 44 years old, unemployment rates of women were always higher than unemployment rates of men, the situation was similar in Switzerland only with reduced gender inequality values. The level of the unemployment gender inequality of those younger than 24 years and older than 44 years were similar in the European Union, while in Switzerland and Spain diversified. When we look at the gender inequality intervals, that we computed,

the widest gender inequality range was in Spain, then in the European Union and the lowest in Switzerland (Figure 1). Since unemployment rates can be arranged in the same way, further in the paper, we would analyse the relationship between gender inequality and the unemployment rate.



Annual changes of gender inequality were the lowest in the European Union. The economic crisis in 2008, increased the levels of gender inequality of the European Union, in favour of women, but they quickly returned to their original behaviour. Changes in gender inequality in Switzerland were the highest in years before 2001 and then stabilised, while in Spain changes were turbulent during the whole observed period (Figure 2).

3.2 Linearity

Unemployment gender inequality series of all age categories were linear according to Wald test results (Table 6), and we could continue with testing for stationarity using unit root tests for linear data.

Table 6: Results from linearity test

Age	*W-stat*	*p-value*	Result
Spain			
From 15 to 24 years	1.2967	0.2548	Linear
From 25 to 44 years	0.1634	0.6860	Linear
From 45+ years	1.6329	0.2013	Linear
Switzerland			
From 15 to 24 years	0.0082	0.9280	Linear
From 25 to 44 years	0.0347	0.8522	Linear
From 45+ years	0.3457	0.5565	Linear
European Union			
From 15 to 24 years	0.3930	0.5307	Linear
From 25 to 44 years	0.8276	0.3630	Linear
From 45+ years	3.6008	0.0578	Linear

Source: Own calculations

3.3 Stationarity of the univariate series

When unemployment gender inequality series were tested using the LM unit root test without breaks, only unemployment gender inequality series of Switzerland, age category 25 to 44 years and the European Union, age category 15 to 24 years old were stationary at 5% level (Table 7). This would suggest that the behaviour of most of the unemployment gender inequality series didn't follow a stationary process but rather show evidence of hysteresis presence.

Table 7: LM test without break

	Serie	ϕ	δ_1	k
Spain	From 15 to 24 years	-0.1906 (-1.1349)	0.4935 (1.5610)	0
	From 25 to 44 years	-0.1346 (-0.6581)	0.5515 (0.8335)	0
	From 45+ years	-0.1590 (-0.9495)	0.0928 (0.2326)	4
Switzerland	From 15 to 24 years	-0.8230 (-1.9624)	-0.3912 (-1.7923)	3
	From 25 to 44 years	-0.7342** (-3.1762)	-0.1788 (-1.2470)	0
	From 45+ years	-0.4742 (-2.2487)	-0.1380 (-0.9327)	0
European Union	From 15 to 24 years	-0.8791** (-3.2733)	0.2683 (3.1532)	1
	From 25 to 44 years	-0.3313 (-1.5143)	0.2680 (1.8009)	0
	From 45+ years	-0.3682 (-2.0493)	0.1319 (2.0152)	1

***Significant at level 0.01; **Significant at level 0.05; *Significant at level 0.1
Numbers in parenthesis under the estimated coefficients are *t*-statistics for the null hypothesis.

Source: Own calculations

Including one (Table 8) or two (Table 9) structural breaks, increased the power of the test and show that not including structural breaks led to false non-stationarity conclusion. Afterwards, duration of the consequences of the economic disturbances was considered, and it was found that their impact on the unemployment gender inequality series, was not permanent but only temporary. This suggests, that policies toward gender equality are so firm and well implemented that not even economic disturbances couldn't damage its achievement.

Table 8: LM test with one break

	Serie	ϕ	δ_1	δ_2	δ_3	k	T_{B1}	HL_ρ
Spain	From 15 to 24 years	-1.6602*** (-4.9680)	-0.1020 (-0.4543)	-0.2823 (-0.4452)	2.2964 (4.0868)	4	2007	1.6694
	From 25 to 44 years	-1.5685*** (-4.4097)	0.4890 (1.6738)	-1.3021 (-1.4076)	1.6982 (2.6449)	4	2007	1.2273
	From 45+ years	-0.7547*** (-4.4140)	-1.2373 (-2.0557)	0.1654 (0.1700)	1.8169 (3.0131)	4	2004	0.4933
Switzerland	From 15 to 24 years	-2.5098*** (-5.3032)	0.1944 (1.8918)	-0.4664 (-2.0500)	0.3486 (3.1145)	3	2009	1.6825
	From 25 to 44 years	-0.9816*** (-5.2208)	0.3199 (1.9010)	-0.6163 (-2.0266)	-0.1712 (-0.9011)	0	2004	0.1735
	From 45+ years	-2.2527*** (-4.5402)	-0.8780** (-3.7926)	-0.9121 (-2.0485)	1.6054 (4.1627)	3	2012	3.0765
European Union	From 15 to 24 years	-1.2937*** (-5.7978)	0.1940 (5.6362)	1.0773 (8.9224)	-0.4577*** (-6.7285)	3	2008	0.5657
	From 25 to 44 years	-2.3803*** (-5.5735)	0.0251 (0.2979)	-0.5962 (-2.4330)	0.9706 (4.4590)	5	2007	2.1506
	From 45+ years	-2.9946*** (-6.0186)	-0.1499 (-2.7843)	0.4817 (4.3956)	0.5132 (4.7755)	5	2008	1.0039

***Significant at level 0.01; **Significant at level 0.05; *Significant at level 0.1
Numbers in parenthesis under the estimated coefficients are *t*-statistics for the null hypothesis.

Source: Own calculations

Table 9: LM test with two breaks

Serie	ϕ	δ_1	δ_2	δ_3	δ_4	δ_5	k	T_{B1}	T_{B2}
Spain									
From 15 to 24 years	-3.3717*** (-9.7103)	0.1378 (0.5173)	3.1550 (7.9433)	-1.2720 (-3.4151)	0.5329 (1.5582)	1.6519 (6.4042)	5	2002	2008
From 25 to 44 years	-2.5035*** (-13.4692)	0.8559 (11.6927)	-1.2483*** (-5.5554)	1.6735 (11.4854)	3.5220 (11.2618)	-3.7991*** (-19.8728)	4	2007	2011
From 45+ years	-3.4263*** (-8.2247)	-0.0253 (-0.0919)	0.3123 (1.1916)	1.2342 (4.1200)	0.4402 (2.1031)	-0.8269*** (-6.8920)	2	2002	2011
Switzerland									
From 15 to 24 years	-6.4496*** (-13.9047)	0.5437 (10.6905)	-0.0783 (-0.9919)	-0.4440*** (-6.2406)	-0.3573*** (-5.3933)	0.5991 (8.9377)	5	2008	2010
From 25 to 44 years	-5.1667*** (-13.3084)	1.2884 (12.5053)	0.0851 (1.0012)	-0.4615*** (-6.6829)	0.3634 (3.4477)	-1.0818*** (-13.0077)	4	2007	2013
From 45+ years	-2.9517*** (-6.4100)	-1.5456*** (-5.7839)	-1.0644 (-3.1188)	0.8643 (3.4685)	-1.3164** (-4.0915)	1.2973 (3.7614)	5	2010	2012
European Union									
From 15 to 24 years	-1.5339*** (-13.8282)	0.2292 (7.6328)	-0.3496*** (-6.2408)	0.3983 (6.3401)	1.4475 (27.5035)	-0.8544*** (-15.8810)	5	2006	2008
From 25 to 44 years	-1.7670*** (-6.8813)	0.1967 (3.1604)	-0.5724 (-2.8202)	0.6632 (4.7339)	0.3835 (2.0232)	-0.8383*** (-5.9347)	1	2007	2011
From 45+ years	-1.5320*** (-10.2777)	-0.3555** (-4.2545)	-0.4137** (-4.4275)	0.1476 (1.7773)	-0.4180** (-4.1822)	0.8952 (9.8103)	4	2003	2007

***Significant at level 0.01; **Significant at level 0.05; *Significant at level 0.1
Numbers in parenthesis under the estimated coefficients are *t*-statistics for the null hypothesis.

Source: Own calculations

3.4 Cross dependence

Unemployment gender inequality of Switzerland didn't depend on age, while of Spain and the European Union did depend on age (Table 10). Common behaviour between territories and age was not found. We couldn't conclude that unemployment gender inequality depends on age of unemployed.

Table 10: Pesaran CD test results

Test	Statistic	Prob.
Spain	7.651491	0.000
Switzerland	1.679278	0.0931
European Union	7.661068	0.0000

Source: Own calculations

3.5 Panel data stationarity

When the stationarity test was performed on country panels of data (among gender inequality age category series in each country), the result was the same as for the univariate series. Stationarity was proven only in the presence of one or two breaks in all three territories (Table 11).

Table 11: ILT LM test statistics for panel data

	Without break	With one break	With two breaks
Spain	-0.969	-7.346***	-16.686***
Switzerland	-0.256	-14.966***	-20.483***
European Union	-0.556	-6.374***	-15.898***
***Significant at level 0.01; **Significant at level 0.05; *Significant at level 0.1			

Source: Own calculations

3.6 Dependency

The relationship between inequality categories and age categories was confirmed only for the European Union, where moderately strong dependence was reported (Table 12). Equality was proven, in the 92.1% of the European Union series, specifically in all series from age categories from 15 to 24 years and from 45+ years and in 76.2% series from age category 25 to 44 years.

Gender inequality depended on the level of unemployment only in Spain (Table 12). In 61.9% of cases, during the periods when the unemployment rate was extreme (from our unemployment gender inequality scale) and in 46.7% cases during the periods when the unemployment rate was very high, unemployment gender inequality didn't exist. In 88.9% of cases, when the unemployment rate was moderate, gender inequality was low. From this we can conclude that in Spain, gender inequality doesn't exist in times of crisis while low unemployment gender inequality exists in times of moderate unemployment rate.

Moderately strong dependence of inequality on gender was proven only in Spain (see Table 12). Where the unemployment rate of women was in 74.1% of cases, higher than the unemployment rate of men. While the unemployment rate of men was never higher than the unemployment rate of women, in remaining 25.9% of cases, equality was proven.

Between age categories and unemployment categories no relationship was proven (see Table 12).

Dependence between gender and unemployment categories was proven only in Spain (Table 12). In 85.7% cases were women unemployed more than men. Remaining 14.3% of men, were 66.7% unemployed more than women in times of extreme levels of unemployment rates and 33,3% in times of very high levels of unemployment rates. Women were unemployed more than men only in times of high and moderate levels of unemployment rates.

In the all three territories was proven moderately strong dependence between age categories and gender (Table 12). In the age category from 15 to 24 years, in the European Union gender inequality didn't exist, while in Spain in 66.7% of cases, the unemployment rate of women was higher than the unemployment rate of men. In Switzerland was in 52.4% of cases, unemployment rate of men higher than the unemployment rate of women. In the age category from 25 to 44 years, in the European Union unemployment rate of women was higher than the unemployment rate of men all the time. In Spain, the unemployment rate of women was higher than the unemployment rate of men in 90.5% of the cases, in Switzerland, the unemployment rate of women was in 95.2% of the cases higher than the unemployment rate of men. Among unemployed who were older than 45 years, the unemployment

rate of women was higher than the unemployment rate of men in 71.4% of the cases in the European Union, 85.7% of the cases in Switzerland and in all cases in Spain.

Table 12: Association results

Categories	Territory	Pearson Correlation Coefficient	*p - value*	*Cramer's V*	Result
Inequality - Age	European Union	10.862	0.004	0.415	Moderately strong dependence
	Spain	2.639	0.620	0.205	No dependence
Inequality - Unemployment	European Union	2.629	0.105	0.204	No dependence
	Spain	31.781	0.000	0.502	Moderately strong dependence
Inequality - Gender	European Union	2.007	0.367	0.178	No dependence
	Spain	18.261	0.000	0.538	Moderately strong dependence
Unemployment - Age	European Union	0.000	1	0.000	No dependence
	Spain	0.000	1	0.000	No dependence
Unemployment - Gender	European Union	1.899	0.387	0.174	No dependence
	Spain	8.400	0.038	0.365	Moderately strong dependence
Age - Gender	European Union	14.957	0.005	0.345	Moderately strong dependence
	Spain	10.111	0.006	0.401	Moderately strong dependence
	Switzerland	17.583	0.001	0.374	Moderately strong dependence

Source: Own calculations

4 Conclusion

Unemployment rate of women was on average higher than the unemployment rate of men for all three territories and for all age categories, except age category 15 to 24 years in Switzerland where the unemployment rate of men was higher. Gender inequality was the highest in Spain for all age categories, in the European Union was by half lower as in Spain and in Switzerland was by quarter lower as in the European Union. The highest gender inequality was among the unemployed, aged from 25 to 44 years for all three territories. Annual changes in gender inequality were steady in the European Union, while in Spain we could observe multitudes of fluctuations.

All tested age category inequality series were stationary only when a structural break was included. Crisis in 2008, resp. one year before, had the highest impact on all series in the European Union and two age categories in Spain (inequality series 45+ years was not affected) while in Switzerland crisis had only impact on unemployed Youth in a year after the crisis occurred. The impact of the crisis on the unemployment gender inequality was inconsequential, since rapidly returned to its original path. When two breaks were included, situation was slightly changed, but the influence of the crisis during 2008 was still present, this time also on series from Switzerland. When tested on a panel, the same results were obtained. Series were stationary only in case when one or two structural breaks were included.

When we tested dependence between distinct categories, only moderately strong dependence between age categories and gender was proven for all three territories. While in Spain, dependence between level of inequality and level of unemployment, level of inequality and gender and level of unemployment and gender was proven. Only in the European Union level of Inequality strongly depended on age categories. Dependence between the level of unemployment and age categories was not found.

Crisis in 2008, apparently decreased gender inequality in the European Union and Spain, but this decrease was only temporary and requires further actions to retain gender inequality in desired boundaries, not only by lowering unemployment rates of women but also keeping unemployment rates

of men under control. This could be done only by the creation of new jobs. By doing this it would be avoided situation that occurred when crisis in 2008 appeared, when gender inequality was lowered not with good actions which lead to its decrease, but because unemployment rates of men rose faster than unemployment rates of women and by this diminished the difference between unemployment gender rates.

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