More than a She-recession: Long-term feminization and short-term pandemic effects

62nd ERSA Congress, Urban Challenges and Sustainable Technological Revolution

Linnea Nelli[1], Maria Enrica Virgillito[2]

[1] Department of Economic Policy, Università Cattolica del Sacro Cuore, Milano (Italy)
[2] Institute of Economics, Scuola Superiore Sant'Anna, Pisa (Italy)

Linnea Nelli[1], Maria Enrica Virgillito[2]

Outline

Introduction (I)

The Covid-19 crisis has been defined as a **"She-recession"** vs past recessions defined as *"Man-recessions"* because of different gendered employment effects:

- we identify the **roots** of the She-recession in the persistence of extra and intra-household **feminization** in the Italian labour market
- **Research questions**:
  - has the She-recession taking place in Italy as a consequence of the Covid-19 shock?
  - If yes, how can we measure the severity of such phenomenon?
  - To what extent the root causes of the She-recession are temporary or, alternatively, structural?

Introduction (II)

This paper aims at measuring and explaining the gender differences in the impact of the Covid-19 crisis on the Italian labour market from a macroeconomic-structuralist perspective:

- **Methodology**: we build and refine the statistic developed by Fazzari and Needler (2021)
  - a **loss function** measuring the unfolding of the Covid-19 crisis in terms of its *duration, depth and diffusion*
- **Results**: the impact of the Covid-19 crisis has been **disproportionate on female employment**, especially for **low educated** female workers and working in the **South**; and a **proportional effect on female inactivity** due to previous **hysteresis** in the labour market during 2020.

The notion of *She-recession*

Gender asymmetries in job losses comparing the pandemic with "ordinary" shocks[1]:

- **Man-recessions**: (i) impact on construction and manufacturing, typically **male-predominant sectors** (**industry channel**); (ii) **added worker effect** fostering female employment[2]
- **She-recession**: (i) impact on services, **female predominant sectors, due to social distance measures** and industries closures (**industry channel**); (ii) **school closures** and **gender norms** in child and elder care induces women to reduce working hours, justified by gender gaps in **earnings**[3], or even exit from the labour market (**childcare channel**); (iii) **discouraged worker effect** due to the magnitude of impact of the pandemic

[1] Alon et al. (2021)

[2] Lundberg (1985), Rubery and Rafferty (2013)

[3] Kleven et al. (2019); Albanesi and Kim (2021a); Albanesi and Kim (2021b); Sun and Russell (2021)

The feminization process[4]

Pre-conditions to the She-recession both for the industry and the childcare channel:

- **extra-household** feminization: the **increase female participation rate** in the labour market by the **servitization** and **flexibilization** of employment relations since the 1990s but accompanied by **occupational segregation** and **precariousness**
- **intra-household** feminization: the gendered division of **unpaid and care work** and **gendered norms** reflected in **high inactivity**, low labour market female participation and employment discontinuity

[4] Manicardi (2023); Rubery (2015); Betti (2016); Cetrulo et al. (2023)

Structural labour market trends (I)

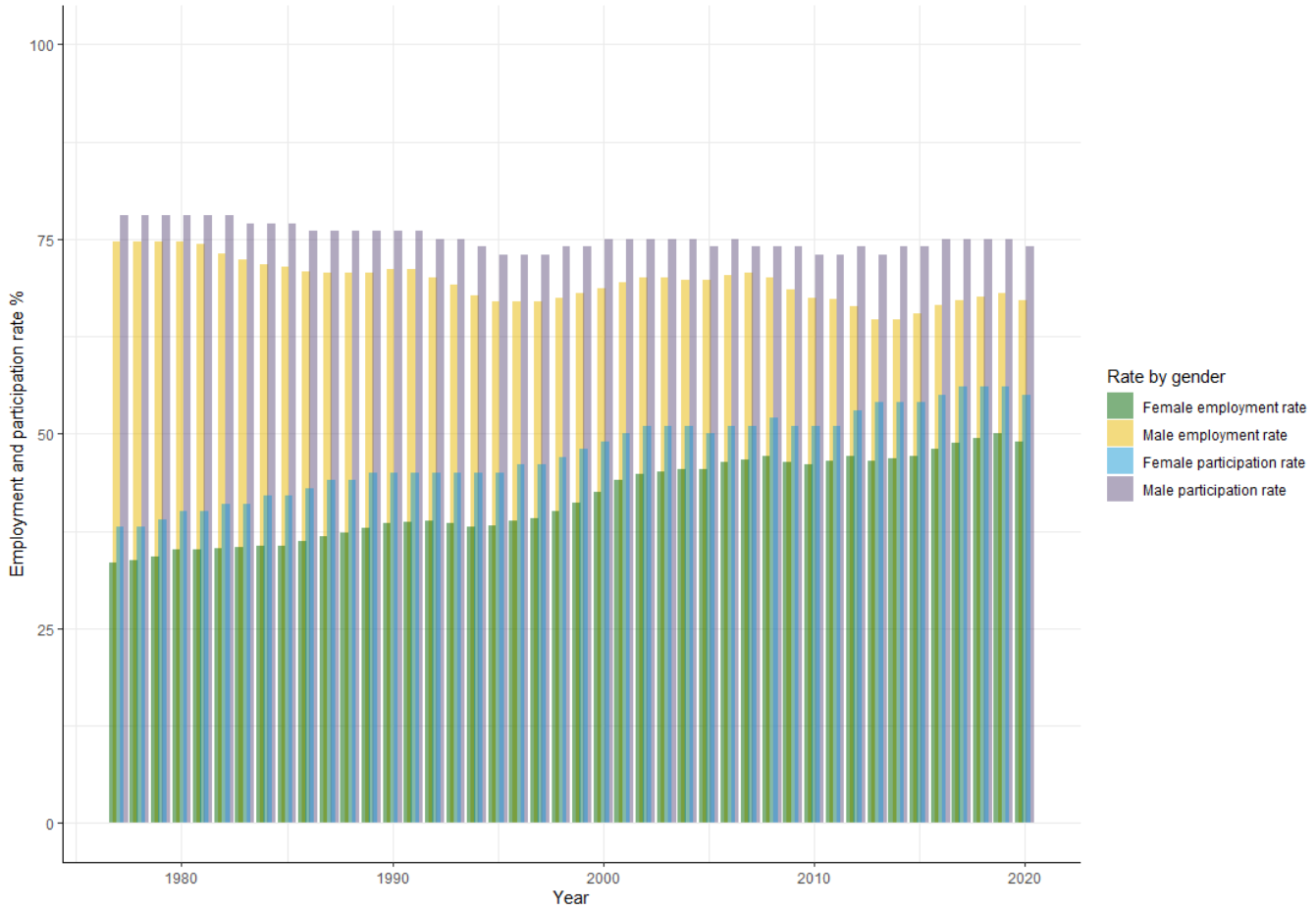


Figure 1: Employment and participation rates by gender between 1977 and 2020 in Italy, age 15-64. Data Source: Labour Force Survey, ISTAT.

Structural labour market trends (II)

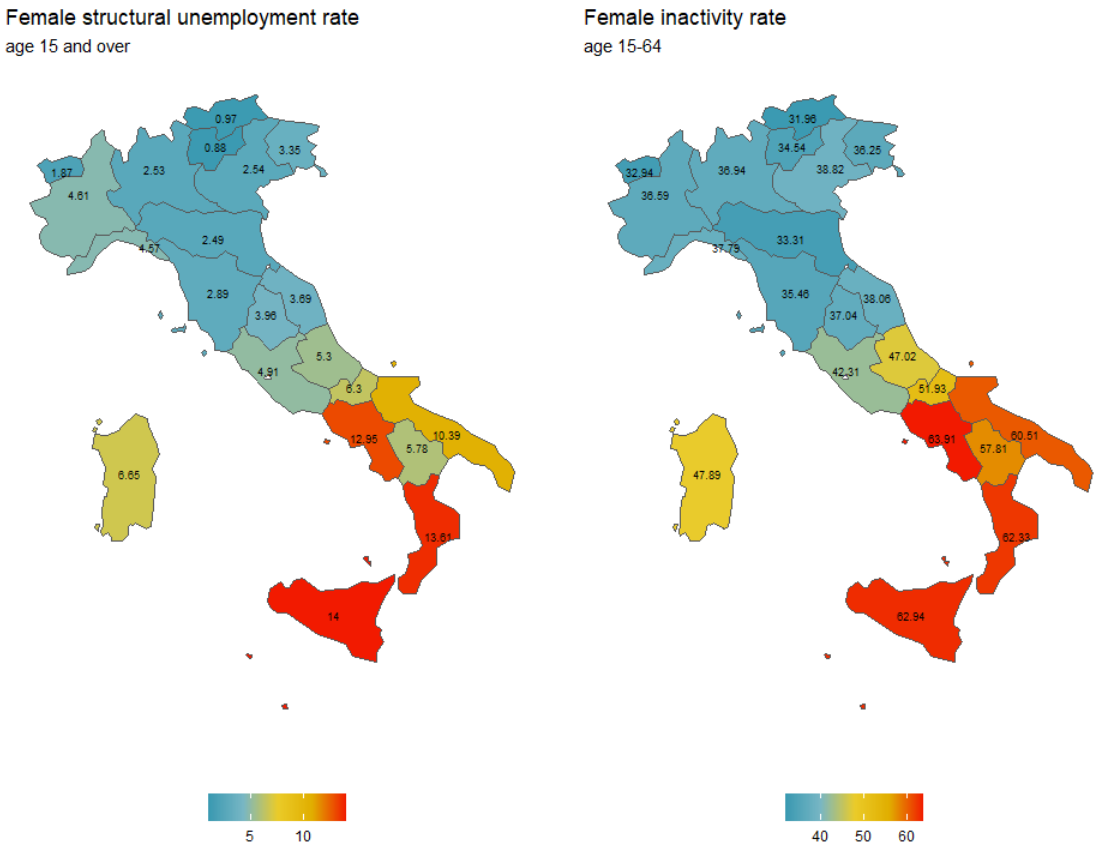
Structural labour market trends have played a role for the She-recession to unfold in **Italy**:

- female occupational **segregation in low value-added sectors** characterised also by **low mobility** (Figures A.3, A.4, A.5) → only **30%** of professions **can be executed from home** in Italy and **women** represent a **low share** of them (Cetrulo et al. (2022));
- **unmatched** increases of **educational attainments (Figure A.1, A.2) with professional upgrading** and in general **wage remuneration** for female workers → persistence of precarious conditions;
- female disproportionate exposure to unstable and **flexible contractual regulations** (Figure A.6) → **temporary** contracts or **self-employed** not covered by the **firings' restrictions**
- **persistence of gender norms** reproducing intra-household asymmetries reflected in high inactivity and low participation → **childcare-channel**[5]

[5] Del Boca et al. (2020); Del Boca et al. (2021); Biroli et al. (2021)

Regional disparities

Figure 2: Female structural unemployment and inactivity rate by regions in Italy in 2020. Data Source: Labour Force Survey, ISTAT



Data

Quarterly data from the Labour Force Survey of the Italian National Institute of Statistics (ISTAT), variables:

- **employment, structural unemployment (duration more than 12 months), inactivity** for **women** and **men** between 15 and over years old from **1993 to 2020**.[6] (Table A.1)
- **female employment**:
  - (i) **macro-regions** (North, Centre and South, islands included) (ii) level of **education** (tertiary, upper secondary, lower secondary and primary) for women with age 15 and over from 2000 to 2020 (Tables A.2, A.3);
  - **sectoral distribution** (macro-sectors and focus on 9 service sub-sectors, NACE-1 digit) for women with age 15 and over from 2008 to 2020 (seasonally adjusted, Tables A.4, A.5)

[6] cohort of age common to all three variables, since age 15-64 in not available for structural unemployment. Istat do not provide data for long-term unemployment from 1977 as for inactivity and employment, hence we use data from 1993

Descriptive statistics (I)

Figure 3: Employment, structural unemployment and inactivity rates by gender in Italy during 2020, age 15 and over, quarterly data. Data source: Labour Force Survey, ISTAT

Descriptive statistics (II)

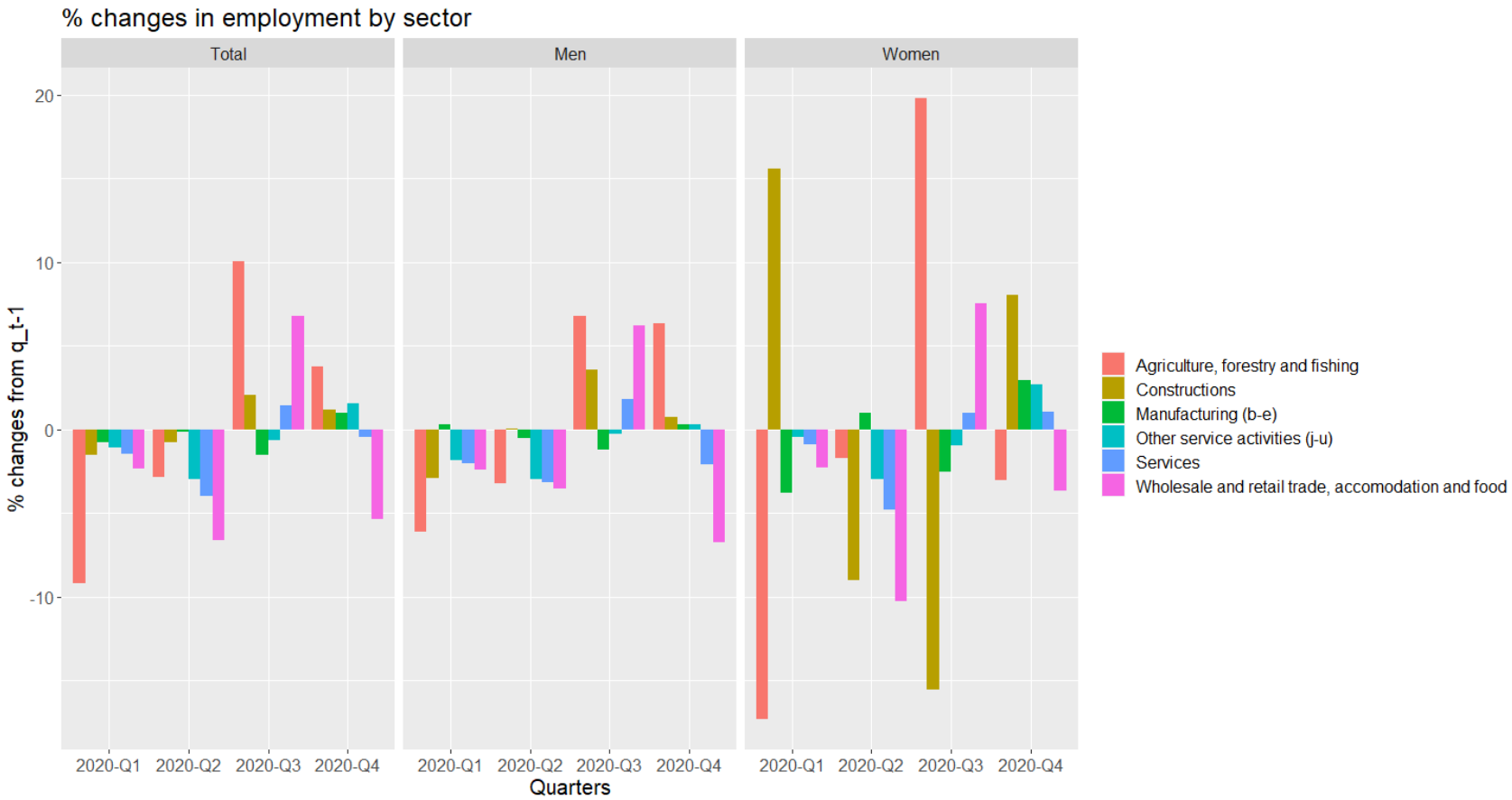


Figure 4: Employment changes from previous quarter in macro-sectors by gender during 2020, age 15 and over. Data Source: Labour Force Survey, ISTAT

Loss functions

The indicator bases on the methodology of Fazzari and Needler (2021), it is a loss function:

- assessing the *depth, duration and diffusion* of the Covid-19 crisis, measuring **deviations and duration of such deviations from the pre-crisis trend measures**;
- **disproportionality/proportionality** for a given **gender category** in employment losses, structural unemployment, inactivity and the role of education, geographical and sectoral distribution in female employment with respect to **pre-recession trends**
- we address **hysteresis effects** on the labour market by (i) **long-run** structuralist perspective by (ii) **structural unemployment, inactivity, occupational segregation** and access to **education** typically **hysteretic** and characterizing female labour market participation

Six main steps:

1. *prior-recession peak and trough identification:* definition the recession period following the three main criteria of NBER[7], *depth, duration and diffusion* :
   - **depth**, output declines more than 3.15%[8]; its **duration** between the first peak (first decrease of $\geq -3.15\%$) and the first trough (first increase $\geq +3.15\%$)

     $\rightarrow$ **Peak Q4-2019**, troughs (i) **Q2-2020** with respect to GDP **cyclical** variation; (ii) **Q4-2020** with respect to GDP **trend** variation (Figure A.10)
   - comparing employment, structural unemployment, inactivity and female employment by education, by regions and by sectors explains the **diffusion** of the recession.

[7] NBER Business Cycle Dating Committee guidelines

[8] Claessens et al. (2009)

2. *Isolation of trend and cyclic data components*: filter time-series with **Christiano-Fitzgerald** (CF) **filter**, to **detach** the trend **(structure)** from the cycle **(shocks' variations)** over the defined recession period. The Hodrick Prescott (HP) filter as a robustness check;

3. *Loss function definition* $\mathcal{L}$:

$$\mathcal{L}_{x_{i_j}} = \sum_{t=Q1_{2020}}^{T} c_{x_{t,i_j}} \tag{1}$$

- $x = \epsilon, u, i$ is employment, structural unemployment and inactivity (Figures A.11, A.12, A.13)
- $i = g, e, r, s$ gender, female education, female regional employment and female employment across sectors
- $j = w, m$ for women or men; $j = p, ls, us, t$ for primary, lower secondary, upper secondary and tertiary level; $j = n, c, s$ North, South or Centre of Italy; $j = a, c, i, s$ agriculture, construction, industry and services. The analysis is deepened also across 9 service subsectors with $T = 2020 - Q4$ (Figures A.14, A.15, A.16, A.17)

4 *Share of each category over the total loss function*. We compute the **percentage of the loss** $\mathcal{L}_{x_{i,j}}$ for each j on total loss function for category i, $\mathcal{L}_{x_i} = \sum_{j=1}^{J} \mathcal{L}_{x_{i_j}}$

$$l_{x_j} = \frac{\mathcal{L}_{x_{i_j}}}{\mathcal{L}_{x_i}}\% \tag{2}$$

5 *Share of each category of total data at prior-recession peak*. We compute the **share of each category** j **of type of individuals** i for each variable over time x_t of actual data **at the prior-recession peak** $t = 2019 - Q4$**:**

$$s_{x_{i_j}} = \frac{x_{p,i_j}}{x_{p,i}}\% \tag{3}$$

6 *Quarter loss (QL) indicator*[9]. We take the **ratio** between the share of losses l_{x_j} over the share of actual data of variable 2019-Q4 $s_{x_{i_j}}$:

$$QL_{x,i_j} = \frac{l_{x_{i_j}}}{s_{x_{i_j}}} \tag{4}$$

where the denominator captures the **persistence** in gender, educational and geographical and sectoral distribution **inequality** over time. The *quarter loss* is interpreted as follows:

$$\begin{cases} QL_{x,i_j} \in [0,1] & \text{impact of the crisis } \textbf{less} \text{ than } \textbf{proportional} \\ QL_{x,i_j} > 1 & \text{impact of the crisis } \textbf{more} \text{ than } \textbf{proportional} \end{cases} \tag{5}$$

[9] Fazzari and Needler (2021) define their measure as *job monthly loss*.

Results by gender

			Employment			
T	$l_{\epsilon_{g,f}}$	$l_{\epsilon_{g,m}}$	$s_{\epsilon_{g,w}}$	$s_{\epsilon_{g,m}}$	QL_w	QL_m
2020-Q2	42.905	57.095	42.157	57.843	**1.018**	0.987
2020-Q4	57.289	42.711	42.157	57.843	**1.359**	0.738
			Structural unemployment			
T	$l_{u_{g,f}}$	$l_{u_{g,m}}$	$s_{u_{g,w}}$	$s_{u_{g,m}}$	QL_w	QL_m
2020-Q2	20.171	79.829	50.382	49.618	0.400	**1.609**
2020-Q4	50.564	49.436	50.382	49.618	**1.004**	**0.996**
			Inactivity			
T	$l_{i_{g,f}}$	$l_{i_{g,m}}$	$s_{i_{g,w}}$	$s_{i_{g,m}}$	QL_w	QL_m
2020-Q2	35.214	64.786	**60.603**	39.397	**0.581**	**1.644**
2020-Q4	51.459	48.541	60.603	39.397	0.996	**1.232**

Table 1: Quarter loss in employment, structural unemployment and inactivity by gender considering both the second and the last quarter of 2020 as trough of the recession.

Results by regions and education

Regional female employment									
T	$l_{\epsilon_{r,n}}$	$l_{\epsilon_{r,c}}$	$l_{\epsilon_{r,s}}$	$s_{\epsilon_{r,n}}$	$s_{\epsilon_{r,c}}$	$s_{\epsilon_{r,s}}$	QL_n	QL_c	QL_s
2020-Q2	12.21	24.73	63.06	54.69	22.24	23.07	0.22	1.11	**2.73**
2020-Q4	39.04	17.93	43.03	54.69	22.24	23.07	0.71	0.81	**1.87**

Table 2: Quarter loss for female employment in different macro regions of Italy

Female employment by education												
T	$l_{\epsilon_{e,p}}$	$l_{\epsilon_{e,ls}}$	$l_{\epsilon_{e,us}}$	$l_{\epsilon_{e,t}}$	$s_{\epsilon_{e,p}}$	$s_{\epsilon_{e,ls}}$	$s_{\epsilon_{e,us}}$	$s_{\epsilon_{e,t}}$	QL_p	QL_{ls}	QL_{us}	QL_t
2020-Q2	22.87	65.48	19.47	-7.82	2.03	21.36	46.20	30.40	**11.24**	**3.07**	0.42	**-0.26**
2020-Q4	9.24	11.27	37.66	41.83	2.03	21.36	46.20	30.40	**4.54**	0.53	0.82	**1.38**

Table 3: Quarter loss in female employment by education level

Results by sectors

Female employment by macro-sectors												
T	$l_{\epsilon_{s,a}}$	$l_{\epsilon_{s,c}}$	$l_{\epsilon_{s,i}}$	$l_{\epsilon_{s,s}}$	$s_{\epsilon_{s,a}}$	$s_{\epsilon_{s,c}}$	$s_{\epsilon_{s,i}}$	$s_{\epsilon_{s,s}}$	QL_a	QL_c	QL_i	QL_s
2020-Q2	0.59	-10.58	-3.22	113.21	2.62	1.01	12.33	84.04	0.23	-10.45	-0.26	**1.35**
2020-Q4	0.65	-5.35	2.23	102.47	2.62	1.01	12.33	**84.04**	0.25	-5.29	0.18	**1.22**

Table 4: Quarter loss in female employment by macro-sectors

Sector	$l_{\epsilon_{serv}}$	$s_{\epsilon_{serv}}$	QL_{serv}
Wholesale and retail trade and repair of motor vehicles and motorcycles	12.3	16.94	0.73
Transportation and storage	5.57	2.9	**1.92**
Accommodation and food activities	10.72	8.38	**1.28**
Information and communication	-1.73	2.05	-0.85
Financial and insurance activities	-3.63	3.53	-1.03
Public administration and defence; compulsory social secutiry	-0.05	4.98	-0.01
Administrative and support service activities	13.79	15.57	0.89
Other services	11.37	14.6	0.78
Education, Human health and social work activities	51.68	31.07	**1.66**

Table 5: Quarter loss in female employment in service sub-sectors

Robustness checks

The HP results:

- **confirm** the disproportionate impact on female employment and proportionate impact on female inactivity (Table A.6);
- confirm the disproportionate effect for women from the South, with lower education and women working in the service sector (Tables A.7, A.8, A.9)
- differently, a **proportionate** effect for women with **tertiary education** and for women working in the **education and health sector** (Tables A.8, A.10), a disproportionate effect also for women working in agriculture (Table A.9). This evidence may be the result of the **linearity** of the filter (Figures A.18, A.19). Further investigation is needed.

Conclusions

The She-recession has been proved to be deeply related to the ex-ante hysteresis and pre-crisis conditions in the labour market:

- reproduction of **intersectionality** and **multi-dimensionality** of **structural vulnerability** of the female segment in the labour market, not commonly widespread, the effects of the She-recession have been **more severe** in case of **informality and self-employment** (e.g., the case of the South of Italy)
- **industry channel:** disproportionate impact on low educated women thus women working in the **service** sector, particularly in **transportation and storage, accommodation and food services**, but even **in education, human health and social work activities**, as knowledge self-employed workers not covered by the firing restrictions
- **childcare channel**: disproportionate effect on women with tertiary education and women working in education and health sector
- Occupational-level, cross-country comparative analyses and measurement of long-lasting She-recessionary effects are further avenues of research.

Policy implications

- Gender asymmetries are **structurally embedded societal factors**, reproducing gender imbalances and subordination to unequal societal power (Folbre (2021)), call it **"patriarchy cum neo-liberalism"**.
- **No advancement** is put forward toward substantive processes of women empowerment, granting higher spaces of decision-making autonomy, equal rights and, in that, **overturning occupational segregation**;[10]
- Our results call therefore for **policy actions** that are **meant to overturn long-term feminization**: **an industrial policy for the care sector** would allow to tackle at the same time **labour market asymmetries** for women and **access to basic needs** for all, requesting for the State to be a good employer (Cresti and Virgillito (2022); *Care manifesto*, Chatzidakis et al. (2020))

[10] See https://feps-europe.eu/wp-content/uploads/2022/12/RECOVERY-WATCH-Feminist-Care-PP-2.pdf

Albanesi, S. and Kim, J. (2021a). Effects of the covid-19 recession on the us labor market: Occupation, family, and gender. *Journal of Economic Perspectives*, 35(3):3–24.

Albanesi, S. and Kim, J. (2021b). The gendered impact of the covid-19 recession on the us labor market. Technical report, National Bureau of Economic Research.

Alon, T., Coskun, S., Doepke, M., Koll, D., and Tertilt, M. (2021). From mancession to shecession: Women's employment in regular and pandemic recessions. Technical report, National Bureau of Economic Research.

Baxter, M. and King, R. G. (1999). Measuring business cycles: approximate band-pass filters for economic time series. *Review of economics and statistics*, 81(4):575–593.

Betti, E. (2016). Gender and precarious labor in a historical perspective: Italian women and precarious work between fordism and post-fordism. *International Labor and Working-Class History*, 89:64–83.

Biroli, P., Bosworth, S., Della Giusta, M., Di Girolamo, A., Jaworska, S., and Vollen, J. (2021). Family life in lockdown. *Frontiers in psychology*, 12.

Cetrulo, A., Guarascio, D., and Virgillito, M. E. (2022). Working from home and the explosion of enduring divides: income, employment and safety risks. *Economia Politica*, 39(2):345–402.

Cetrulo, A., Sbardella, A., and Virgillito, M. E. (2023). Vanishing social classes? facts and figures of the italian labour market. *Journal of Evolutionary Economics*, 33(1):97–148.

Chatzidakis, A., Hakim, J., Litter, J., Rottenberg, C., et al. (2020). *The care manifesto: The politics of interdependence*. Verso Books.

Christiano, L. J. and Fitzgerald, T. J. (2003). The band pass filter. *international economic review*, 44(2):435–465.

Claessens, S., Kose, M. A., and Terrones, M. E. (2009). What happens during recessions, crunches and busts? *Economic Policy*, 24(60):653–700.

Cresti, L. and Virgillito, M. E. (2022). Strategic sectors and essential jobs: a new taxonomy based on employment multipliers. *Available at SSRN*.

Del Boca, D., Oggero, N., Profeta, P., and Rossi, M. (2020). Women's and men's work, housework and childcare, before and during covid-19. *Review of Economics of the Household*, 18(4):1001–1017.

Del Boca, D., Oggero, N., Profeta, P., and Rossi, M. C. (2021). Household division of labor during two waves of covid-19 in italy. *Covid Economics*, 60.

Fazzari, S. M. and Needler, E. (2021). Us employment inequality in the great recession and the covid-19 pandemic. *European Journal of Economics and Economic Policies: Intervention*, 18(2):223–239.

Fitzgerald, T. J. and Christiano, L. J. (1999). *The band pass filter*. National Bureau of Economic Research.

Folbre, N. (2021). *The rise and decline of patriarchal systems: An intersectional political economy*. Verso Books.

Hodrick, R. J. and Prescott, E. C. (1997). Postwar us business cycles: an empirical investigation. *Journal of Money, credit, and Banking*, pages 1–16.

Kleven, H., Landais, C., Posch, J., Steinhauer, A., and Zweimuller, J. (2019). Child penalties across countries: Evidence and explanations. In *AEA Papers and Proceedings*, volume 109, pages 122–26.

Lundberg, S. (1985). The added worker effect. *Journal of Labor Economics*, 3(1, Part 1):11–37.

Manicardi, C. (2023). Feminization of labour in italy. a preliminary assessment. *mimeo*.

Rubery, J. (2015). Change at work: feminisation, flexibilisation, fragmentation and financialisation. *Employee Relations*, 37(6):633–644.

Rubery, J. and Rafferty, A. (2013). Women and recession revisited. *Work, employment and society*, 27(3):414–432.

Sun, C. and Russell, L. (2021). The impact of covid-19 childcare closures and women's labour supply. *VoxEU. org. See also: Lauren Russell and Chuxuan Sun (2020), "The*, 61:124–154.

The Christiano-Fitzgerald Filter

The CF filter decomposes a time series $\{x_t\}_{t=1}^{T}$ into its trend and cyclical components. Assume we have a stochastic process

$$x_t = y_t + \bar{x}_t \tag{6}$$

where y_t is a process oscillating between $2 < p_l < p_u < \infty$ and the frequencies for which y_t has power are limited to $\{(a, b) \bigcup (-a, -b)\} \in (-\pi, \pi)$ where $a = \frac{2\pi}{p_u}$ and $b = \frac{2\pi}{p_l}$. For what concerns our analysis, $p_l = 6$ and $p_u = 32$, since cyclical components in a business cycle last from a minimum of six quarters (18 months with monthly data, 1.5 years with annual data) and a maximum of 32 (96 months, 8 years) hence $a = \frac{2\pi}{32}$ and $b = \frac{2\pi}{6}$ (Baxter and King (1999), Christiano and Fitzgerald (2003), Hodrick and Prescott (1997)). $\bar{x}_t$ is a process oscillating in the complement interval in $(-\pi; \pi)$ (Fitzgerald and Christiano (1999)). The CF filter approximate y_t with $\hat{y}_t$, a filter that is a linear function, a projection of y_t onto x_t of the raw data x_t: for $t = 1, \ldots, T$

$$\bar{y}_t = P[y|x] = \sum_{j=-f}^{p} \hat{B}_i^{p,f} x_{t-j} \tag{7}$$

where $f = T - t$ and $p = t - 1$. The weights are chosen to minimise the mean square error between y_t and $\hat{y}_t$, that is $\hat{B}_j^{p,f}$ solves

$$\min_{\hat{B}_i^{p,f} j=-f,..,p} E[(y_t - \hat{y}_t)^2 |x] \tag{8}$$

x_t is represented as a moving average of order q to avoid the filter to depend on time and non-stationarity of the series. As a result, we get two time series: a trend and a cycle, representing the deviations from the trend.

Linnea Nelli[1], Maria Enrica Virgillito[2]

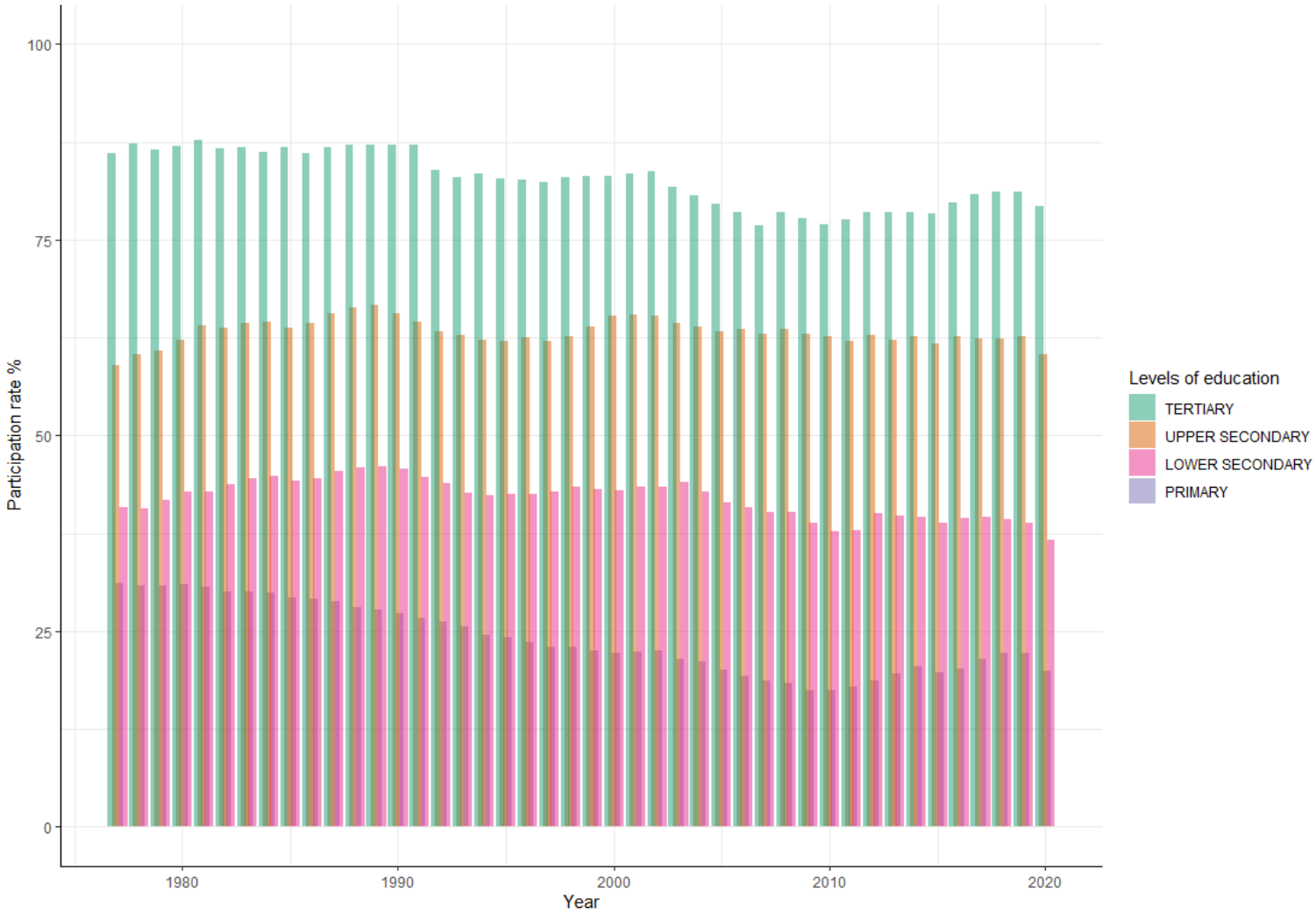


Figure A.1: Shares of female participation rate by education from 1977 to 2020, age 15-64. Data Source: Labour Force Survey, ISTAT

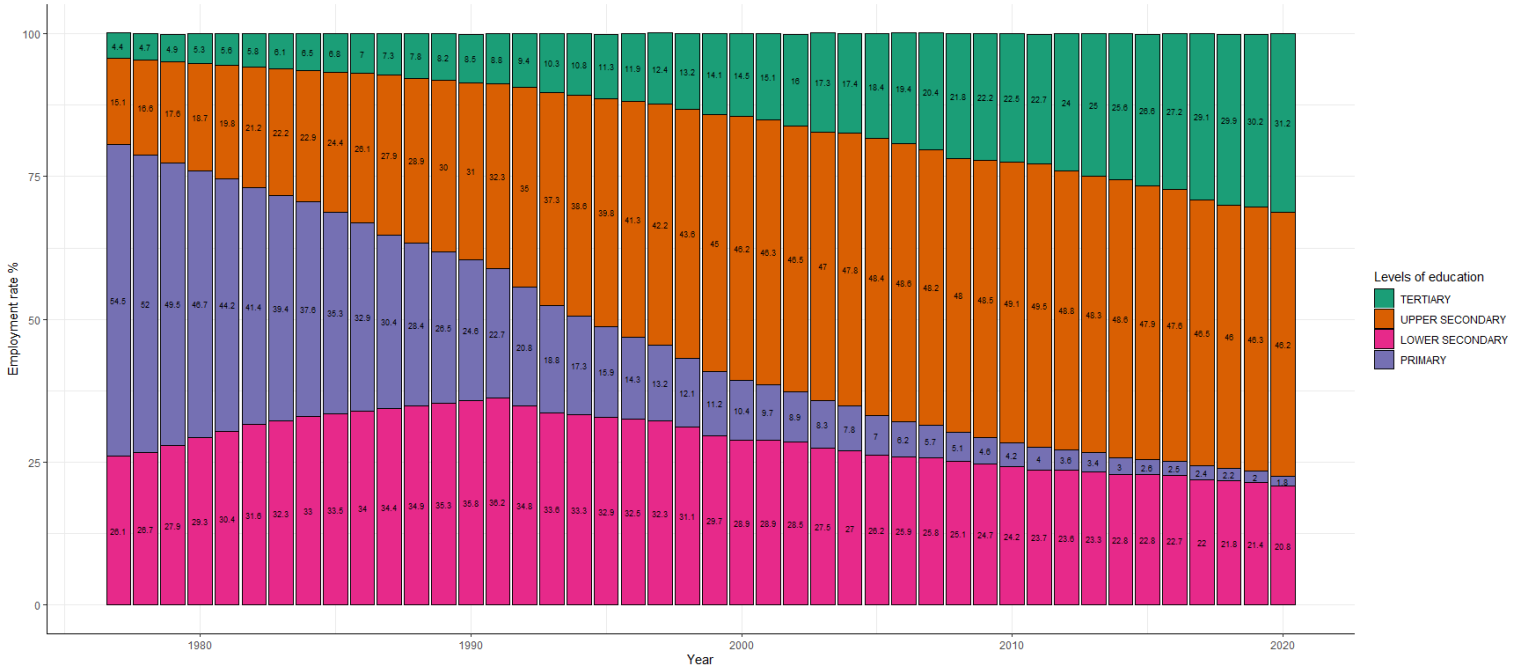


Figure A.2: Female employment rate by education from 1977 to 2020, age 15-64. Data Source: Labour Force Survey, ISTAT

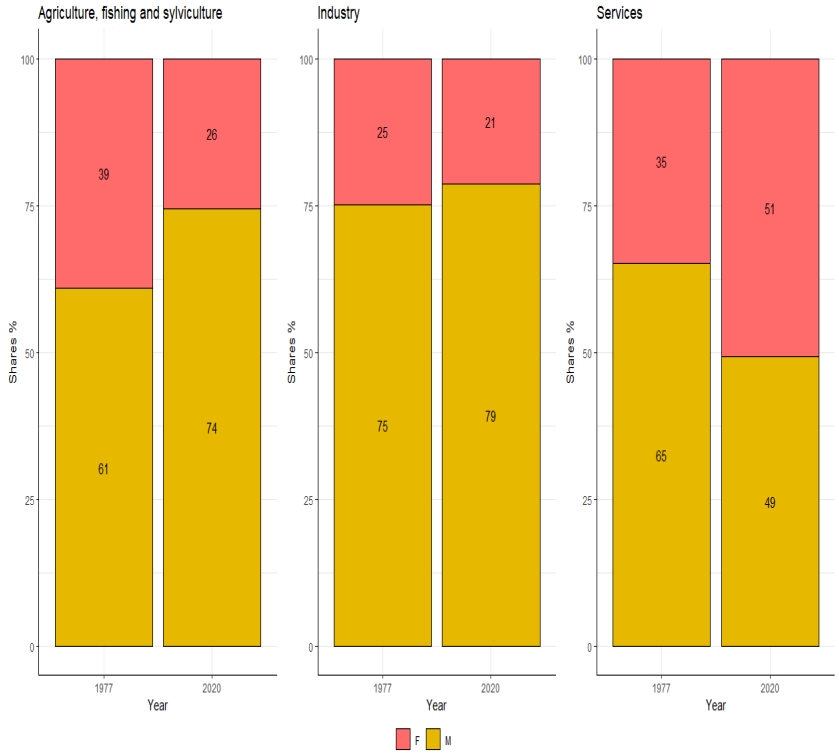


Figure A.3: Percentage share in employment by gender in macrosectors in 1977 and in 2020 in Italy, age 15 and over. Data Source: Labour Force Survey, ISTAT

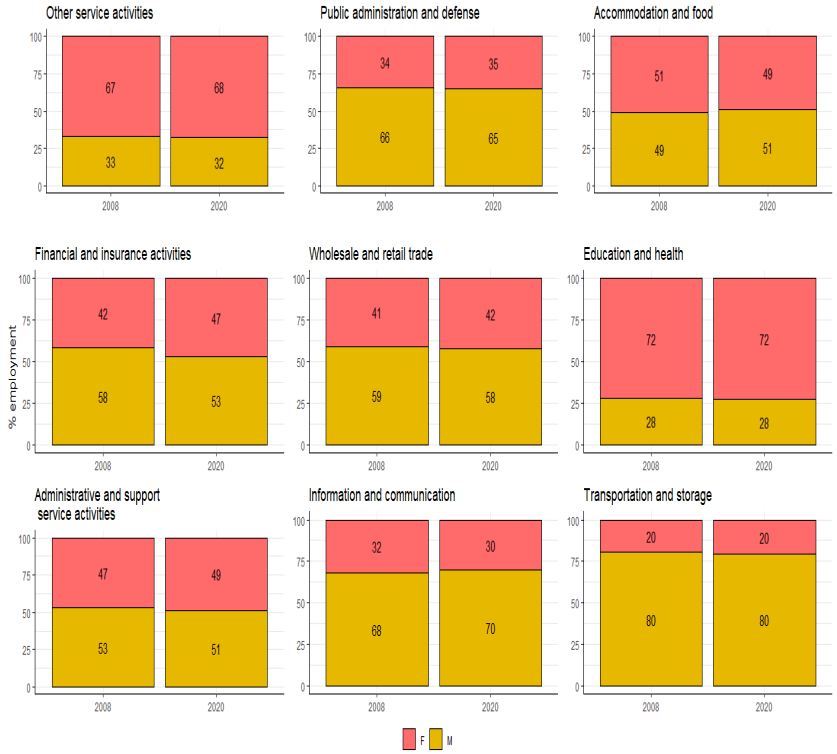


Figure A.4: Percentage share in employment by gender in the service sectors in Italy in 2008 and 2020, age 15 and over. Data Source: Labour Force Survey, ISTAT

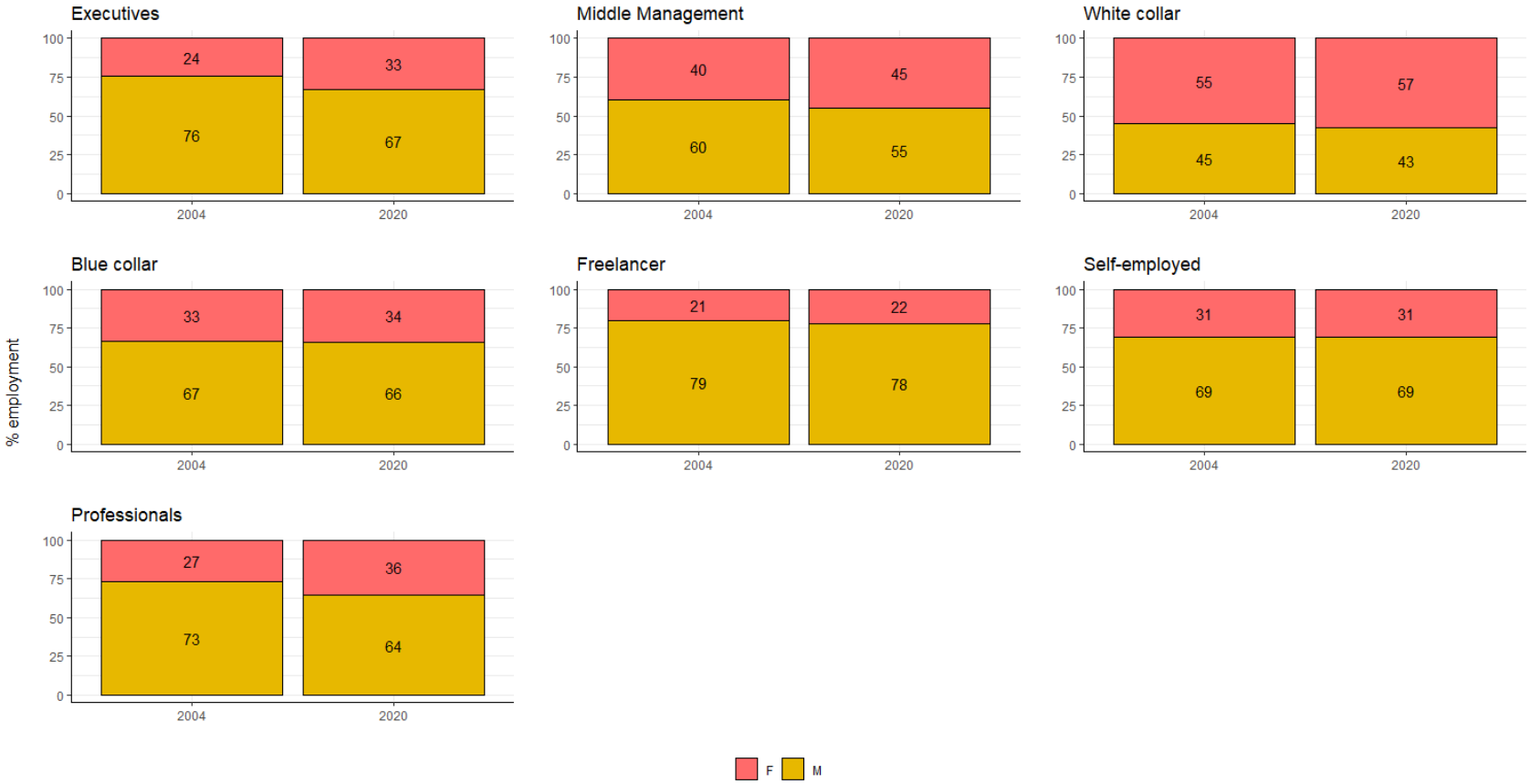


Figure A.5: Percentage shares in employment by gender and by professional status in 2004 and in 2020, age 15 and over. Data Source: Labour Force Survey, ISTAT

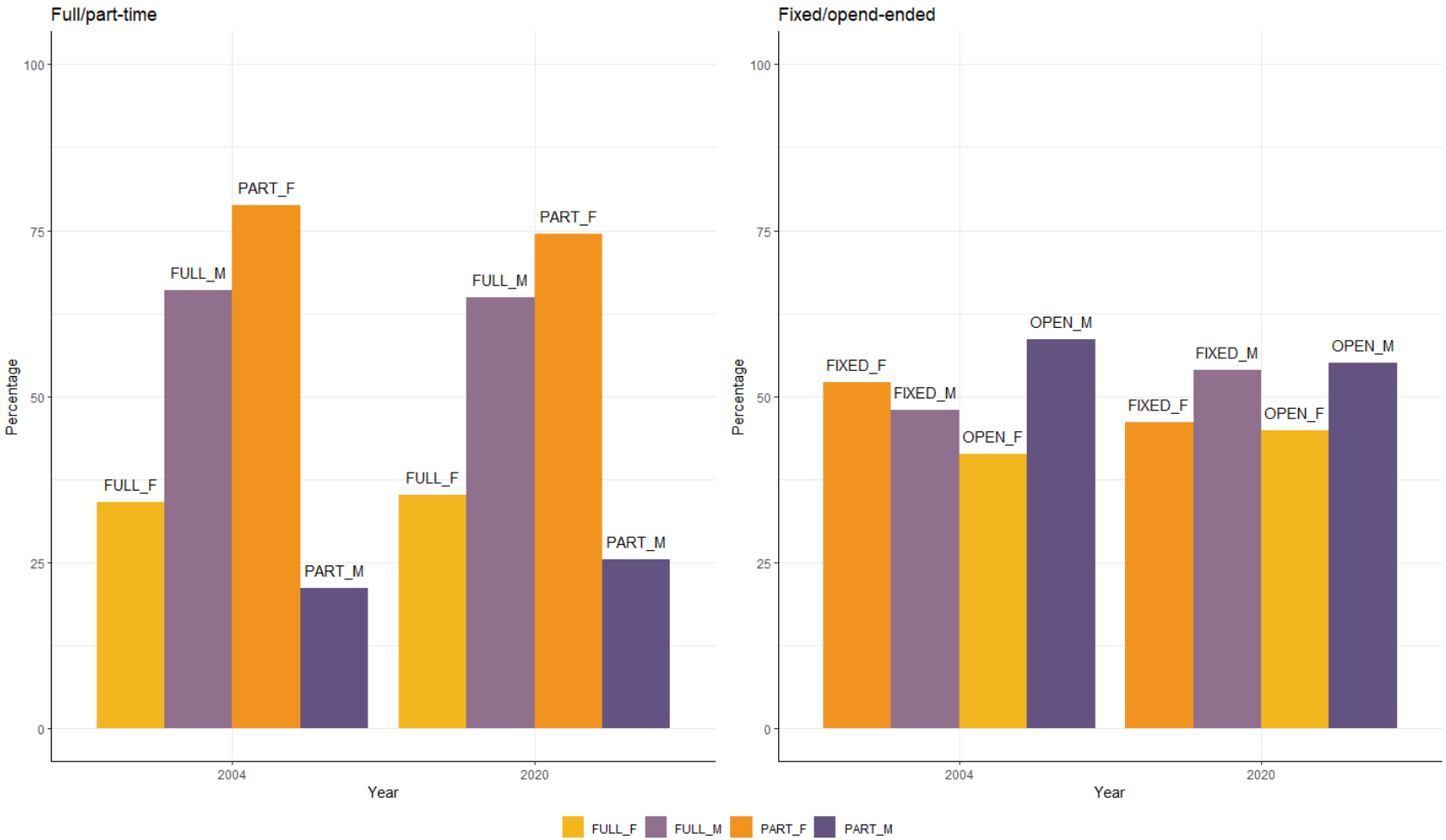


Figure A.6: Percentage shares of full/part time and fixed/open-ended contracts in employment by gender in 2004 and 2020, age 15-64. Data Source: Labour Force Survey, ISTAT

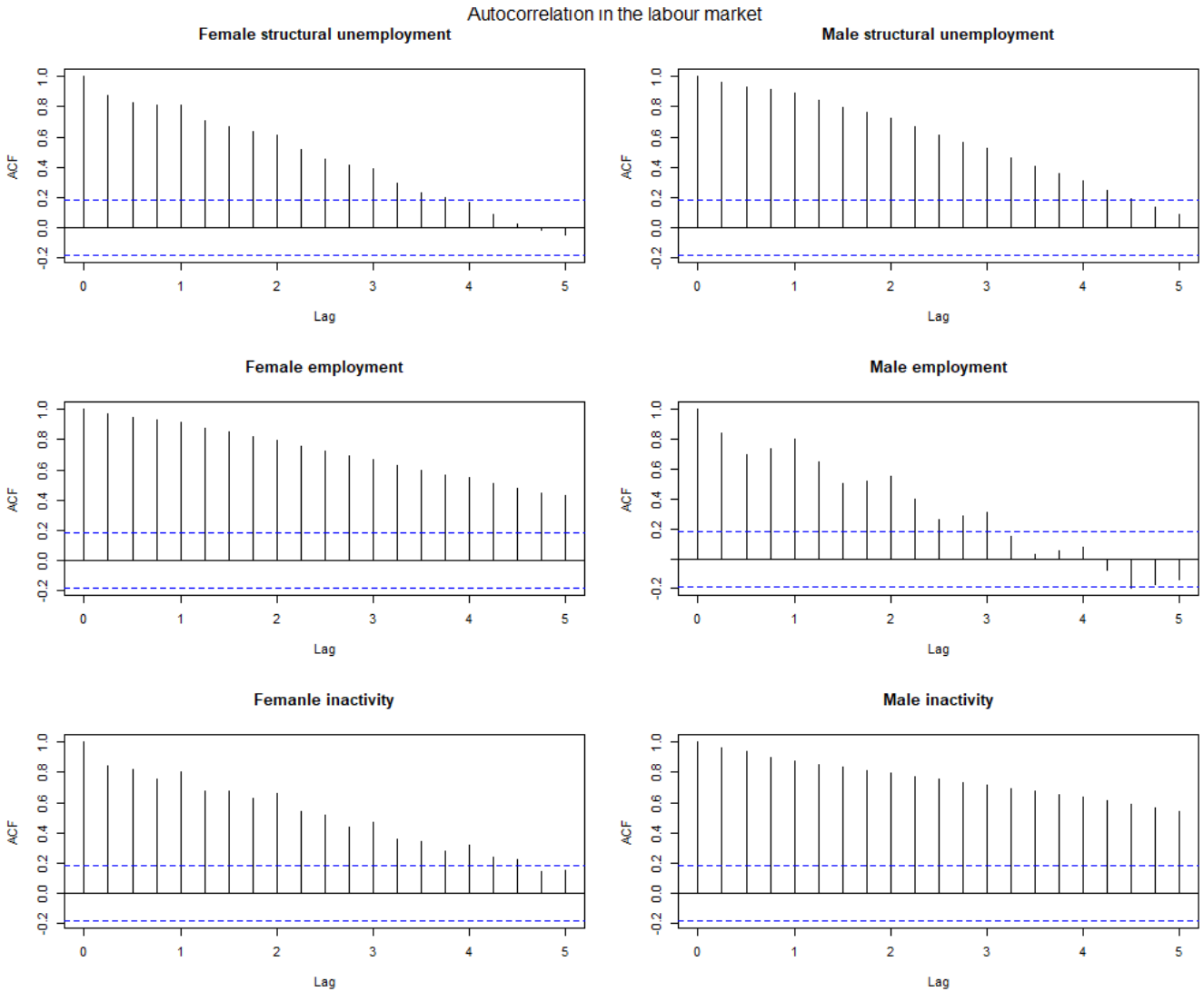


Figure A.7: Autocorrelation in the Italian Labour market by gender, quarter lags, age 15 and over. Data Source: Labour Force Survey, ISTAT

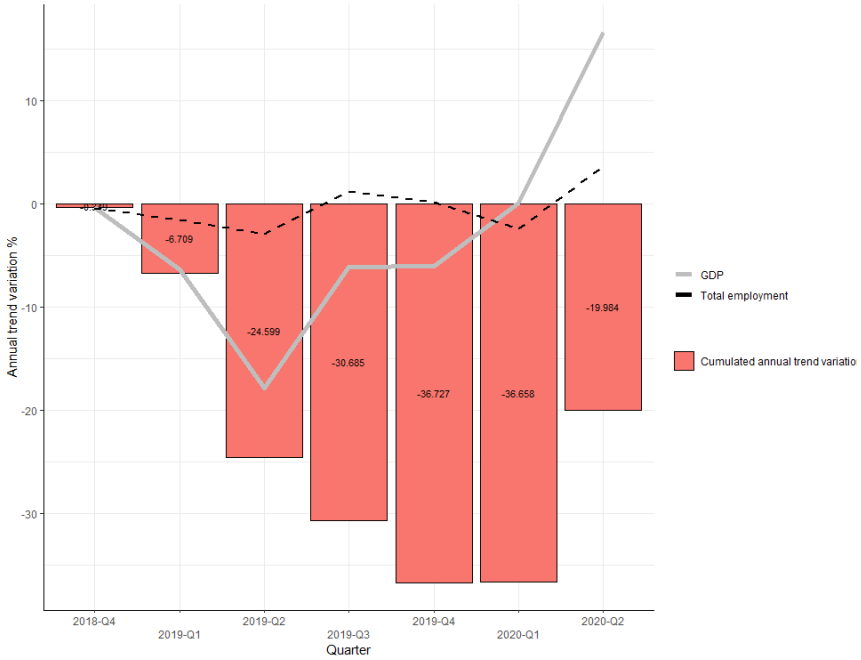


Figure A.8: Pre-recession peak identification: annual trend variation of GDP growth and employment with respect to correspondent quarter of previous year (from 2019-Q4 to 2021-Q2 with respect to 2018-Q4 and 2020-Q2)

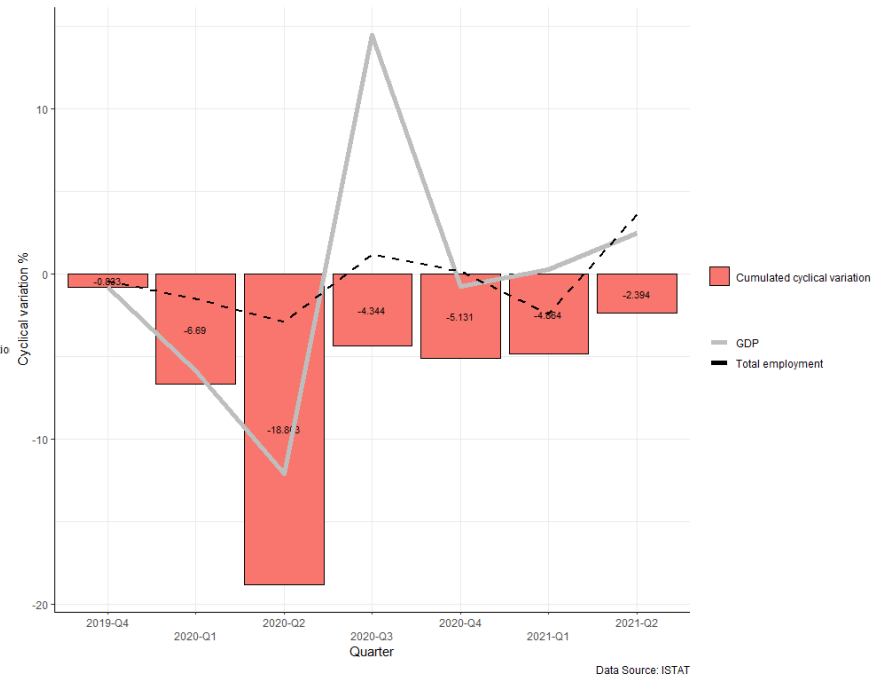


Figure A.9: Pre-recession peak identification: cyclical variation of GDP growth and employment with respect to previous quarter between 2019-Q4 and 2021-Q2

Figure A.10: Annual and cyclical variations in GDP and total employment. Data Source: National Accounts, ISTAT

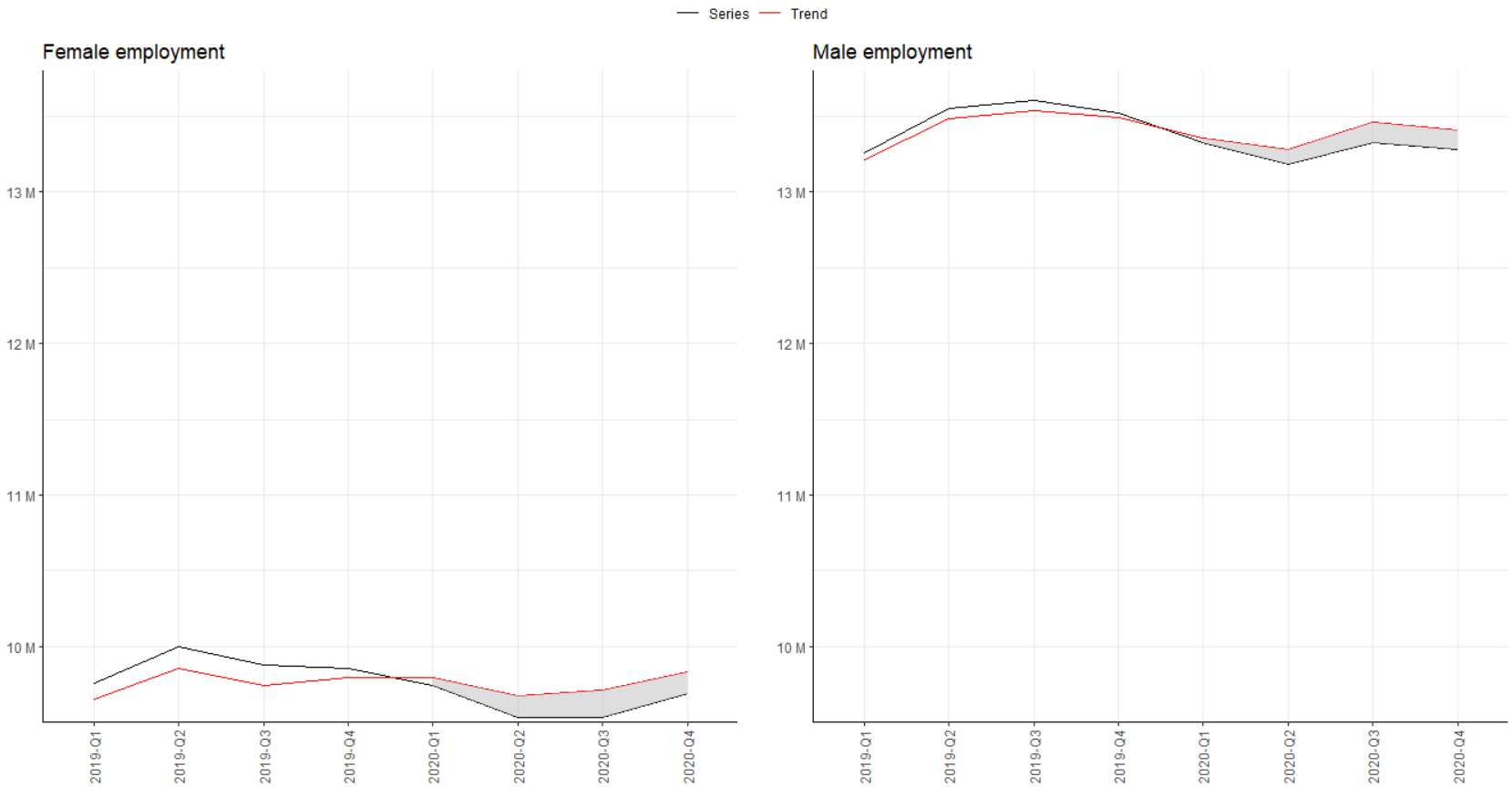


Figure A.11: Filtered employment data by gender by the CF filter, *quarter loss* in grey.

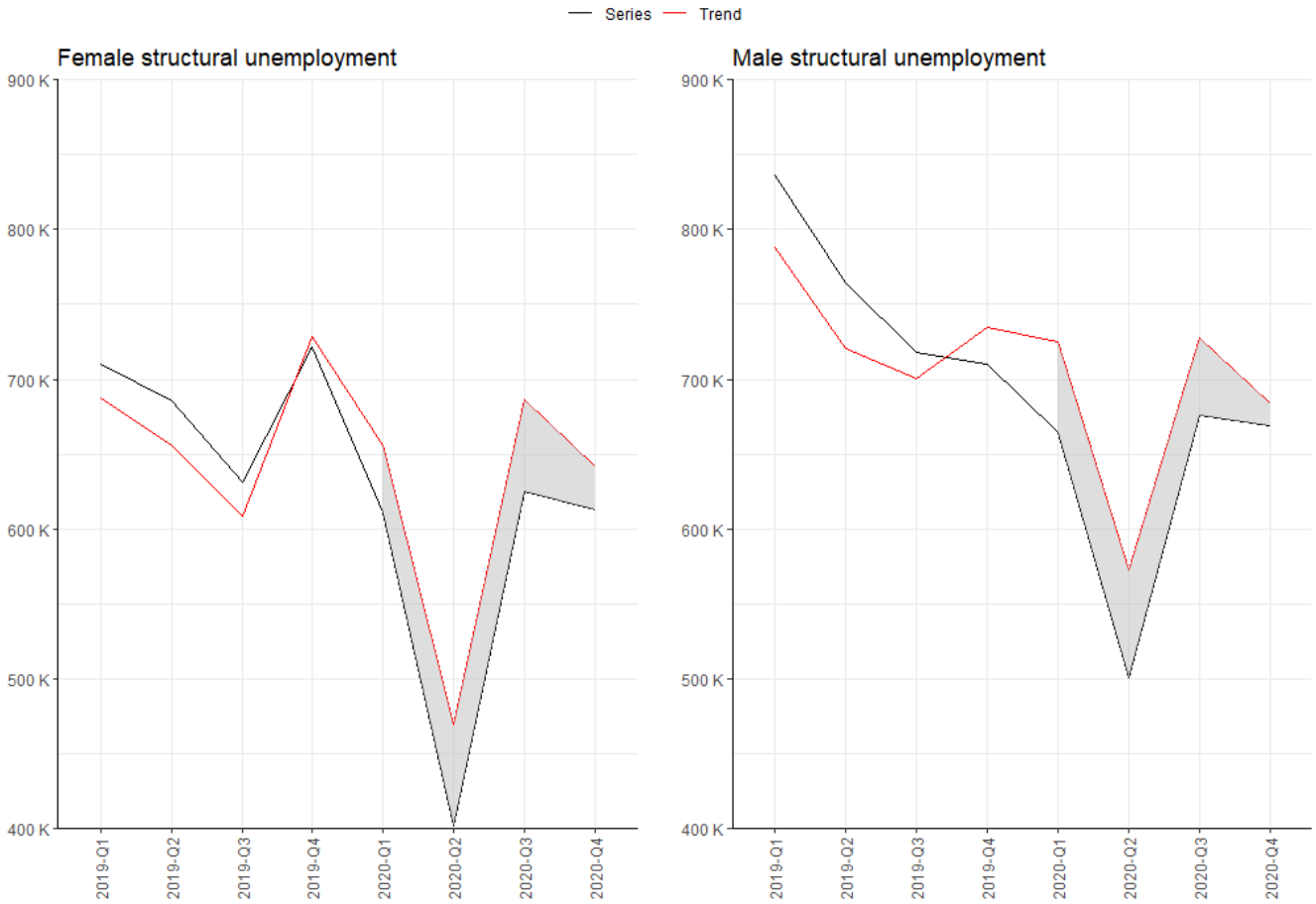


Figure A.12: Filtered structural unemployment data by gender by the CF filter, *quarter loss* in grey.

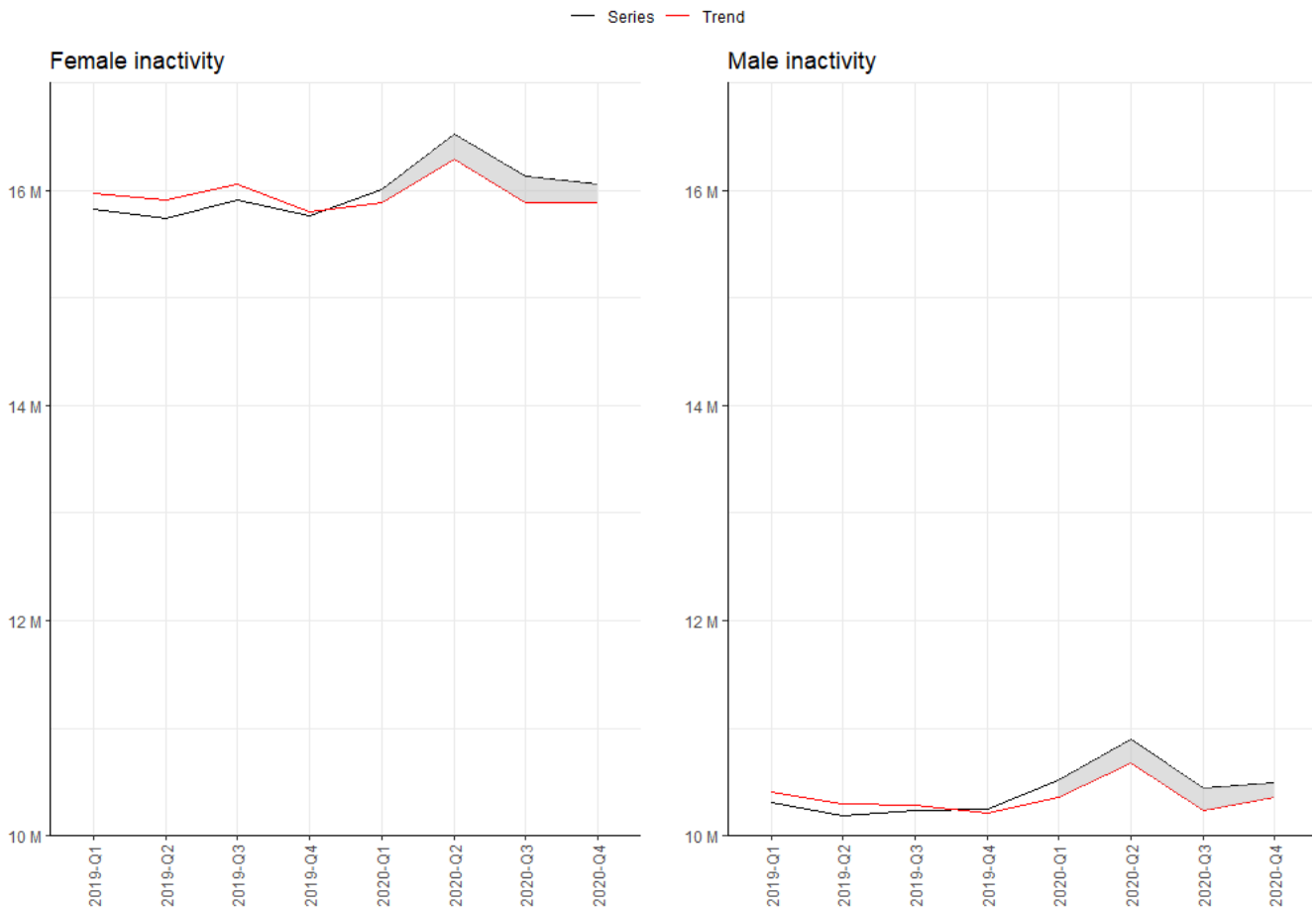


Figure A.13: Filtered inactivity data by gender by the CF filter, *quarter loss* in grey

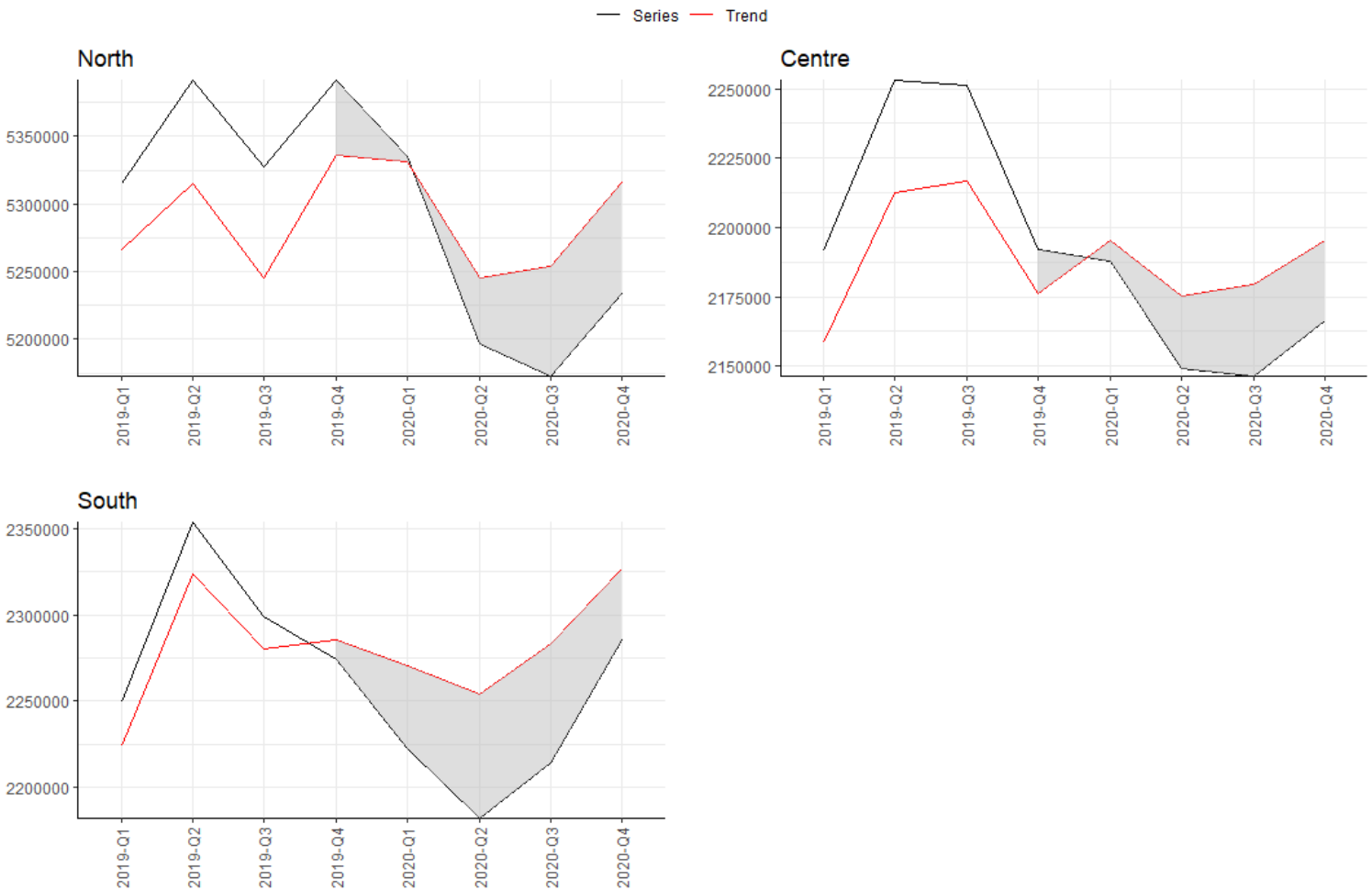


Figure A.14: Regional female employment data filtered up to 2020-Q4 quarter loss in grey

Figure A.15: Female employment by education level, data filtered up to 2020-Q4 quarter loss in grey

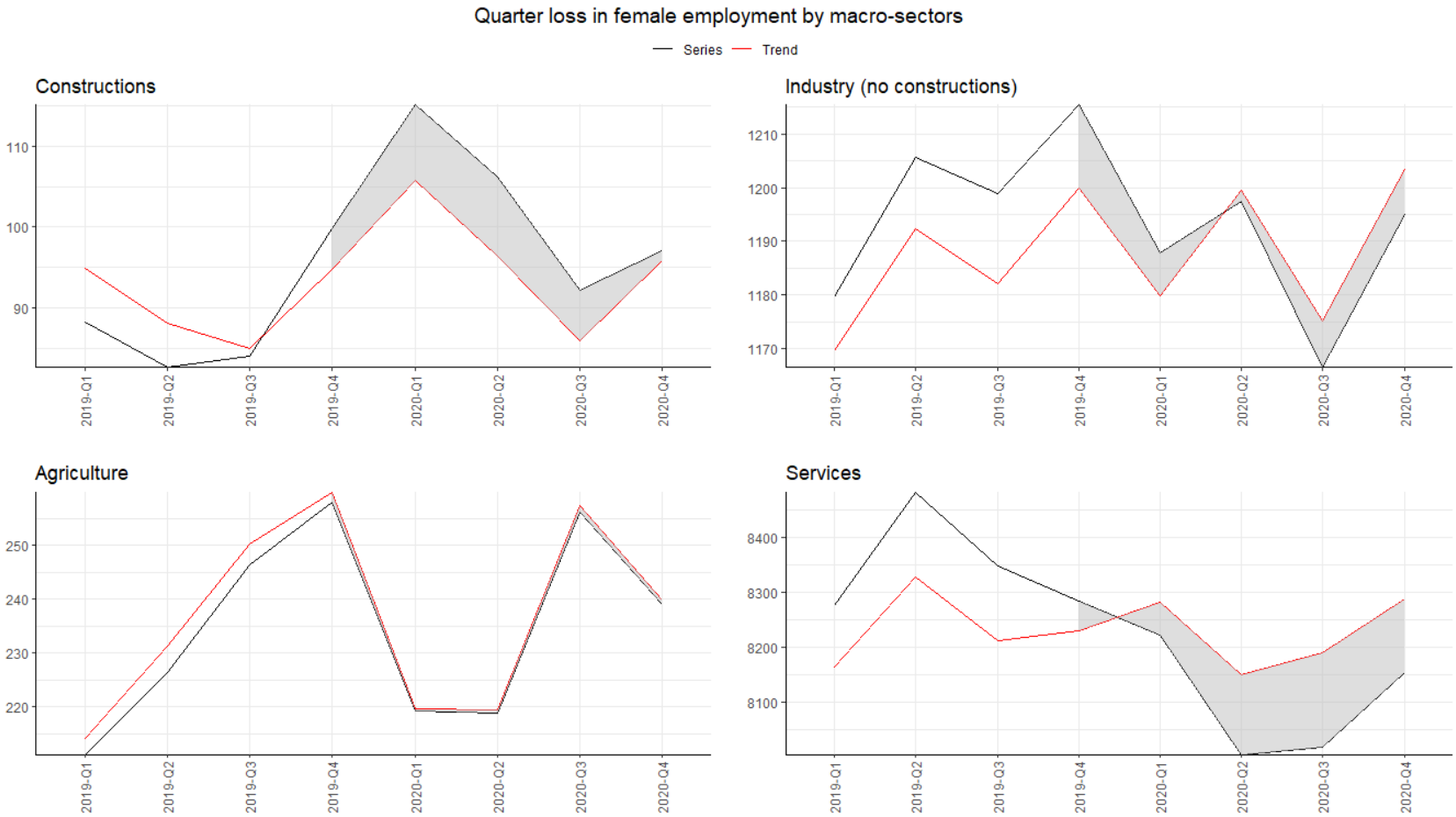


Figure A.16: Female employment by macro-sectors, data filtered up to 2020-Q4, quarter loss in grey.

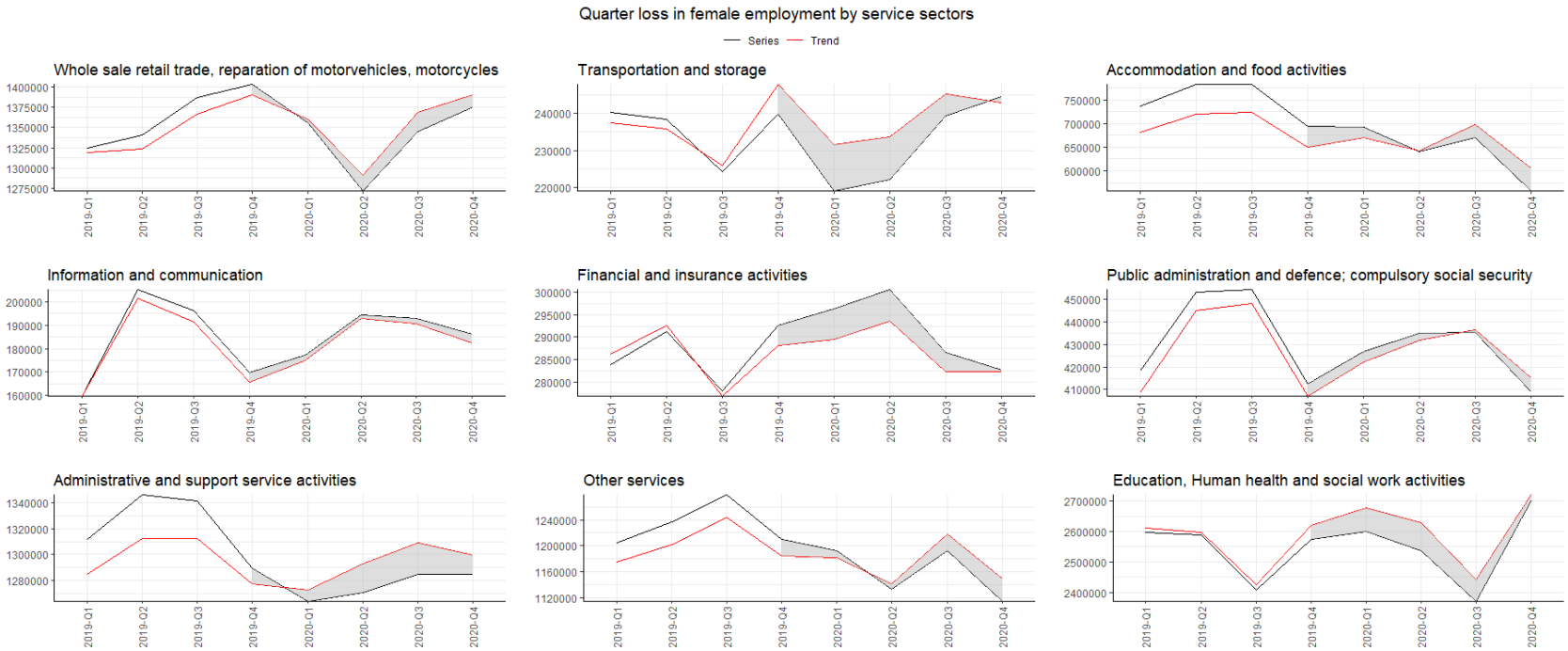


Figure A.17: Female employment by service sectors, data filtered up to 2020-Q4, quarter loss in grey

Figure A.18: Female employment by education level, filtered data by Hodrick-Prescott filter up to 2020-Q4, quarter loss in grey. Data Source: Labour Force Survey, ISTAT

Figure A.19: Female employment in service sub-sectors filtered data by Hodrick-Prescott filter up to 2020-Q4, quarter loss in grey

Table A.1: Descriptive statistics of the total, male and female employment, structural unemployment and inactivity, quarterly data, age 15 and over. Data Source: Labour Force Survey, ISTAT

	Employment		
Statistic	Female	Male	Total
t: 1993-Q1/2020-Q1	t=112	t=112	t=112
Mean	8,804,935	13,377,585	22,182,520
Median	9,065,017	13,353,464	22,405,984
St. Dev.	736,713.400	253,506.200	802,131.100
Min	7,398,284	12,766,801	20,522,766
Max	9,997,537	13,939,058	23,553,667
	Structural unemployment		
Statistic	Female	Male	Total
t: 1993-Q1/2020-Q1	t=112	t=112	t=112
Mean	604,888.900	602,806.400	1,207,695
Median	608,514	550,275	1,161,076
St. Dev.	144,883.100	209,565.500	349,337.600
Min	332,883	290,625	623,508
Max	1,022,043	1,093,141	2,062,632
	Inactivity		
Statistic	Female	Male	Total
t: 1993-Q1/2020-Q1	t=112	t=112	t=112
Mean	15,961,169	9,465,930	25,427,099
Median	15,960,906	9,440,054	25,483,066
St. Dev.	275,743.700	705,876.000	898,781.700
Min	15,417,757	8,186,644	24,095,277
Max	16,596,764	10,891,029	27,410,160

Table A.2: Descriptive statistics of female regional employment, quarterly data, age 15 and over. Data Source: Labour Force Survey, ISTAT

Female regional employment			
Statistic	North	Centre	South
t: 2000-Q1/2020-Q4	t=84	t=84	t=84
Mean	4,986,625	2,004,683	2,177,057
Median	5,027,856	2,020,519	2,169,161
St. Dev.	219,108.200	152,710.800	70,179.390
Min	4,433,069	1,633,726	1,959,192
Max	5,391,286	2,252,968	2,353,283

Table A.3: Descriptive statistics of female employment by education level, seasonally adjusted, quarterly data, age 15 and over. Data source: Labour Force Survey, ISTAT

	Female employment by education			
Statistic	Primary	Lower Secondary	Upper Secondary	Tertiary
t: 2000-Q1/2020-Q4	t=84	t=84	t=84	t=84
Mean	449,410.400	2,250,118	4,367,995	2,100,842
Median	388,812	2,244,788	4,453,724	2,079,064
St. Dev.	217,706.200	132,796.800	221,956.800	557,931
Min	164,703	1,930,380	3,704,025	1,175,015
Max	877,990	2,551,847	4,642,923	3,106,937

Table A.4: Descriptive statistics for female employment in macro-sectors, seasonally adjusted, quarterly data, age 15 and over. Data source: Labour Force Survey, ISTAT

Statistic	Agriculture	Industry (no constructions)	Constructions	Services
t: 2008-Q1/2020-Q4	t=52	t=52	t=52	t=52
Mean	238,012.700	1,194,168.000	102,475.900	7,900,942.000
St. Dev.	21,970.100	59,253.030	12,857.300	270,898.500
Min	192,242	1,121,008	82,309	7,461,804
Max	285,696	1,393,379	138,650	8,482,943

Statistic	t:2008Q1/2020Q4	Mean	St. Dev.	Min	Max
Wholesale and retail trade, repair of motorvehicles and motorcycles	t=52	1,350,212.000	38,889.180	1,263,695	1,437,968
Transportation and Storage	t=52	215,664.700	14,868.440	186,070	247,524
Accommodation and food services	t=52	657,866.900	69,819.430	537,172	808,972
Information and Communication	t=52	173,919.700	12,447.250	142,509	205,232
Financial and insurance activities	t=52	282,109.400	12,803.440	251,640	314,483
Administration and support services	t=52	1,204,422.000	65,243.330	1,083,271	1,346,365
Public administration and defense	t=52	451,678.900	29,169.130	403,661	504,997
Education, human health and social work	t=52	2,406,468.000	118,035.900	2,209,399	2,700,402
Other services	t=52	1,158,601.000	96,157.810	875,814	1,278,327

Table A.5: Descriptive statistics for female employment in service subsectors, seasonally adjusted, quarterly data, age 15 and over. Data source: Labour Force Survey, ISTAT

Employment						
T	$l_{\epsilon_{g,w}}$	$l_{\epsilon_{g,m}}$	$s_{\epsilon_{g,w}}$	$s_{\epsilon_{g,m}}$	QL_w	QL_m
2020-Q2	47.878	52.122	42.157	57.843	1.136	0.901
2020-Q4	50.723	49.277	42.157	57.843	1.203	0.852
Structural unemployment						
T	$l_{u_g,w}$	$l_{u_g,m}$	$s_{u_g,w}$	$s_{u_g,m}$	QL_w	QL_m
2020-Q2	52.880	47.120	50.382	49.618	1.050	0.950
2020-Q4	53.053	46.947	50.382	49.618	1.053	0.946
Inactivity						
T	$l_{i_g,w}$	$l_{i_g,m}$	$s_{i_g,w}$	$s_{i_g,m}$	QL_w	QL_m
2020-Q2	50.840	49.160	60.603	39.397	0.839	1.248
2020-Q4	53.649	46.351	60.603	39.397	0.885	1.177

Table A.6: Quarter loss with respect to the Hodrick-Prescott filter in employment, structural unemployment and inactivity

Regional female employment									
T	$l_{\epsilon_{r,n}}$	$l_{\epsilon_{r,c}}$	$l_{\epsilon_{r,s}}$	$s_{\epsilon_{r,n}}$	$s_{\epsilon_{r,c}}$	$s_{\epsilon_{r,s}}$	QL_n	QL_c	QL_s
2020-Q2	40.696	22.715	36.58	54.691	22.239	23.070	0.744	1.021	1.586
2020-Q4	47.948	23.169	28.88	54.691	22.239	23.070	0.877	1.042	1.252

Table A.7: Quarter loss by Hodrick-Prescott filter for female employment in different macro regions of Italy

Female employment by education												
T	$l_{\epsilon_{e,p}}$	$l_{\epsilon_{e,ls}}$	$l_{\epsilon_{e,us}}$	$l_{\epsilon_{e,t}}$	$s_{\epsilon_{e,p}}$	$s_{\epsilon_{e,ls}}$	$s_{\epsilon_{e,us}}$	$s_{\epsilon_{e,t}}$	QL_p	QL_{ls}	QL_{us}	QL_t
2020-Q2	7.639	33.874	33.360	25.127	2.035	21.363	46.197	30.405	3.754	1.586	0.722	0.826
2020-Q4	3.765	31.349	31.365	33.521	2.035	21.363	46.197	30.405	1.850	1.467	0.679	1.102

Table A.8: Quarter loss with respect to the Hodrick-Prescott filter in female employment by education level

	Female employment by macro-sectors											
T	$l_{\epsilon_{s,a}}$	$l_{\epsilon_{s,c}}$	$l_{\epsilon_{s,i}}$	$l_{\epsilon_{s,s}}$	$s_{\epsilon_{s,a}}$	$s_{\epsilon_{s,c}}$	$s_{\epsilon_{s,i}}$	$s_{\epsilon_{s,s}}$	QL_a	QL_c	QL_i	QL_s
2020-Q2	13.89	-12.24	0.44	97.91	1.01	12.33	2.62	84.04	5.30	-12.09	0.04	1.17
2020-Q4	2.76	-4.85	6.19	95.89	1.01	12.33	2.62	84.04	1.05	-4.79	0.50	1.14

Table A.9: Quarter loss by Hodrick Prescott filter for female employment by macro-sectors

Sector	$l_{\epsilon_{serv}}$	$s_{\epsilon_{serv}}$	QL_{serv}
Wholesale and retail trade and repair of motor vehicles and motorcycles	9.27	16.94	0.55
Transportation and storage	3.28	2.9	1.13
Accommodation and food activities	36.7	8.38	4.38
Information and communication	-1.41	2.05	-0.69
Financial and insurance activities	-1.81	3.53	-0.51
Public administration and defence; compulsory social secutiry	2.01	4.98	0.4
Administrative and support service activities	18.36	15.57	1.18
Other services	25.23	14.6	1.73
Education, Human health and social work activities	8.38	31.07	0.27

Table A.10: Quarter loss by Hodrick Prescott filter for female employment by service subsectors filtered up to 2020-Q4