WOMEN, TERRITORIES AND INEQUALITY.
A MULTIDIMENSIONAL ANALYSIS OF THE WELL-BEING GENDER GAP IN THE ITALIAN PROVINCES [1]

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Abstract. The analysis of the well-being gender gap in the Italian provinces highlights the persistent socio-economic inequalities between men and women and the territorial differences in the distribution of well-being. In this study, a multidimensional statistical analysis of the well-being gender gap in the Italian provinces is proposed to identify latent structures and recurring territorial patterns. Using data from official sources such as Italian National Institute of Statistics (Istat) and in particular the report on "Equitable and Sustainable Well-being in Italy" (BES) [2], a set of indicators was selected that represent three dimensions of well-being - Knowledge, Work and Wealth - disaggregated by gender. The study provides ideas for the design of targeted territorial policies that can address inequalities in an integrated way and promote more equitable and inclusive development at local level.

1. Introduction

Gender equality is a fundamental human right and a strategic goal for individual economic and social well-being. Ensuring equal opportunities for men and women promotes economic growth, strengthens democracy and improves social cohesion, which benefits society as a whole.

Goal 5 of the United Nations Sustainable Development Goals (SDGs)[3] focuses on reducing the gender gap with the aim of achieving gender equality and empowering all women and girls. However, despite the progress made in recent years, gender inequalities persist in our country and manifest themselves in many areas of life.

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[1] The paper is the result of the common work of the authors. In particular, the sections are attributed as follows: M. Carbonara sections 1, 2.1 and 3.2, G. Lecardane sections 3, 3.1, 3.3, 3.4 and 4, A. Pareto sections 2.2. and 3.5.

[2] ISTATa. 2024. Rapporto Bes 2023: il Benessere Equo e Sostenibile in Italia. https://www.istat.it/wp-content/uploads/2024/04/Bes-2023-Ebook.pdf.

[3] The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. ISTATb. 2024. Rapporto SDGs 2024: informazioni statistiche per l'Agenda 2030 in Italia. https://www.istat.it/produzione-editoriale/rapporto-sdgs-2024/.

According to the World Economic Forum's Global Gender Gap Report 2024[4], full gender equality could only be achieved in 134 years, i.e. in around five generations, well beyond the sustainable development goal set for 2030. In the global ranking of 146 countries, Italy is in 87th place, with a worrying drop of 8 positions compared to 2023.

The analysis of the BES indicators in Italy reveals significant differences between men and women. Although women achieve better school results, with fewer dropouts and higher skills, they encounter considerable difficulties on the labour market. The female employment rate is significantly lower, while non-participation in the labour market and involuntary part-time work are higher.

Gender inequality manifests itself in various areas, from professional life to family, from education to pay, up to the representation of women in leadership positions. This phenomenon is influenced by behavioural patterns or personal attitudes and the socioeconomic context. However, there is still much scope for policy measures aimed at building a more equitable system, improving work-life balance, strengthening services and promoting employment and employability.

In this paper, data from the "BES of Territories" indicator system are used to perform a multidimensional statistical analysis of inequalities between men and women in the Italian provinces, focussing on three key dimensions: Knowledge, Work and Wealth. The aim is to identify particularly vulnerable groups and provide elements of reflection for policies aimed at improving well-being in various aspects of life.

2. Data and method

2.1 Individual indicators and polarities

Every year, Istat publishes the update of the indicator system for the "Equitable and Sustainable Well-being of Territories" (BesT) for the Italian provinces and metropolitan cities, which is consistent and integrated with the BES framework adopted at national level. The BesT indicators provide a detailed overview of the distribution of well-being in the different territories of the country and allow a more accurate assessment of territorial inequalities and the definition of the specific well-being profiles of each territory.

From this system of indicators, 11 individual indicators updated until 2023 were selected and grouped into three dimensions:

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[4] The Global Gender Gap Index annually benchmarks the current state and evolution of gender parity across four key dimensions (Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment).

1. *Knowledge*, which includes indicators related to educational attainment and skills development.
2. *Work*, which relates to employment and job security.
3. *Wealth*, which contains indicators related to income and economic well-being.

Table 1 describes, for each dimension, the indicators and their 'polarity', i.e. the sign of the relationship between the indicator and the phenomenon to be measured.

Table 1 – *Dimensions, individual indicators and polarities.*

Dimension	Label	Indicator	Polarity (+/-)
Knowledge	Ind1	Transition to university	+
	Ind2	Inadequate numerical competence (students in third year of secondary school)	-
	Ind3	Inadequate literacy skills (third year secondary school students)	-
Work	Ind4	Employment rate (20-64 years)	+
	Ind5	Non-participation rate at work	-
	Ind6	Rate of fatal and permanent disability accidents at work	-
	Ind7	Youth employment rate (15-29 years)	+
	Ind8	Youth Labour Market Non-Participation Rate (15-29 years)	-
Wealth	Ind9	Average annual wages of employees	+
	Ind10	Average annual per capita pension income	+
	Ind11	Retirees with low pension income	-

Source: Istat

2.2 Composite index construction

The challenge of this study is to compare the evolution of well-being in the Italian provinces by gender and over time.

In order to make comparisons by gender from 2018 to 2022, the individual indicators were normalized using the constrained Min-Max method of the AMPI (Adjusted Mazziotta-Pareto Index), which transforms the indicators in a similar way to the Min-Max method but uses a common reference base set equal to 100 (Mazziotta and Pareto, 2022).

For a generic province *i*, indicator *j* and gender *k* at time *t*, the normalized value is:

$$r_{ijk}^t = 100 \pm 60 \frac{x_{ijk}^t - x_{oj}}{\max_{itk}(x_{ijk}^t) - \min_{itk}(x_{ijk}^t)}$$

where:
- x_{ijk}^t is the original value;

- x_{oj} is the value of indicator j for Italy (males + females) in 2018 (base);
- $\min_{itk}(x_{ijk}^t)$ and $\max_{itk}(x_{ijk}^t)$ are the minimum and maximum of indicator j from 2018 to 2022 regardless of gender;
- the sign $\pm$ is the polarity of indicator j.

The normalized indicators were aggregated with a compensatory approach into 3 pillars (one for each dimension) using a simple arithmetic mean:

$$\text{KNOW}_{ik}^t = \frac{\sum_{j=1}^{3} r_{ijk}^t}{3} \; ; \quad \text{WORK}_{ik}^t = \frac{\sum_{j=4}^{8} r_{ijk}^t}{5} \; ; \quad \text{WEAL}_{ik}^t = \frac{\sum_{j=9}^{11} r_{ijk}^t}{3} \; .$$

The 3 pillars were then aggregated with a partially compensatory approach into the AMPI with a negative penalty (Mazziotta and Pareto, 2016). Therefore, the composite index of well-being for province i and gender k at time t is given by:

$$\text{AMPI}_{ik}^t = \text{M}_{ik}^t - \text{S}_{ik}^t \, \text{cv}_{ik}^t$$

where M_{ik}^t, S_{ik}^t, cv_{ik}^t are the mean, standard deviation, and coefficient of variation of the three pillars (KNOW, WORK and WEAL) for province i and gender k at time t, respectively.

Finally, the AMPI variation from 2018 to 2022 for province i and gender k was also calculated as follows:

$$\Delta(\text{AMPI})_{ik} = \text{AMPI}_{ik}^t - \text{AMPI}_{ik}^{t-1}$$

where t=2022 and t-1=2018.

If $\Delta(\text{AMPI})_{ik} > 0$, well-being has increased from 2018 to 2022; if $\Delta(\text{AMPI})_{ik} < 0$, well-being has decreased.

3. Results and discussions

3.1. Descriptive statistics of the individual indicators

Table 2 presents the descriptive statistics of the analysed indicators, disaggregated by gender and compared between 2018 and 2022. The data reveal marked gender differences that persist over time.

Regarding education, the transition to university (Ind1) shows a clear female advantage, with an average of 56.6% for women versus 44.6% for men in 2018, a gap that widens further in 2022 (59.8% vs. 46.2%). Conversely, indicators of inadequate basic education (Ind2 and Ind3) show worse performance for men, with higher coefficients of variation indicating greater territorial dispersion. The greatest inequalities can be observed on the labour market. The general employment rate

(Ind4) presents a substantial gender gap: 73% for men versus 53.4% for women in 2018, which persists in 2022 (74.9% vs. 55.4%). The phenomenon is even more pronounced in the youth cohort (Ind7), where the gap intensifies over time. Non-participation in the labour force (Ind5 and Ind8) confirms greater female exclusion from the labour market.

Table 2 – *Descriptive statistics of the indicators. Male and Female. 2018 and 2022.*

Indicator	Male			Female		
	Mean	**Std**	**CV (%)**	**Mean**	**Std**	**CV (%)**
			2018			
Ind1	44.6	6.0	13.4	56.6	6.7	11.8
Ind2	37.2	10.5	28.3	40.5	11.0	27.1
Ind3	37.8	7.8	20.6	29.9	6.7	22.5
Ind4	73.0	8.9	12.2	53.4	13.2	24.7
Ind5	16.1	9.6	59.3	24.4	13.4	55.1
Ind6	18.4	5.9	32.2	7.7	3.8	48.7
Ind7	36.3	9.2	25.3	27.1	8.9	32.7
Ind8	32.9	16.4	49.7	39.6	17.5	44.2
Ind9	22,449.2	4,485.3	20.0	15,075.7	3,040.9	20.2
Ind10	21,053.8	2,626.4	12.5	15,401.9	1,273.2	8.3
Ind11	9.3	3.2	35.0	11.3	3.6	32.1
			2022			
Ind1	46.2	6.0	13.0	59.8	6.5	10.9
Ind2	41.9	10.2	24.4	45.7	10.7	23.4
Ind3	43.7	7.3	16.8	33.4	7.1	21.1
Ind4	74.9	8.1	10.9	55.4	13.1	23.6
Ind5	13.2	8.4	64.0	20.4	12.5	61.4
Ind6	15.1	4.4	29.3	6.1	2.5	40.8
Ind7	39.6	8.6	21.8	29.6	9.5	32.1
Ind8	26.2	14.3	54.4	31.5	17.5	55.6
Ind9	23,534.3	4,503.9	19.1	16,037.9	3,065.6	19.1
Ind10	22,765.4	2,797.9	12.3	16,908.3	1,441.4	8.5
Ind11	8.1	2.7	33.6	10.2	3.2	31.9

Source: Istat data processing.

Economic indicators reveal further disparities: the average wage of employees (Ind9) and the average amount of pension income (Ind10) show higher values for men in both years. The percentage of pensioners with low-income benefits (Ind11) is systematically higher among women. The coefficients of variation highlight considerable territorial heterogeneity for all indicators, with particularly high values for labour participation indicators, suggesting marked differences across Italian provinces. Overall, the data confirm the persistence of significant gender inequalities in Italian territorial well-being, with slight improvements in some areas between 2018 and 2022, but without substantial structural changes.

3.2. *Box plots of the individual indicators*

The box plots in Figure 1 show the distribution of the eleven normalized well-being indicators across Italian provinces, disaggregated by gender in 2022. The graphical analysis reveals not only differences in medians between men and women, but also territorial variability and the presence of extreme values.

Knowledge indicators. The transition to university (Ind1) graphically confirms the female advantage, with a significantly higher median for women and a distribution more concentrated in the upper values. The inadequate basic education indicators (Ind2 and Ind3) show similar distributions between genders, with a slight tendency toward higher values for men, particularly evident in the upper outliers.

Work indicators. The box plots reveal the most pronounced disparities in the work market. The general employment rate (Ind4) and youth employment rate (Ind7) show markedly different distributions: for men, the medians are positioned at high levels with contained variability, while for women the distributions are systematically shifted toward lower values. Non-participation in work (Ind5 and Ind8) presents the opposite pattern, with women showing higher medians and greater territorial dispersion, evidenced by wider boxes and numerous outliers.

Wealth indicators. The wage indicators (Ind9 and Ind10) show distributions favourable to men, with higher medians and more contained variability. Particularly significant is the gap in pension income (Ind10), where the difference between medians is substantial. The indicator on low-income pensioners (Ind11) confirms greater female economic vulnerability, with a distribution shifted toward higher values.

The most significant aspects emerging from the analysis are:
– Persistence of the employment gap. Women continue to show systematic disadvantages in labour market-related indicators, both for general and youth employment.
– Female educational advantage. The transition to university represents an area where women excel, suggesting greater investment in human capital.
– Temporal stability of disparities. The 2018-2022 comparison shows that, despite some improvements, the fundamental patterns of the gender gap remain substantially unchanged.
– Territorial heterogeneity. The variability of the box plots highlights how gender disparities manifest differently across Italian provinces, requiring territorially differentiated approaches.
– Territorial variability. The box plots highlight how some indicators present considerable heterogeneity among provinces, with wide interquartile ranges and presence of outliers, particularly in female labour participation indicators. This variability suggests the existence of territorial contexts with very

different performances, emphasizing the importance of the geographical dimension in analysing gender inequalities. The presence of numerous outliers in several indicators indicates provinces with exceptional characteristics compared to the national pattern, deserving specific in-depth analysis to understand the factors underlying such differences.

**Figure 1** – *Normalized well-being indicators across Italian provinces by gender. 2018, 2022.*
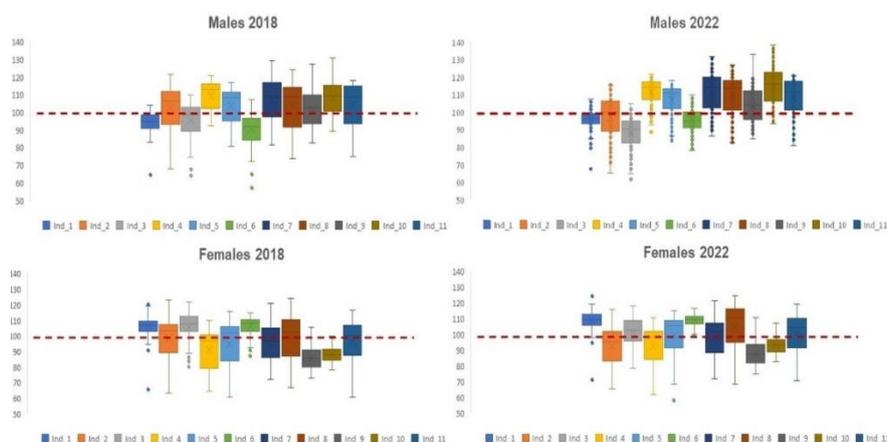
Source: Istat data processing

3.3. Transition diagrams of the Pillars

In this Section, the transition diagrams of the three pillars from 2018 to 2022 are discussed. The further away the points are from the main diagonal (the line of equation $y = x$), the more the values for 2018 and 2022 differ.

Knowledge Pillar. The diagram shows a prevalent concentration for northern Italy in the upper right quadrant (values >100 in both years), with particular prominence of Lombardia and Triveneto provinces, while in southern Italy, the concentration is present in the lower left quadrant, with values systematically below the national average (Fig. 2). The female advantage is marked, with systematically superior performance compared to men in all geographical areas. The gender gap persists and remains stable over time, with differences of approximately 5-10 points. Lecco is the province with absolute prevalence for women (>113), representing the best national case. Additionally, a generalized deterioration is recorded in the provinces as most of them are positioned below the bisector, indicating decreases from 2018 to 2022.

Figure 2 – *Transition diagram of the Knowledge Pillar, Male and Female. 2018 vs 2022.*
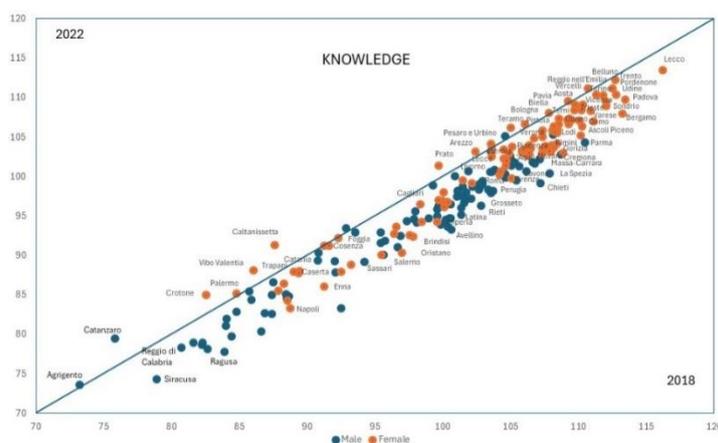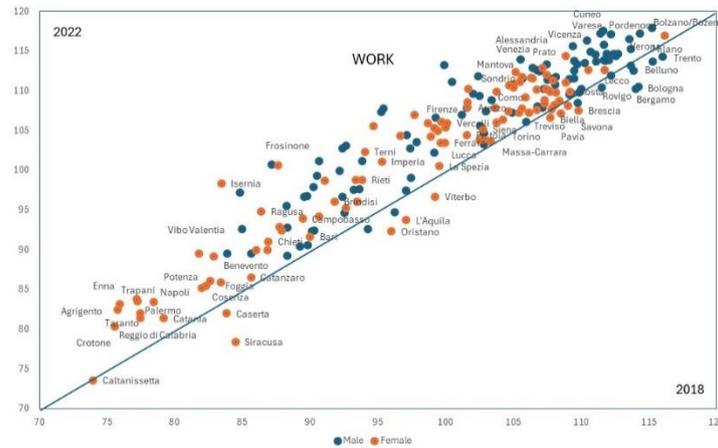

Source: Istat data processing

Work Pillar. The diagram highlights a pronounced territorial gap with higher performance for northern provinces, particularly for Bolzano/Bozen, which reaches the highest values approaching 120 for both genders (Fig. 3). The South shows a strong concentration in the lower quadrant, with acute criticalities for the provinces of Sicilia and Calabria. Contrary to the Knowledge pillar, there is a reversal of the gender advantage in favour of men, who generally show superior performance. Furthermore, women's results present higher dispersion. Between the two years, many provinces show substantial progress for both sexes, positioning themselves well above the reference bisector. A particular case is the province of Caltanissetta, which shows strong improvement for women. Additionally, the southern provinces, while improving, maintain critical values.

Wealth Pillar. Territorial stratification is more pronounced compared to other pillars, with an almost exclusive concentration of northern provinces above the value of 100 (Fig. 4). Southern values are systematically below 90, with Crotone and Agrigento in critical conditions (<80). A greater gender divergence is evident. Indeed, the differences between men and women are larger compared to the other pillars examined. Furthermore, rigidity in progress is highlighted with apparent temporal stability across territory and gender. The points concentrate closer to the bisector compared to the other pillars examined.

The analysis reveals how the three dimensions of well-being in the gender gap present distinct evolutionary dynamics and territorial patterns, requiring differentiated policy strategies for each pillar.

Figure 3 – *Transition diagram of the Work Pillar, Male and Female. 2018 vs 2022.*

Source: Istat data processing

Figure 4 – *Transition diagram of the Wealth Pillar, Male and Female. 2018 vs 2022.*
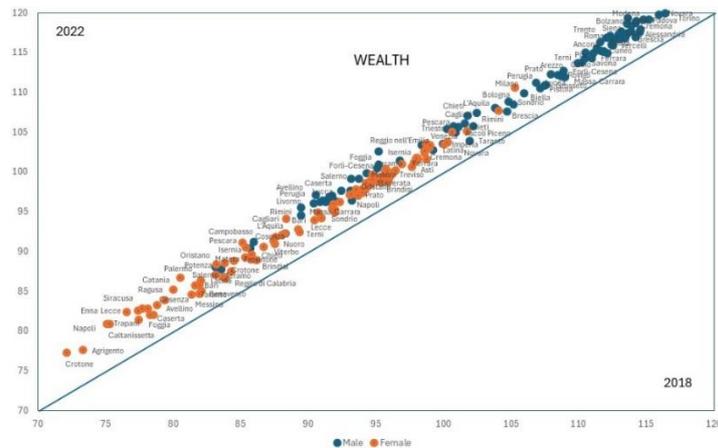
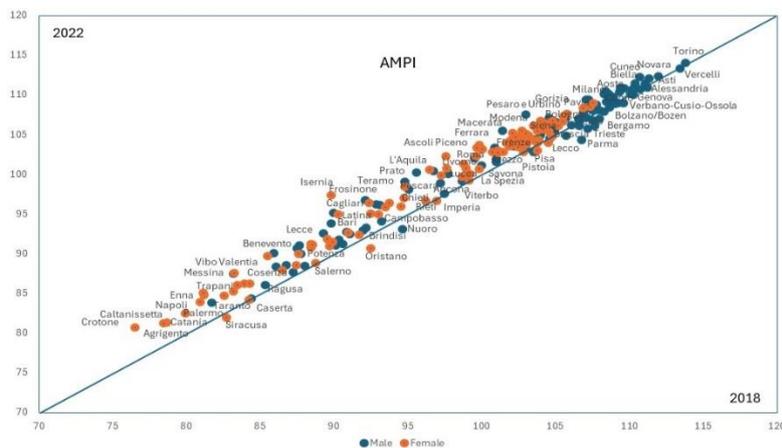*Source: Istat data processing*

3.4 Transition diagram of the AMPI Index

Figure 5 illustrates the evolutionary dynamics of the AMPI, disaggregated by gender, across Italian provinces over the period 2018-2022, allowing for a visualization of the trajectory of change for each province. The data reveal a distribution spanning a wide range of values, with the AMPI varying from approximately 70 to 120 points in both reference years. A general upward trend is

observed during the period, with most data points located above the bisector, indicating a widespread improvement in multidimensional well-being for both sexes.

The partial overlap between gender clusters in the central segment of the distribution suggests that, while gender-specific disparities persist, there are provinces where the well-being gap between men and women is relatively limited. In contrast, at the extremes of the distribution, more distinct patterns emerge, suggesting that gender inequalities tend to intensify in territorial contexts characterized by either particularly high well-being levels in favour of men or particularly low levels for women. Despite the overall improvement observed between 2018 and 2022, the persistence of the gender gap indicates that progress towards gender equality remains slow and requires targeted policy interventions.

Figure 5 – *Transition diagram of the AMPI, Male and Female. 2018 vs 2022.*
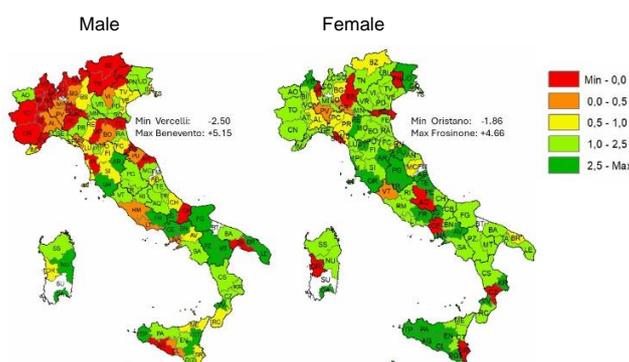

Source: Istat data processing

3.5. AMPI variations from 2018 to 2022

Figure 6 shows a comparative cartographic representation of AMPI changes by gender in the Italian provinces between 2018 and 2022. The aim is to identify the spatial dynamics of multidimensional well-being and gender-specific patterns in its territorial evolution.

The analysis of the map for the male population reveals a pronounced north-south territorial polarization of AMPI variation. The north regions show a widespread decline in the index, with negative changes in Piedmont, Western Lombardy and Liguria. In contrast, Central and Southern Italy shows a more heterogeneous but generally positive pattern, with several southern and island provinces showing

significant improvements, particularly in Eastern Sicily, Calabria and parts of Apulia. For the female population, the improvement appears to be widespread throughout almost the entire country, especially in the North-East, where several provinces report significant increases of between 1.0 and 2.5 points. This trend indicates progress in the integration of women into skilled labour markets and access to positions of higher responsibility, which has a positive impact on the dimensions of Work and Wealth. Emilia-Romagna and Veneto stand out with particularly favourable results, indicating the effectiveness of territorial policies to promote work-life balance and the empowerment of women. Southern Italy also shows generally positive results for women, although in some areas with slightly less intensity than for men. Nevertheless, there is a clear increase in Sicily, Calabria and Apulia, which indicates a stronger convergence process in the well-being of women in these regions.

Figure 6 - *AMPI variation from 2018 to 2022*.*

* The values for the provinces of Monza and Brianza, Fermo, Barletta-Andria-Trani and South Sardinia are not present because they are missing.
Source: Istat data processing

In summary, between 2018 and 2022, the dynamics of multidimensional well-being evolved differently between the genders. In the northern regions, traditionally characterized by a higher level of well-being, the trend seems to have been more favourable for women than for men, while in Southern Italy both genders have benefited from improvements, albeit with varying intensity.

4. Conclusions

The AMPI analysis reveals a complex picture in which the gender gap in multidimensional well-being exhibits strong territorial characteristics. While signs of improvement are evident, the persistence of the gap highlights the need for

integrated policies that simultaneously address the educational, labour market, and economic dimensions of women's well-being, with particular attention to Italy's territorial specificities. In the *Knowledge pillar*, the gender gap shows a tendency to narrow, with women continuing to outperform men, thereby consolidating the educational advantage acquired in previous decades. In the *Work pillar*, the results indicate a substantial reduction in the gender employment gap, although men still maintain an overall advantage and higher performance levels. Furthermore, women's outcomes show greater territorial dispersion between the North and South. In the *Wealth pillar*, the gender gap demonstrates divergent trends and remains strongly in favour of men. Although the growth in disposable income has benefited both genders, southern regions remain disadvantaged compared to the North, with persistent disparities that particularly penalize women. Unfortunately, recent improvements in female employment have not yet translated fully into pay equity.

This emerging configuration suggests that gender inequalities are being reconfigured rather than simply reduced. Consequently, policy responses must address both the emergence of new male disadvantages and the consolidation of female progress, with a nuanced focus on territorial and sectoral specificities.

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