GRINS FOUNDATION

Assessing the competitiveness of Italian firms patenting in Circular Economy

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Italiadomani

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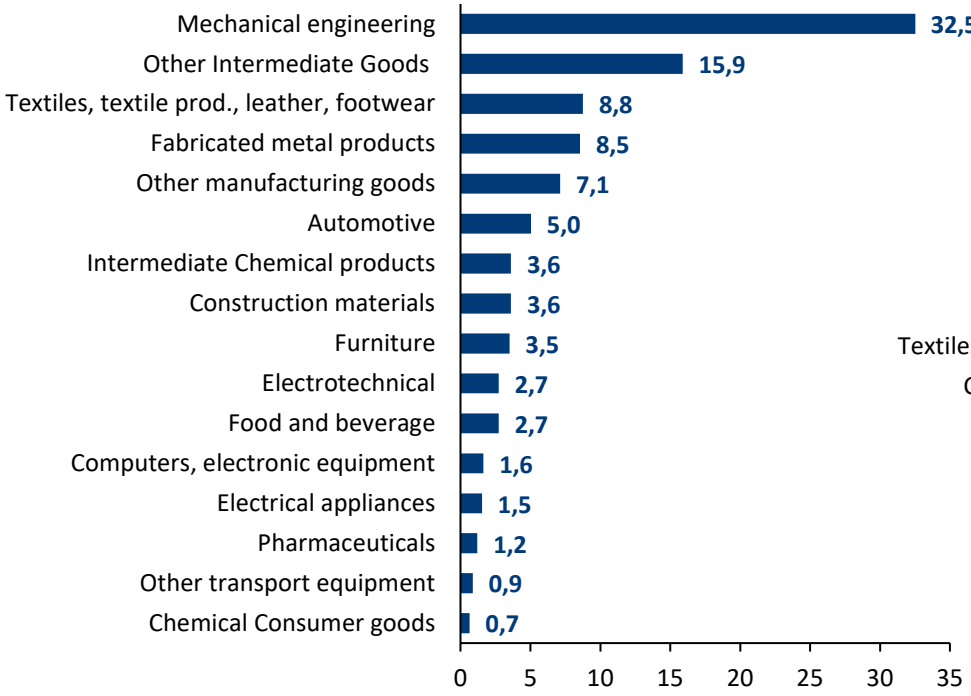
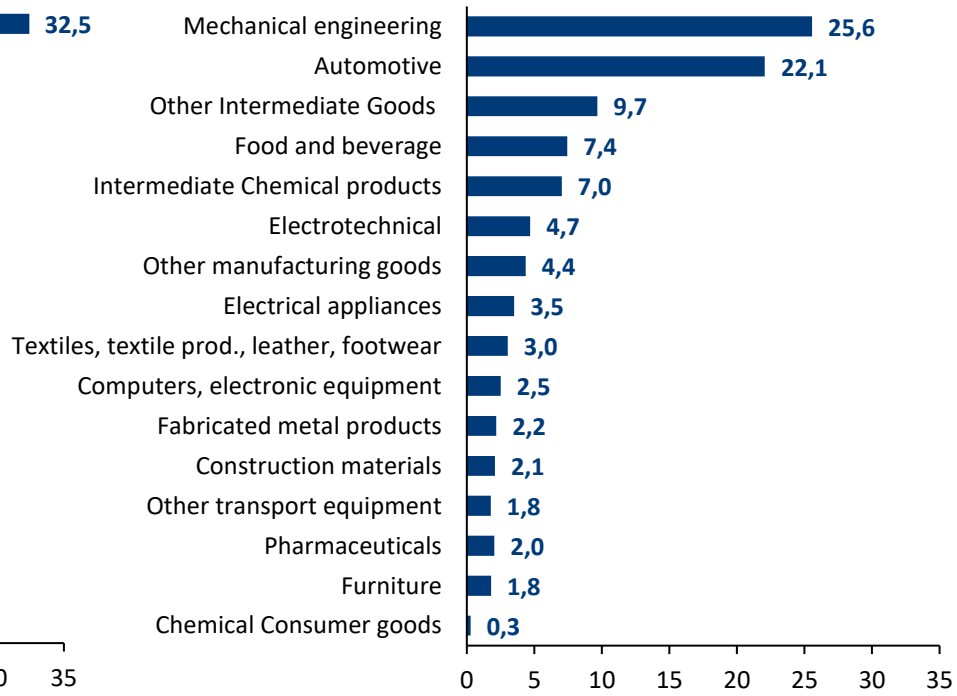
The reference sample for the analysis of financial KPIs

The analysis is based on a sample of 913 manufacturing firms with circular patents, which in 2024 generated total revenues of nearly €150 billion.

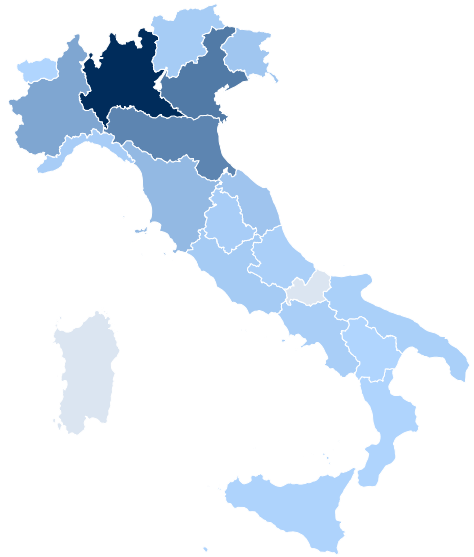
Percentage distribution of CE-patenting firms, by sector



Revenues: % breakdown by sectors (current values, 2024)



Lombardy, Veneto and Emilia-Romagna account for two-thirds of the CE sample of firms



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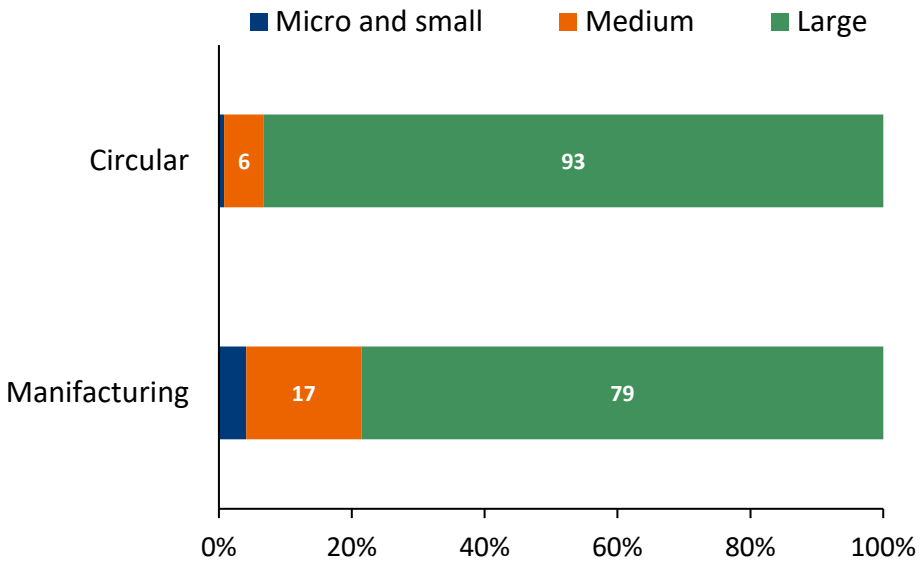
Note: "Other manufacturing" includes Biomedical, Sports equipment and Precision engineering; "Other intermediates goods" include rubber and plastics, paper and wood.
Source: Intesa Sanpaolo Integrated Database (ISID)

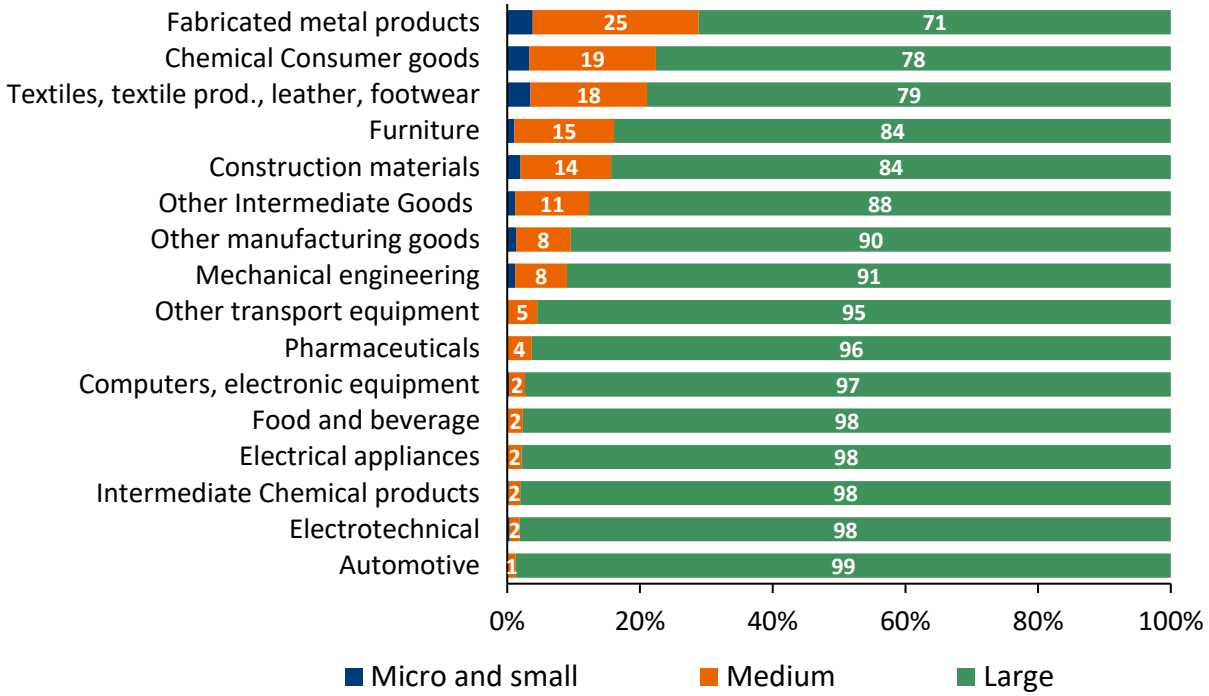
Circular Economy sample: strong presence of large firms, with sectoral heterogeneity

Revenues (current values), breakdown by size categories: average % share over 2022–2024

Circular vs Manufacturing (control sample of 6.238 non-Circular patent-holding manufacturing firms)*



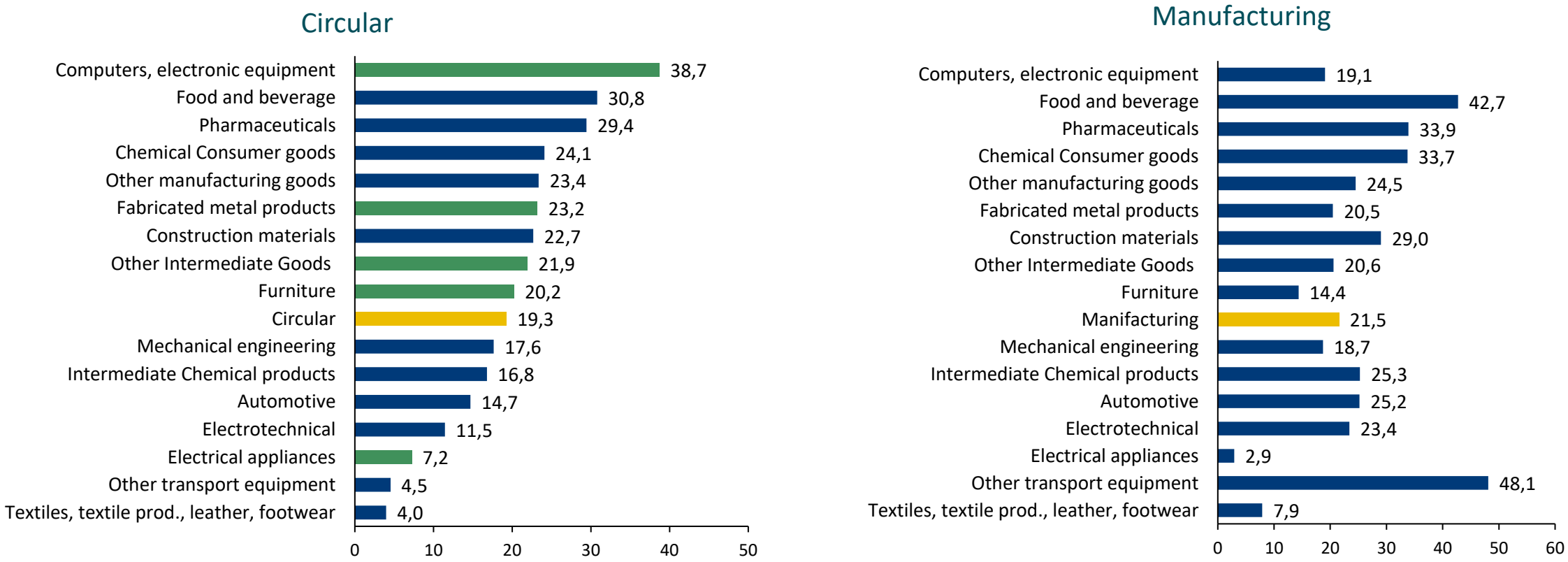
Circular: additional breakdown by size and sectors



Note: * The matching between circular economy (CE) patents and financial statements identifies 913 Circular manufacturing firms active over the 2019–2024 period. These firms are compared with a control group of 6,238 non-Circular patent-holding manufacturing firms operating in the same sectors of specialization (excluding NACE/ATECO 19). The breakdown by size category is calculated using the European Commission's turnover thresholds, with reference to the year 2024. Micro and small firms: up to €10 million. Medium-sized firms: between €10 million and €50 million. Large firms: over €50 million.
Source: Intesa Sanpaolo Integrated Database (ISID)

Strong increase in revenues compared to pre-covid period (+19% in 2024 for Circular firms), across all sectors…

Evolution of Revenues by sector: 2024 vs 2019
(% change at current prices, median values)*

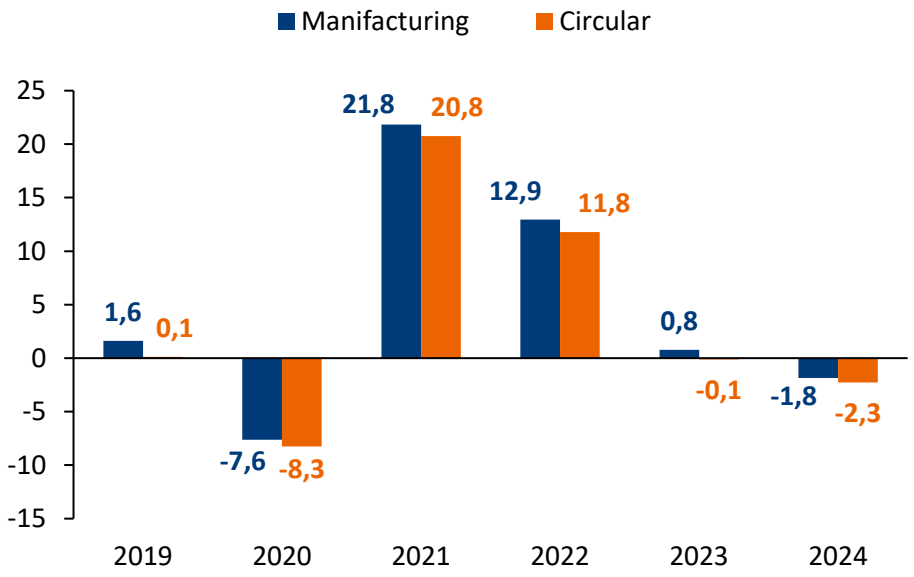


Note * Sectors where Circular firms show higher 2019–24 growth rate of revenues compared to the Manufacturing sample are in Green. Source: Intesa Sanpaolo Integrated Database (ISID)

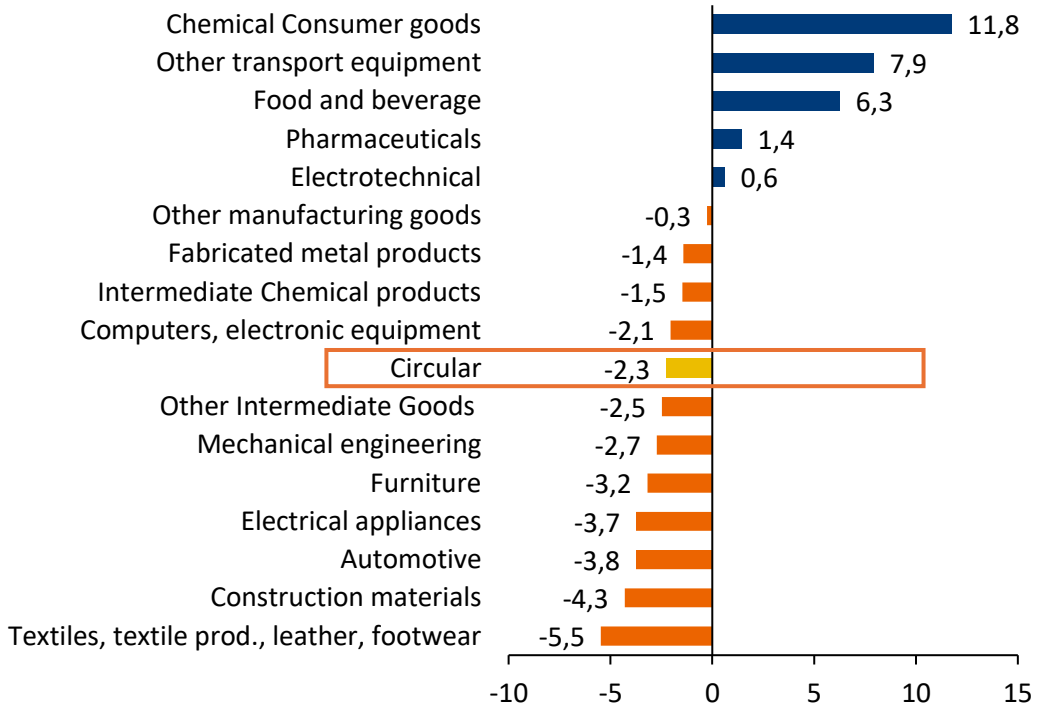
…but growth rates are slowing down after the post-pandemic rebound and the 2022-23 inflationary period

Evolution of revenues
(% change at current prices, median values)*

Circular vs Manufacturing



Circular: breakdown by macro-sector: 2024 vs 2023

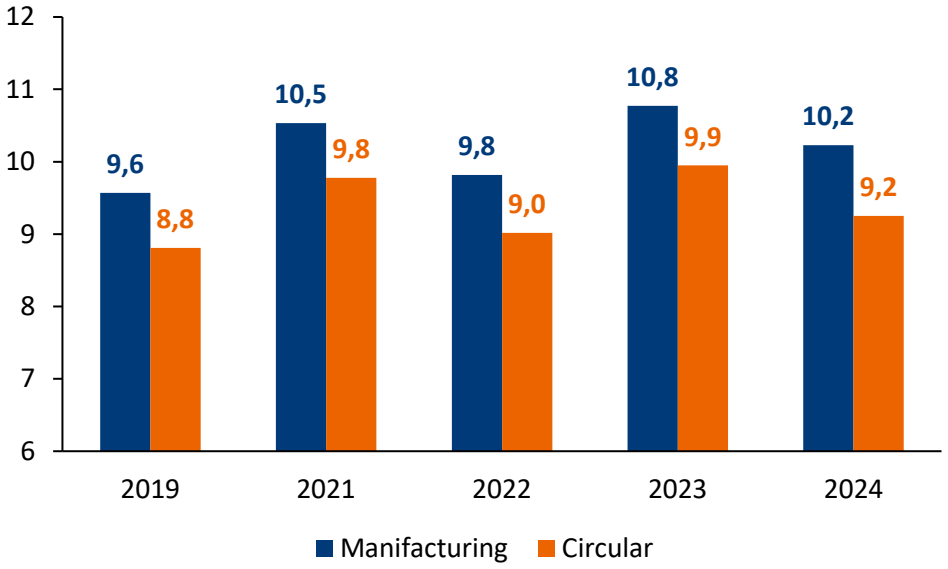


Source: Intesa Sanpaolo Integrated Database (ISID)

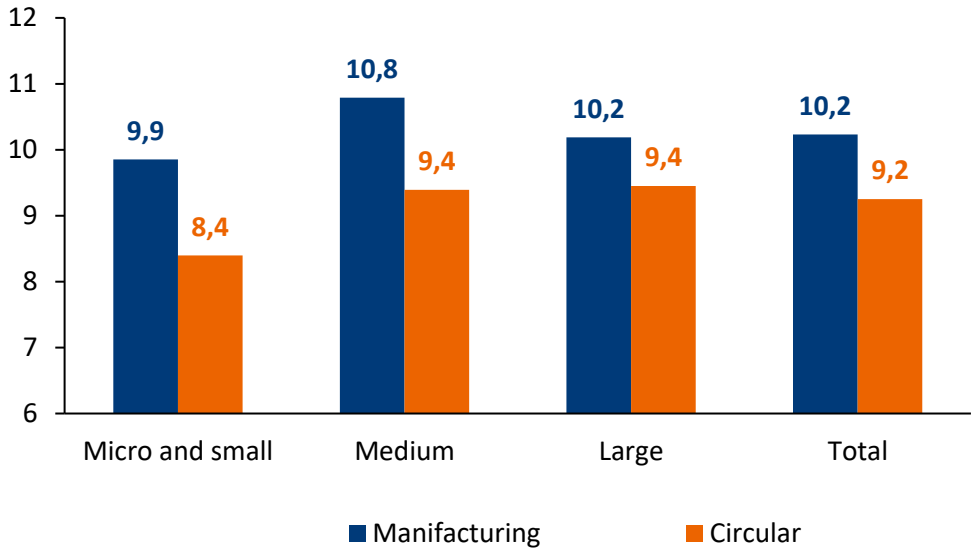
Circular firms: strong ability to preserve margins in a context of cost pressures…

EBITDA margin (median values, %)

Circular vs Manufacturing: 2019-2024 period



Circular vs Manufacturing, by firm size: 2024

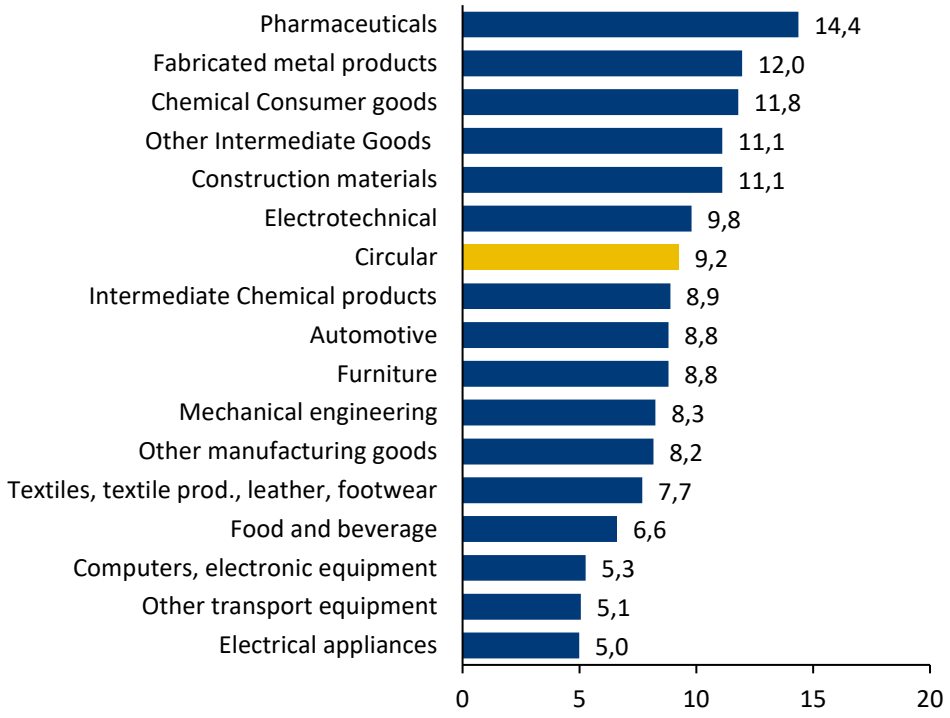


Source: Intesa Sanpaolo Integrated Database (ISID)

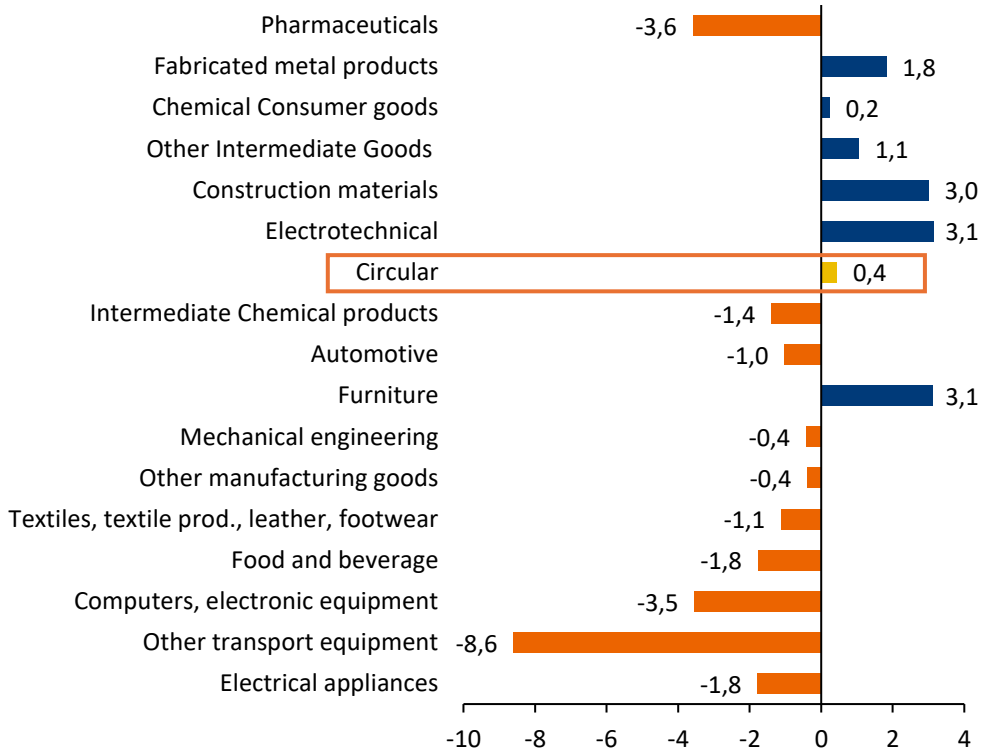
…driven by a mixed performance at the sectoral level

Circular sample

EBITDA margin 2024 by macro-sector (%, median values)



EBITDA margin: 2024 vs 2019 (%, median values)

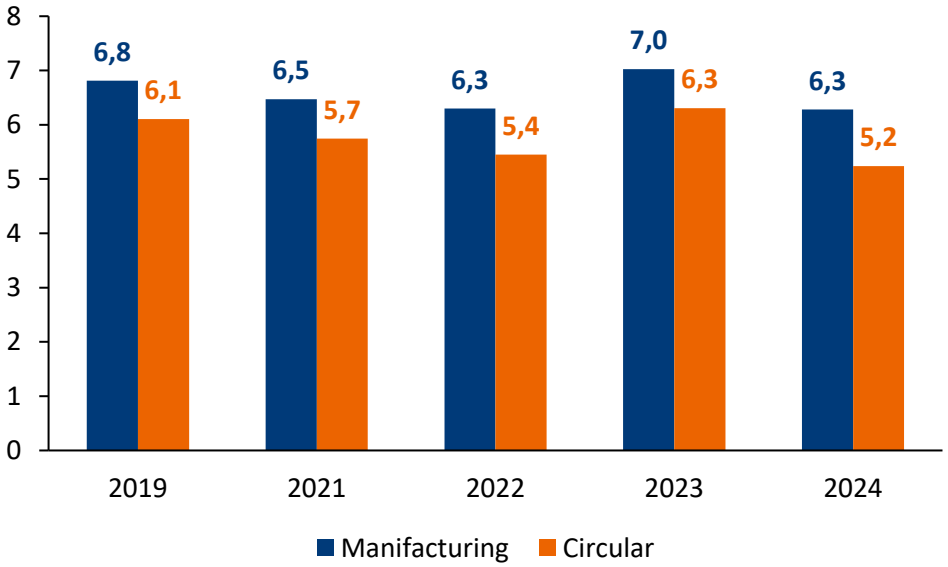


Source: Intesa Sanpaolo Integrated Database (ISID)

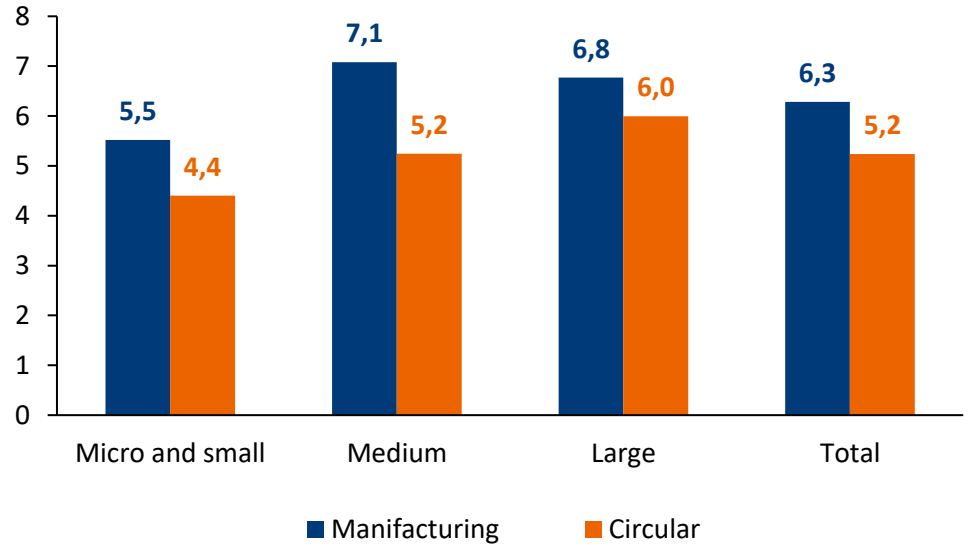
Return on Investments(ROI) has declined in 2024 and remains below the Manufacturing average….

ROI (median values, %)

Circular vs Manufacturing: from 2019-2024

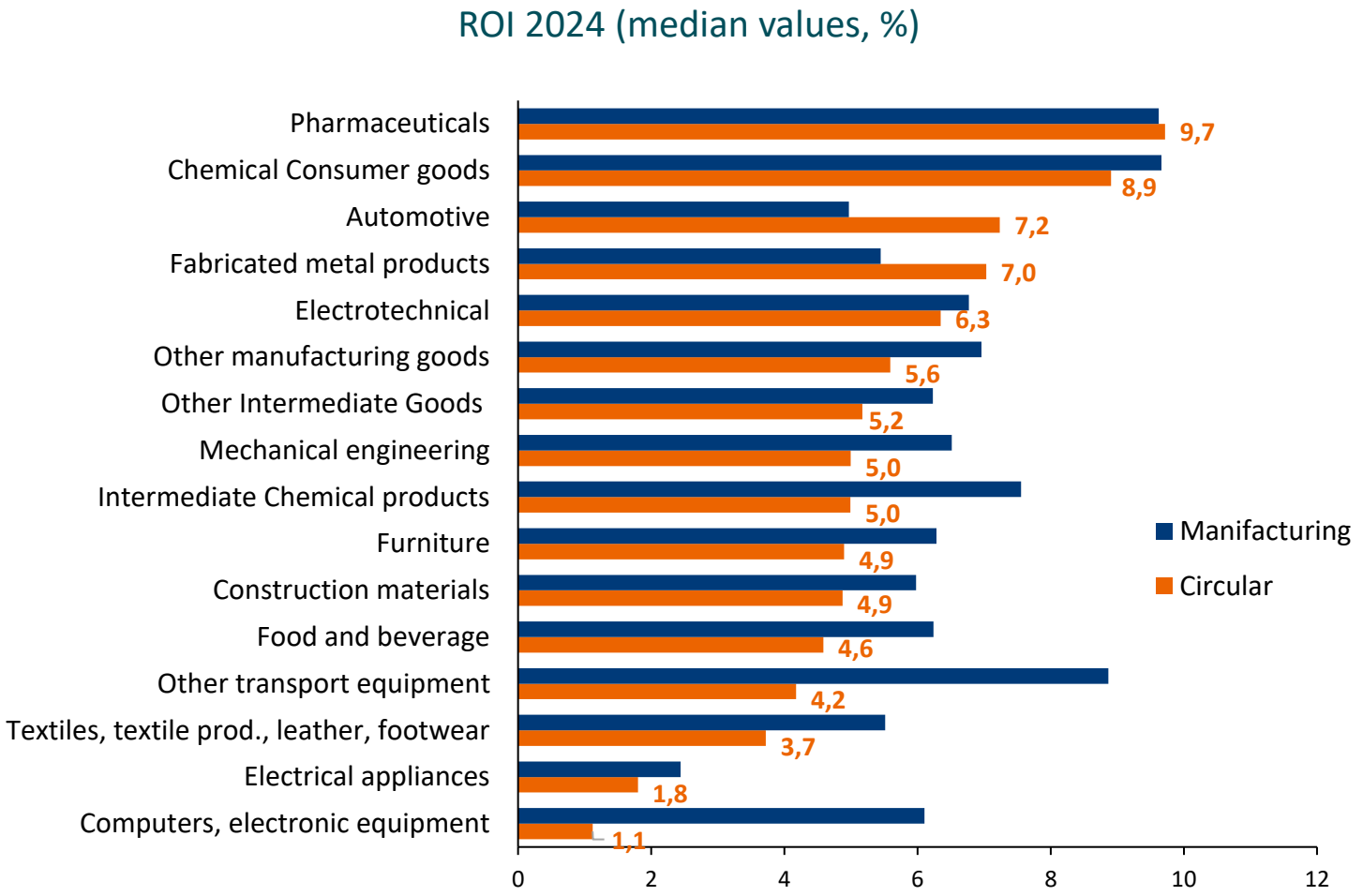


Circular vs Manufacturing, by firm size: 2024



Source: Intesa Sanpaolo Integrated Database (ISID)

…with only few exceptions

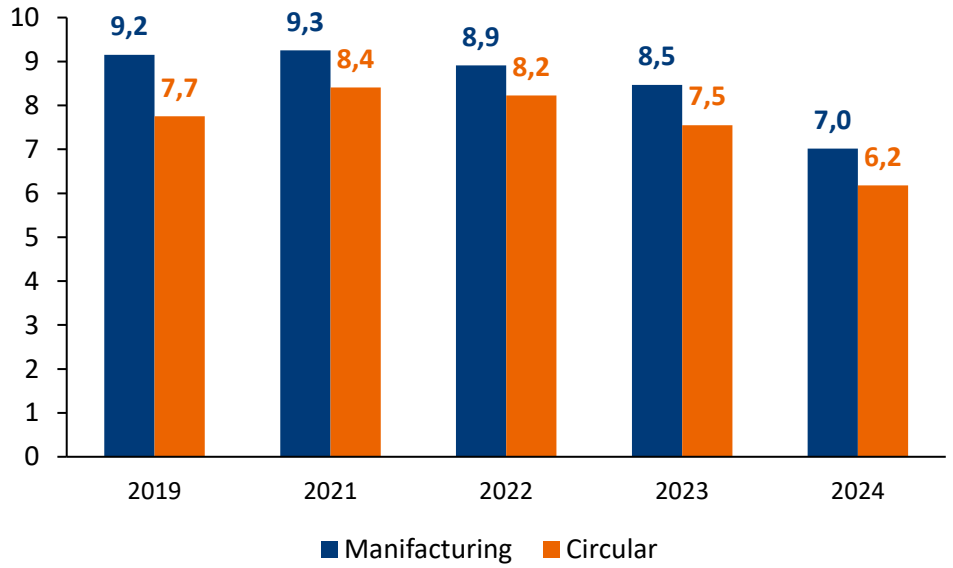


Source: Intesa Sanpaolo Integrated Database (ISID)

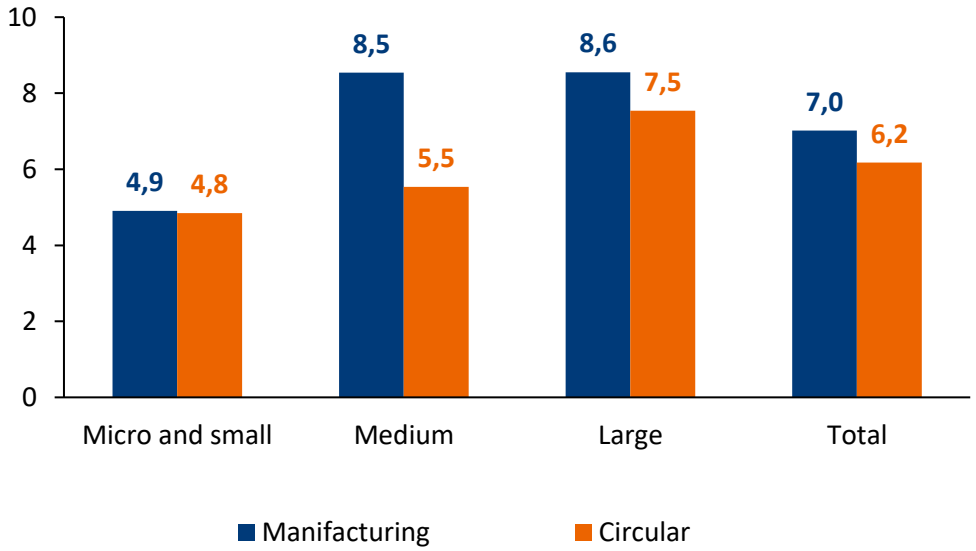
Return on Equity (ROE) started declining in 2023, after exceeding 2019 levels in 2021–22

ROE after taxes (median values, %)

Circular vs Manufacturing: from 2019-2024



Circular vs Manufacturing, by firm size: 2024

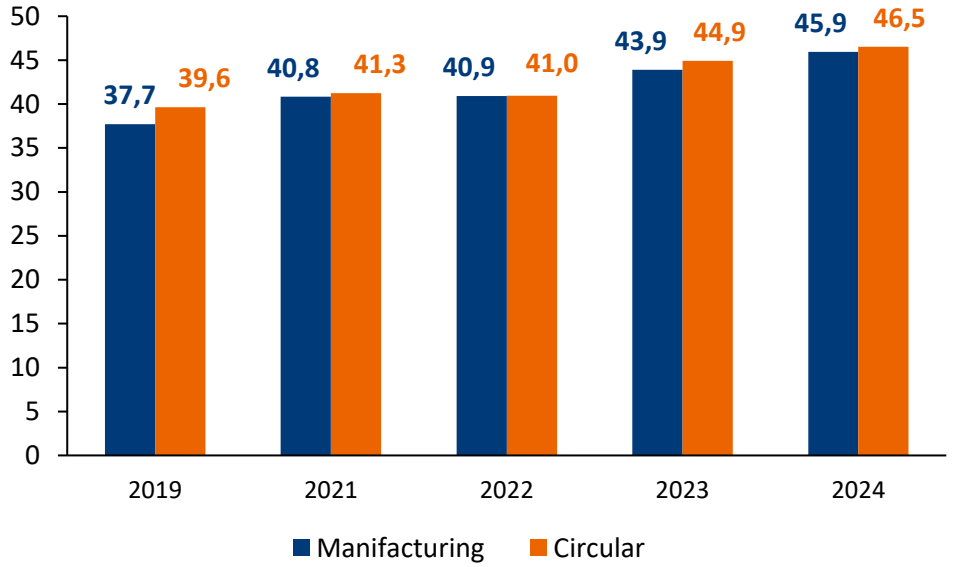


Source: Intesa Sanpaolo Integrated Database (ISID)

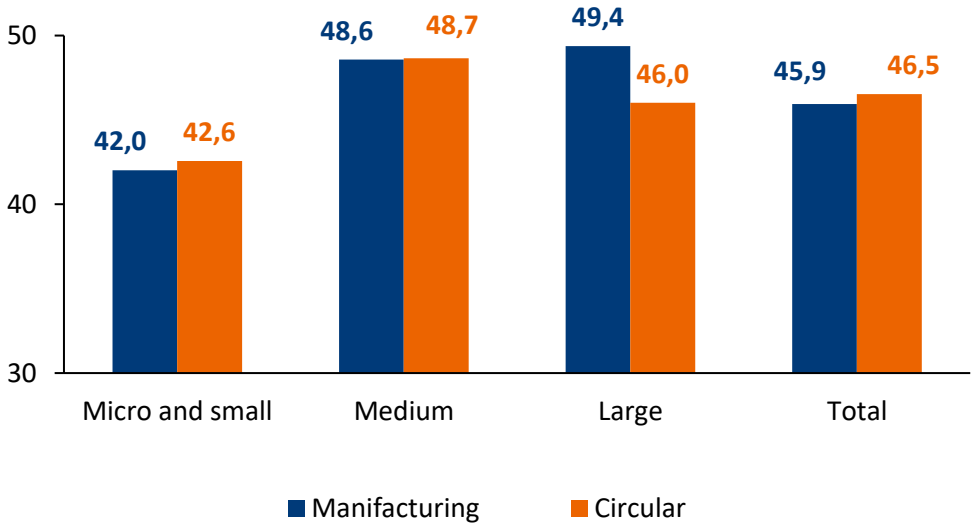
Capitalization of assets followed a general upward trend

Equity as a percentage of total assets
(median values)

Circular vs Manufacturing: from 2019-2024



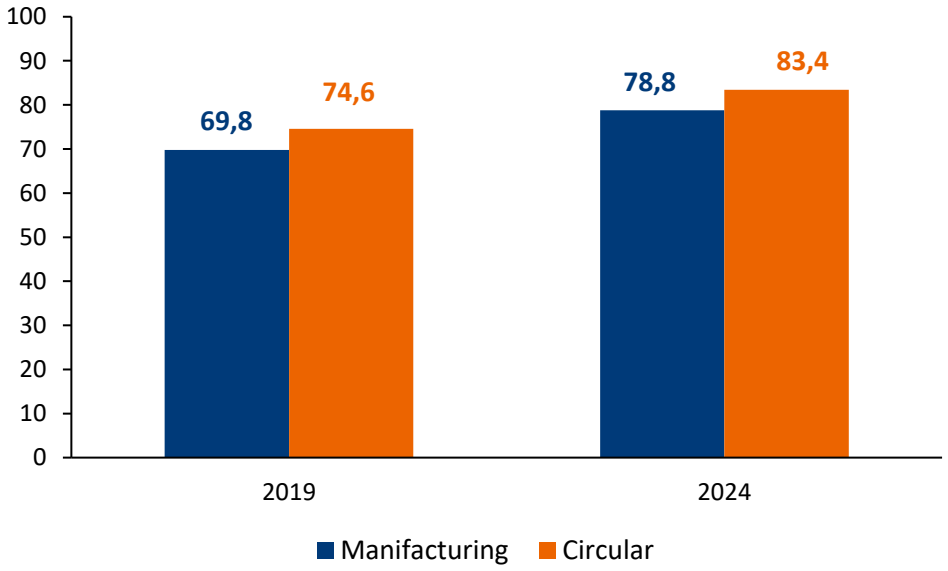
Circular vs Manufacturing, by firm size: 2024



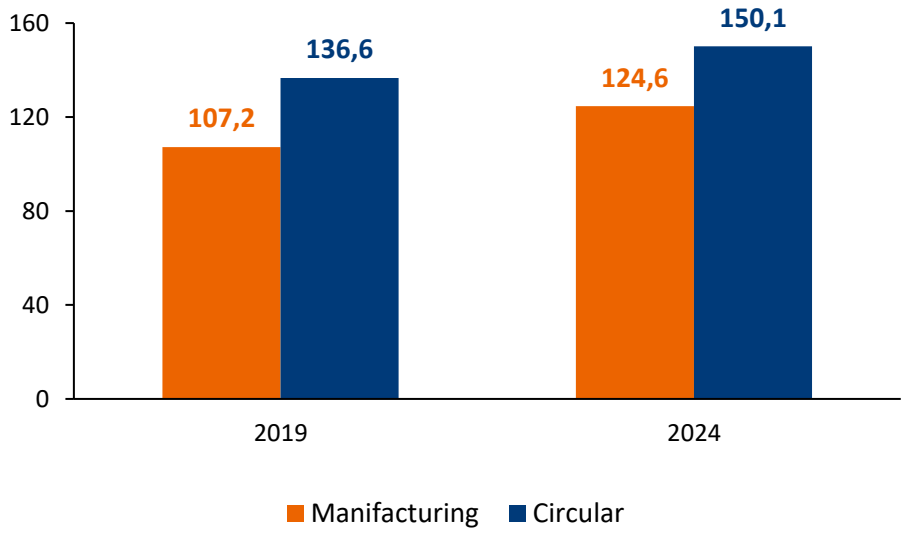
Source: Intesa Sanpaolo Integrated Database (ISID)

Productivity is higher for Circular firms, both Labour Productivity and estimated Total Factor Productivity (TFP)

Labour Productivity*
(€ thousands, median values at current prices)

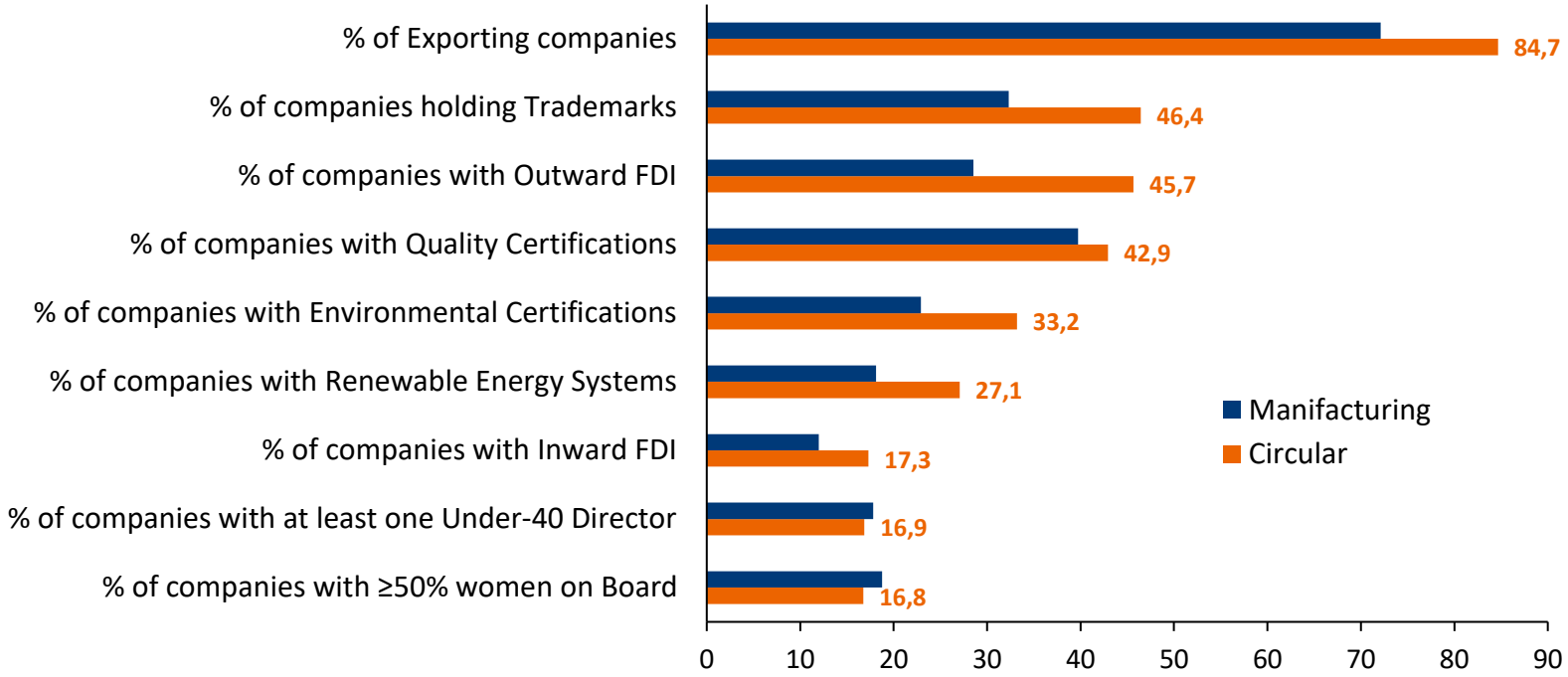


Total Factor Productivity** (TFP)
(€ thousands, median values at current prices)



Note: *value added per employee , calculated from financial statements, ** estimated using the method proposed by Levinsohn and Petrin
Source: Intesa Sanpaolo Integrated Database (ISID)

Competitive advantages of Circular firms: a key to business success?



Circularity, measured in terms of patents in the circular economy field, is associated with a more advanced strategic and competitive profile among firms. Competitive advantages range from internationalization (via exports, membership of multinational groups or registration of trademarks on global markets) to a focus on quality and sustainability (through the acquisition of certifications and the installation of renewable energy systems).

Note: The ISID (Intesa Sanpaolo Integrated Database) provides information on firms' strategic levers across several dimensions of business activity, including international trademark registration at the World Intellectual Property Organization (WIPO), the acquisition of quality certifications (e.g. ISO 9001), foreign direct investment linkages (inward FDI), outward foreign direct investment (outward FDI), and export activity. On the green dimension, the dataset includes multiple indicators, such as environmental certifications (ISO 14001, EMAS – Eco-Management and Audit Scheme, FSC – Forest Stewardship Council certifications specific to the forestry sector and wood/non-wood products, and certifications related to organic production in the food and beverage sector), as well as firms that have installed at least one renewable energy system for self-generation of electricity. The latter refers to installations supported by GSE (Gestore dei Servizi Energetici) incentives under the Energy Account scheme, GRIN (Incentive Recognition Management) certificates, or Renewable Energy Sources (RES) schemes for electricity. It is worth noting that the actual share of firms adopting renewable energy systems may be underestimated, as many companies may have installed grid-connected photovoltaic systems without accessing GSE incentives. Source: Intesa Sanpaolo Integrated Database (ISID)

Descriptive evidence is supported by results from a probit analysis

Marginal Effects after probit: determinants of the probability to belong to the cluster of circular firms

	Marginal effect	Standard error
Trademarks	0,022*	0,009
Quality certifications	-0,003	0,009
Environmental certifications	0,011	0,010
Renewable energy	0,033***	0,010
FDI_in	0,019	0,012
FDI_out	0,029***	0,010
Export	-0,024	0,019
Corporate group	0,006	0,010
Under40_board	-0,021*	0,011
50% women_board	0,014	0,011
Small firms	0,024	0,015
Medium firms	0,054***	0,016
Large firms	0,100***	0,019
Sectoral effects	added	

Results highlight the presence of a positive and significative correlation (p<0,1%) between the installation of renewable energy systems, outward foreign direct investment (FDI_out) and membership of the Circular group;

A significant size effect is present.

Number of observations: 6.707
Significance level *** 0,001 ** 0,01 * 0,05
Dimensional effects: micro firms represent benchmark in estimation
Source: Intesa Sanpaolo Integrated Database (ISID)

The impact of Circular innovation on productivity growth is controversial…

A Heckman selection model has been selected to estimate the impact of Circular Economy innovation on productivity growth. The structure of the model can be summarized as follows:

$$delta\_producitivity\_2019\text{-}24_i = \beta_0 + \beta_1 circular_i + \beta_2 trademarks_i + \beta_3 quality\ cert._i + \\ + \beta_4 environmental\ cert._i + \beta_5 renewable\ sources_i + \beta_6 FDI\_IN_i + \\ + \beta_7 FDI\_OUT_i + \beta_8 export_i + \beta_9 corporate\ group_i + \beta_{10} under40\_board_i + \\ + \beta_{11} 50\%women\_board_i + \beta_{12} small_i + \beta_{13} medium_i + \beta_{14} large_i + \mu_j + u_i$$

$$circular_i = 1\ (\beta_0 + \beta_1 trademarks_i + \beta_2 quality\ cert._i + \beta_3 environmental\ cert._i + \beta_4 renewable\ sources_i + \\ + \beta_5 FDI\_in_i + \beta_6 FDI\_out_i + \beta_7 export_i + \beta_8 corporate\ group_i + \beta_9 under40\_board_i + \\ + \beta_{10} 50\%women\_board_i + \beta_{11} small_i + \beta_{12} medium_i + \beta_{13} large_i + \mu_j + w_i > 0)$$

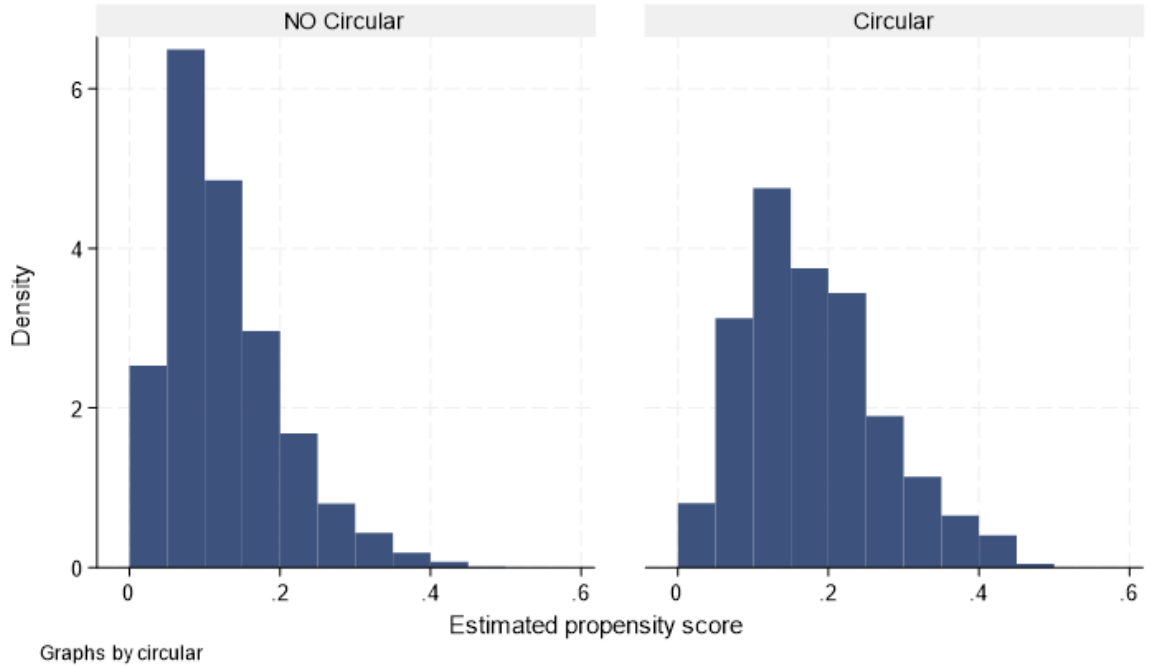
$$Cov\ (u_i\ ;\ w_i\ ) = \rho$$

… especially when a control group is selected with a propensity score matching approach

Estimates from "Heckman Selection Model – Heckit": subsample of matched firms, dependent variable Labour Productivity (delta 2019-24)

	Selection equation Coefficient	Standard error	Outcome equation Coefficient	Standard error
Circular (treatment variable)			0.132	0.114
Trademarks	0.110	0.063	-0.046	0.020
Quality certifications	0.054	0.057	-0.007	0.017
Environmental certifications	0.164	0.071	-0.043*	0.020
Renewable energy	0.409***	0.066	-0.011	0.025
FDI_in	0.366***	0.083	-0.052	0.033
FDI_out	0.164*	0.070	-0.025	0.019
Export	-0.168	0.117	0.034	0.028
Corporate group	-0.083	0.068	-0.009	0.021
Under40_board	0.284**	0.074	-0.014	0.025
50% women_board	0.334***	0.070	-0.011	0.024
Small firms	0.137	0.115	0.079	0.043
Medium-size firms	0.352***	0.128	0.177***	0.048
Large firms	0.382*	0.150	0.295***	0.053
Log Labour Productivity_2019			-0.412***	0.030
Sectoral dummies	added		added	
Hazard Lambda			-0.092	0.069
Rho			-0.211	0.158
Sigma			0.433	0.014
Wald test of indep. eqns. (rho=0)				0.235
Prob > chi2				

Distribution of estimated propensity scores (the control sample is reduced to 2500 non-Circular patent-holding manufacturing firms by applying a nearest neighbor matching with replacement)



Number of observations: 3.178
Significance level *** 0,001 ** 0,01 * 0,05
Dimensional effects: micro firms represent benchmark in estimation
Source: Intesa Sanpaolo Integrated Database (ISID)

A cura di:

Research Department, Intesa Sanpaolo