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The use of Electronic Invoicing Data for the Retail Trade Sector

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Summary

- From administrative data availability to statistical use
- Integration of data sources
- Simulation analysis
- Results
- Remarks and future work

From administrative data availability to statistical use

- Starting in 2025, Istat has been regularly receiving **Electronic Invoicing (EI) data** from the **Revenue Agency (Agenzia delle Entrate)**; **Electronic Receipts (ER)** data became available at a later date (middle of 2025)
- A **consolidation phase** led to the development of standardised procedures for transforming **EI+ER data (AD)** into statistical information
- **In 2025,** an experimental analysis on the use of AD for the **Survey in Turnover Services** (FAS) showed positive results, leading to the **partial replacement of the sample survey with AD** from **January 2026**
- Following the successful validation and **reliability of EI and ER data,** further extensions to other sector of the **FAS** are planned in the coming years, progressively increasing the role of AD in official statistics
- **From 2026** Istat is assessing the feasibility of using AD for other STBS: the growing **response burden and declining response rates,** particularly among small enterprises, moved the attention on the **Retail Trade Survey (RTS)**

Administrative Data in STS: Recent Experience

Fig. 1 – Turnover in Service Survey – from sample data to AD data

NACE Section	TSS sample 2026			Composition % (enterprises)		Weights % (turnover)	Population level
	Target	Sample	AD	Sample	AD		
G – Wholesale and retail trade	***7,969***	***2,807***	***5,162***	***35.2***	***64.8***	***41.2***	***244,638***
G45 Wholesale and retail trade and repair of motor vehicles and motorcycles	2,160	855	1,305	39.6	60.4	17.2	35,570
G46 Wholesale trade, except of motor vehicles and motorcycles	5,809	1,952	3,857	33.6	66.4	46.4	209,068
H–N – Other services	***17,637***	***11,792***	***5,845***	***66.9***	***33.1***	***27.8***	***575,230***
H – Transportation and storage	3,850	3,027	823	78.6	21.4	24.4	25,343
I – Accommodation and food service activities	2,566	701	1,865	27.3	72.7	79.7	171,811
J – Publishing, broadcasting, and content production and distribution activities	2,094	1,969	125	94.0	6.0	8.1	11,109
L – Real estate activities	2,463	787	1,676	32.0	68.0	49.9	98,022
M – Professional, scientific and technical activities	3,103	2,562	541	82.6	17.4	22.1	212,152
N – Administrative and support service activities	3,561	2,746	815	77.1	22.9	15.3	56,793
G–N – Total services	**25,606**	**14,599**	**11,007**	**57.0**	**43.0**	**35.3**	**819,868**

Note: 'Population' refers to the average number of enterprises, identified through AD sources, for estimating the TSS index during the first five months of 2026.

- **AD significantly reduces response burden:** Accommodation and Food Services, Real Estate and Wholesale and Retail
- Survey data remains important in **sectors with specific structural characteristics**
- **Improved quality**: eliminates non-response and reduces sampling error, strengthening the accuracy and robustness of turnover indicators.
- **Greater efficiency**: substantially reduces response burden and data collection costs

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The Retail Trade Survey

- **Purpose and scope**

  Monitoring monthly retail trade developments (NACE Rev. 2 Division 47), by producing **value and volume** sales indicators by retail channels and commodity group, supporting national and European STS

- **Statistical framework**

  Compliant with EBS Regulation (EU) 2019/2152, with dissemination of **unadjusted, seasonally and calendar-adjusted series**, released within 38 days (preliminary) and 60 days (final)

- **Survey design**

  Sample survey of around **8,000 enterprises** from the **ASIA Business Register**, stratified by **economic activity and number of employees**; large enterprises are included with certainty, while other units are selected through a **probability sampling scheme**

- **Quality data**

  Indicators are involved in comprehensive **validation, editing, outlier detection and imputation** procedures

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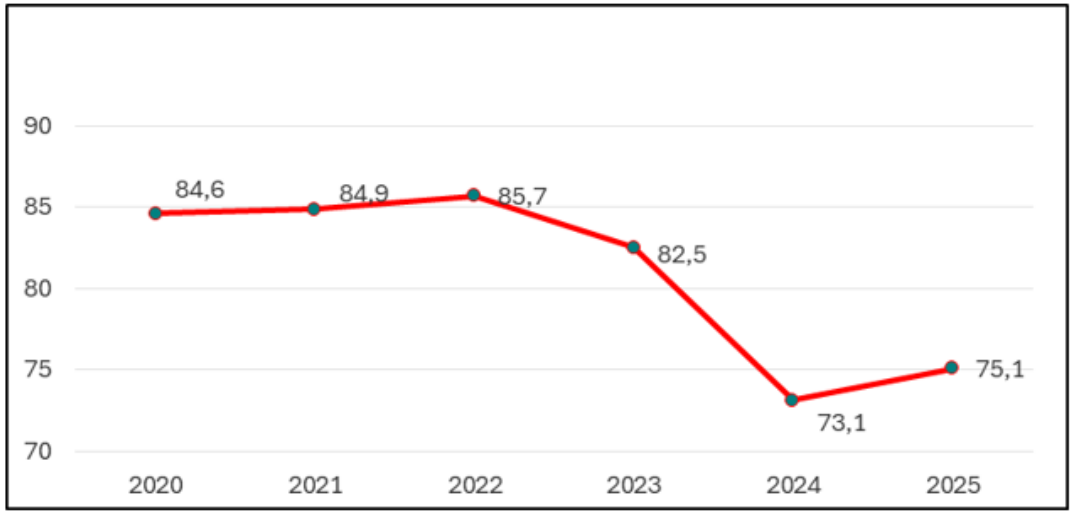
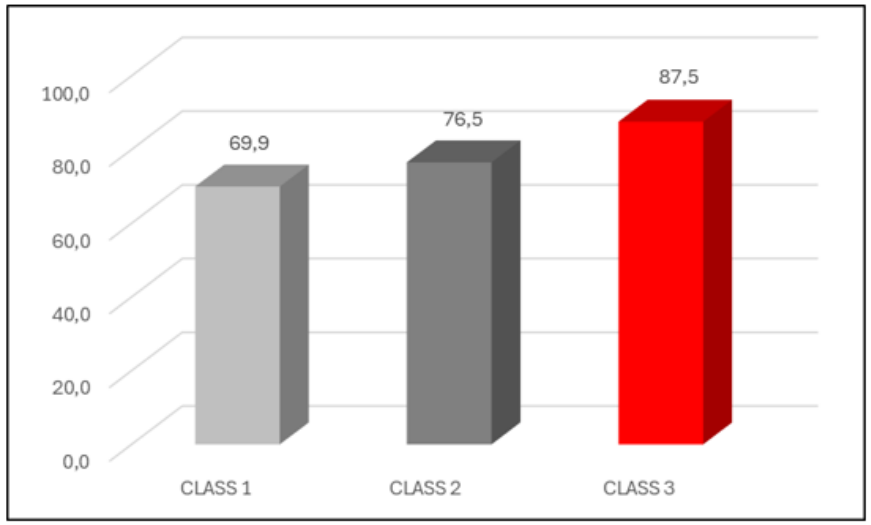
Response burden and future perspectives

Fig. 2 – Overall response rate (2020-2025), and distribution by employee size class (average on 2025)





Note: 'Class' refers to categories of employees '1–5' (class 1), '6–49' (class 2), '50+' (class 3)

- **Response rates**: Stable (84%) until 2023, then declining since 2024, particularly among **small enterprises**
- **Need for innovation**: Increasing response burden threatens survey sustainability and requires innovative solutions
- **Perspective**: Administrative data (AD) can support or partially replace information, ensuring timely and high-quality statistics

Simulation analysis: preliminary remarks

- **Scope and period**: subset of enterprises within the scope of the RTS, for each month between **January 2025 and May 2026** (**17 months**)
- **Kind of data**: AD data consist of **EI and ER**
- **Simulation domain:**
  - **Sample level**, approximately **130,200 "firm-period" records** from the RTS sample, of which almost 92,200 respondent in the considered period
  - **Population level**, approximately **380,000 firms x 17 months** within the scope of the RTS survey (according to the Asia BR 2023)
- **Data aggregation**: the total turnover per period and firm, derived from the two sources, was aggregated according to the classification criterion used in the survey (**stratum)**
- **Pre-treatment**: detecting and removing **anomalous values** through a mixed method based on non-symmetrical inclusion thresholds and constraints on annual turnover
- **Results:** at different level of data aggregation, by **Total**; by **"size class" (n. of employees)**; by **NACE Rev. 2 Group**; by **stratum**

Data sources and methodological framework

- **Diagnostics and graphical analysis** were conducted considering:
  - **Retail sectors**: **specialised and non-specialised** to take into account of different customer profiles and business models
  - **Turnover definition**: to distinguish between sector-specific effects and data source differences
    - **Type A:** ER + EI (B2C+B2B)
    - **Type B:** ER + EI (only B2C)
    - **Type C:** only ER
- Different **criteria for assessing** the degree of similarity between the two sources were adopted:
  - **Graphical approach**:

    Scatter plots at “firm-period” level; short-term changes (m-o-m) at stratum level
  - **Diagnostic approach**:

    Composite Indicator of **Structural** and **Dynamic Comparability** (**CCI**) at stratum level to summarises the consistency between the two sources in terms of levels and short-term changes

Multidimensional comparability framework

- Comparability between **RTS and AD** was assessed through **two complementary dimensions**:
  - **Structural comparability (SCI):** captures deviations in levels, scale consistency, distributional biases and magnitude of discrepancies *(LCC, Ratio, KS, sMAPE)*
  - **Dynamic comparability (DCI):** captures temporal discrepancies thorough correlation of growth rates, direction of changes, volatility pattern *(Corr, Sign, Vol)*
- Each similarity measure composing the indicators, is first transformed into a **normalised indicator** ranging from 0 to 1, in order to ensure comparability across the different dimensions
- The two components are **combined into a single Composite Comparability Indicator (CCI)**, providing an overall measure of the agreement between survey and AD, ranging from 0 to 1
- A **weighted geometric scheme of aggregation** is used to ensure no compensatory effects, meaning that a poor performance in a component cannot be fully offset by a strong performance in another

Multidimensional comparability framework

$$CCI = \sqrt{SCI \cdot DCI}$$

COMPOSITE COMPARABILITY INDEX

$$SCI = \prod_{k=1}^{4} S_k^{w_k} = \underbrace{[LCC]}_{S_{CCC}}^{w_1} \cdot \left[\underbrace{\exp^{(-KS)}}_{S_{KS}}\right]^{w_2} \cdot \left[\underbrace{\exp^{\left(-\left|\log \frac{AD_{Tot}}{SU_{Tot}}\right|\right)}}_{S_{Ratio}}\right]^{w_3} \cdot \left[\underbrace{\exp^{\left(-\frac{|AD-SU|}{\frac{|AD|+|SU|}{2}}\right)}}_{S_{sMAPE}}\right]^{w_3}$$

STRUCTURAL COMPONENT

$$DCI = \prod_{j=1}^{3} D_j^{v_j} = \underbrace{\left[\frac{\rho+1}{2}\right]}_{S_{Corr}}^{v_1} \cdot \left[\underbrace{\exp^{(-\log(SD_\rho))}}_{S_{Vol}}\right]^{v_2} \cdot \underbrace{\left[\frac{N_{conc}}{N}\right]}_{S_{Sign}}^{v_3}$$

DYNAMIC COMPONENT

Weights

$w_1 = w_3 = 0.3 \qquad w_2 = w_4 = 0.2$

$v_1 = 0.4 \qquad v_2 = 0.35 \qquad v_3 = 0.25$

AD = administrative data *SU* = survey data

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Results: Macro-level evidence from Diagnostic approach

Table 1 – Fraction of strata by range of comparability indexes.

	Cross Comparability Index			Dynamic Comparability Index			Structural Comparability Index		
	Type A	Type B	Type C	Type A	Type B	Type C	Type A	Type B	Type C
Very High	23.7	30.3	28.0	50.2	48.3	43.1	14.2	25.6	23.7
High	46.4	26.5	19.0	30.8	32.2	26.5	46.4	20.9	18.0
Moderate	13.3	19.0	15.6	12.8	12.8	16.6	18.0	19.4	11.4
Low	11.4	11.4	14.2	5.2	5.7	9.5	10.0	13.3	14.2
Very Low	5.2	12.8	23.2	0.9	0.9	4.3	11.4	20.9	32.7

Note: (Type A) EI (B2B+B2C) and ER; (Type B) EI (only B2C) and ER; (Type C) only ER.

- **Dynamic dimension**: High agreement across all aggregation types, showing that **AD capture short-term dynamics effectively**
- **Structural dimension**: More heterogeneous. **Type A performs best**, while excluding invoicing (Types B, especially C) reduces structural comparability
- **Overall CCI**: Highest for **Type A** and progressively lower for **Types B and C**
- Invoicing data are essential for **structural comparability**, but **AD remain highly effective in reproducing short-term dynamics**, the main objective of **Short-Term Statistics (STS)**

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Results: Macro-level evidence from Diagnostic approach

Table 2 – Fraction of strata with *High/Very High* comparability indexes, by size class and NACE group

Agg.	N. of strata	Number of records			CCI			SCI			DCI		
		Type A	Type B	Type C	Type A	Type B	Type C	Type A	Type B	Type C	Type A	Type B	Type C
							Size class						
1-5	73	58,782	58,788	52,818	76.7	53.4	42.5	69,9	42,5	37,0	87,7	79,5	71,2
6-49	78	12,599	12,601	11,278	61.5	46.2	34.6	51,3	37,2	30,8	71,8	74,4	60,3
50+	60	22,005	22,019	20,940	73.3	75.0	68.3	61,7	63,3	61,7	85,0	90,0	80,0
							NACE group						
471	19	16,277	16,277	16,161	63.2	68.4	68.4	57,9	47,4	47,4	68,4	78,9	78,9
472	29	9,757	9,757	9,589	55.2	41.4	41.4	27,6	27,6	31,0	82,8	79,3	79,3
474	8	6,118	6,118	5,653	37.5	50.0	37.5	25,0	25,0	25,0	62,5	62,5	62,5
475	43	10,145	10,145	9,292	83.7	60.5	34.9	74,4	51,2	32,6	88,4	83,7	60,5
476	18	12,626	12,635	11,663	77.8	66.7	61.1	77,8	55,6	55,6	77,8	72,2	72,2
477	73	27,528	27,534	25,744	75.3	64.4	56.2	71,2	57,5	54,8	83,6	84,9	75,3
478	6	4,572	4,574	4,479	50.0	50.0	50.0	50,0	50,0	50,0	66,7	66,7	66,7
479	15	6,363	6,368	2,455	60.0	20.0	6.7	40,0	13,3	6,7	80,0	80,0	40,0

Note: 'Size class' refers to number of employees. 'NACE group' refers to the NACE Rev. 2 system at the three-digit level.

- **Type A** consistently exhibits the highest comparability across all enterprise size classes, with few exceptions in some **NACE groups**
- The lower comparability for **intermediate-size enterprises** may reflect greater heterogeneity in business structures and reporting practices

- In some sectors, **B2C** achieves **higher comparability** than total turnover (NACE 471 non-spec, 474)
- **Comprehensive EI** data provide the **best approximation**, while dynamic comparability remains robust, supporting the use of AD for **Short-Term Statistics** (STS)

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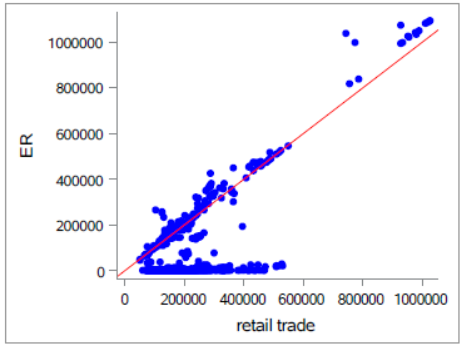
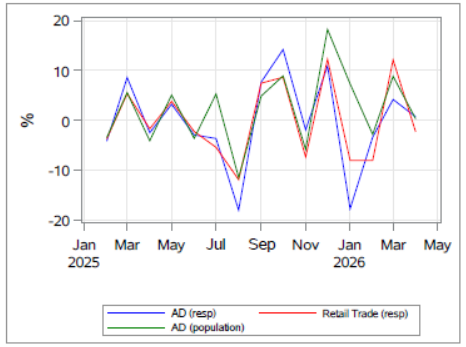
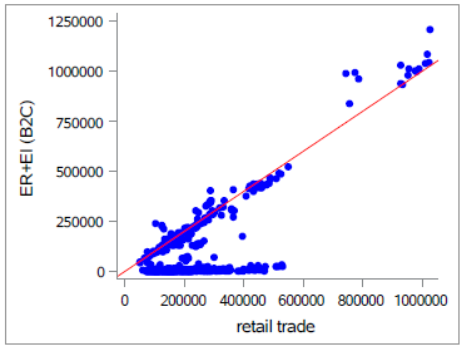
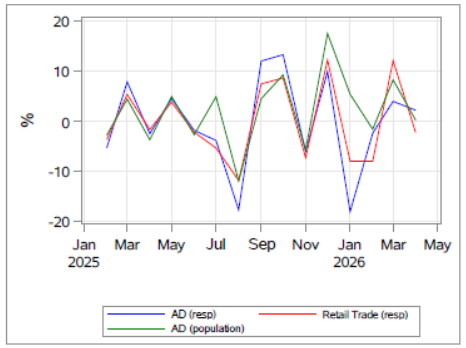
Results: Micro-level evidence by stratum - Some criticalities:

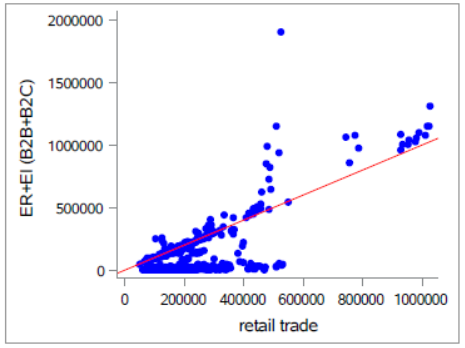
ATECO 47.73.1 (class 1) – Pharmacies (Retail sale of pharmaceutical products in specialised stores)

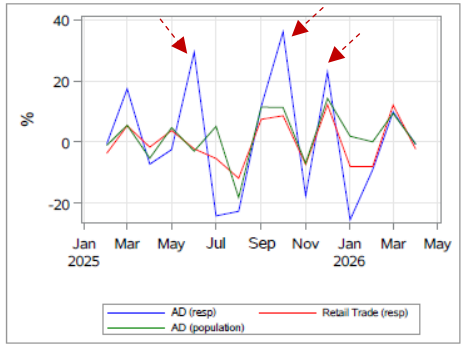










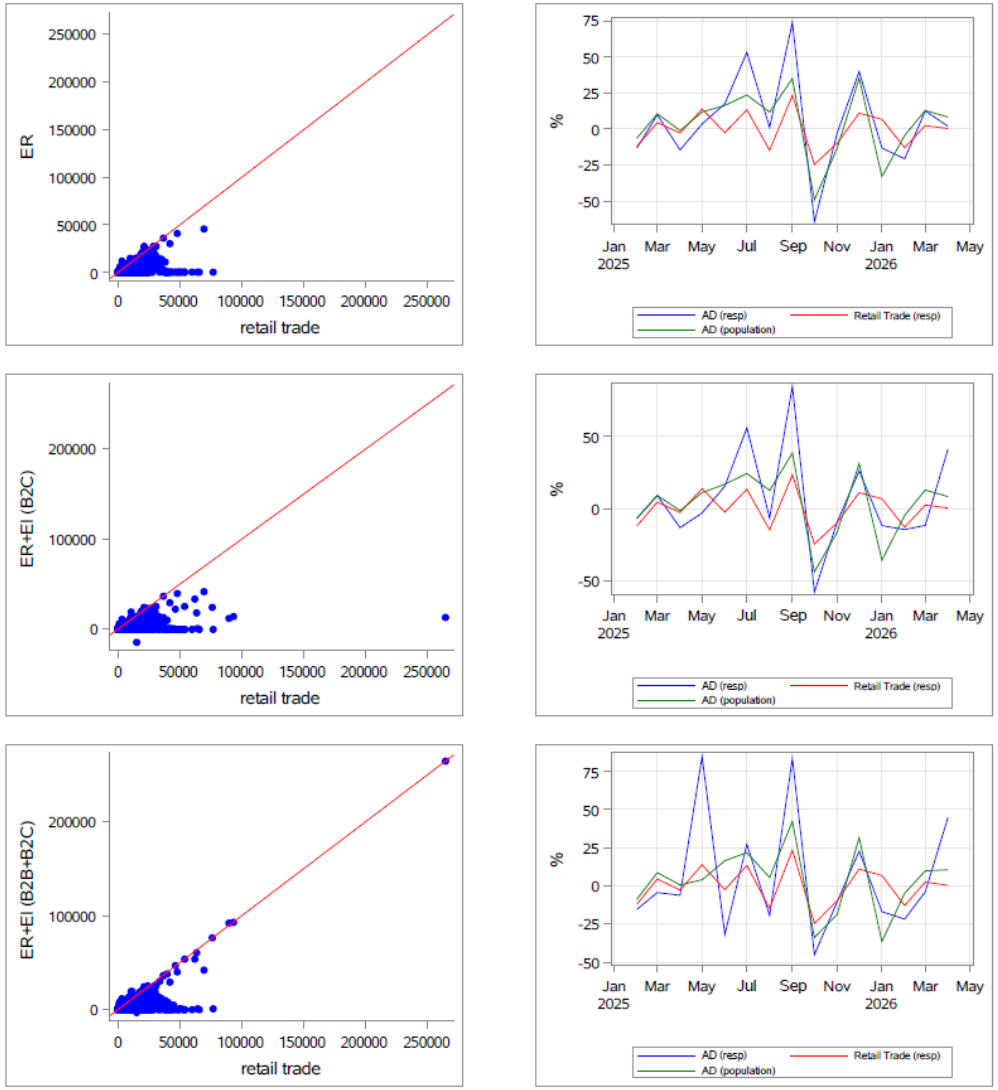


- **Low comparability** of data across all aggregation Types: CCI in the **Low** or **Moderate** range, mainly driven by the structural component
- **High frequency of zero values**, likely related to **regulatory and operational peculiarities** of the sector
- Including **EI**, particularly **B2B component**, introduces **greater volatility** in AD series (peaks in the AD (resp)
- **Interesting compensation effect on m-o-m** at the **population level:** positive and negative deviations across units tend to offset each other, resulting in a more stable overall dynamic

	Type A	Type B	Type C
CCI	**0,541** L	**0,603** M	**0,595** L
SCI	0,440 L	0,407 L	0,392 VL
DCI	0,665 M	0,893 H	0,903 VH

Results: Micro-level evidence by stratum - Some criticalities:

ATECO 47.62.1 (class 1) – Retail sale of newspapers and stationery in specialised stores

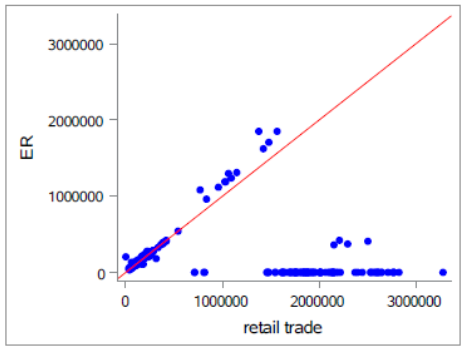


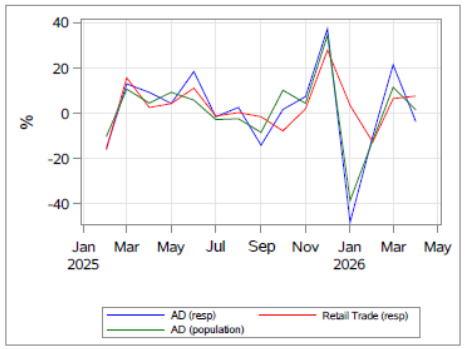
- Limited agreement between survey and AD
- Adding B2B and B2C EI slightly improves coverage (Type A)
- Many zero AD values reflect incomplete ER coverage, owing to **sector-specific regulatory exemptions** (e.g. newspaper sales) and possibly to ancillary activities captured in the survey but certified through EI
- **Low-to-moderate** range for the statistical indicators: suggesting only modest improvements from integrating additional administrative sources

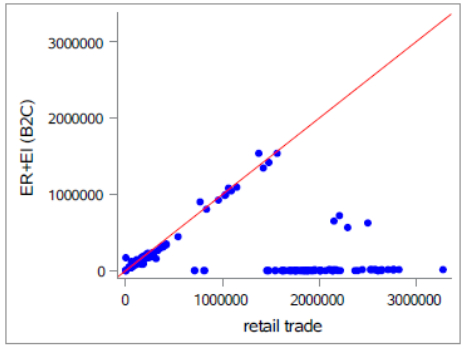
	Type A	Type B	Type C
CCI	**0,495** L	**0,390** VL	**0,384** VL
SCI	0,396 VL	0,241 VL	0,222 VL
DCI	0,618 M	0,631 M	0,662 M

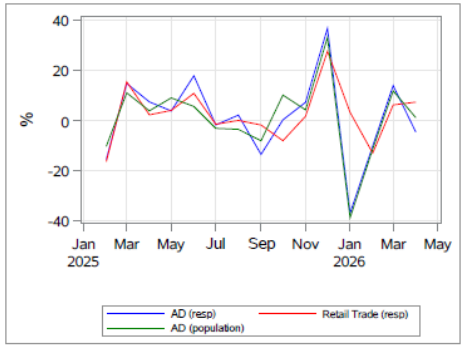
Results: Micro-level evidence by stratum - Some criticalities:

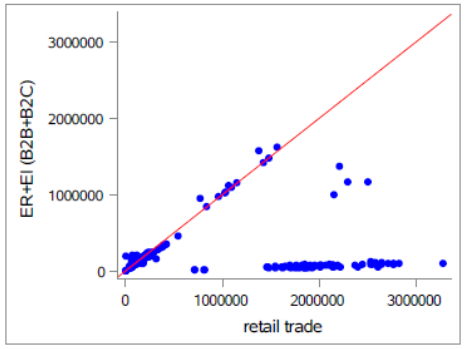
ATECO 47.19.1 (class 2) – Other retail sale in non-specialised stores – Department stores

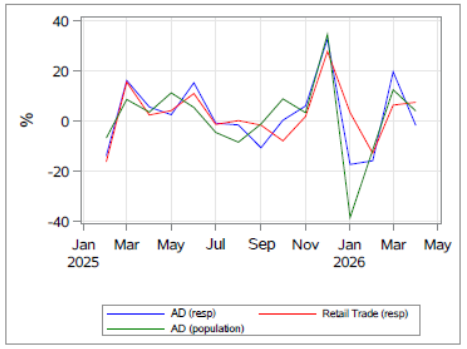












- **Expected low structural comparability** due to **heterogeneous turnover composition** and difficulty of separating retail sales from other transactions in AD
- **ER, EI (B2C and B2B)** do not substantially improve alignment with survey estimates, reflecting the sector's mixed nature of transactions
- **Dynamic comparability is more satisfactory**, especially at **population level**, where AD capture short-term movements reasonably well
- **AD** are more suitable for capturing **short-term dynamics** than reproducing turnover levels in non-specialised retail trade

	Type A	Type B	Type C
CCI	**0,358** VL	- VL	- VL
SCI	0,157 VL	- VL	- VL
DCI	0,817 H	0,756 H	0,706 M

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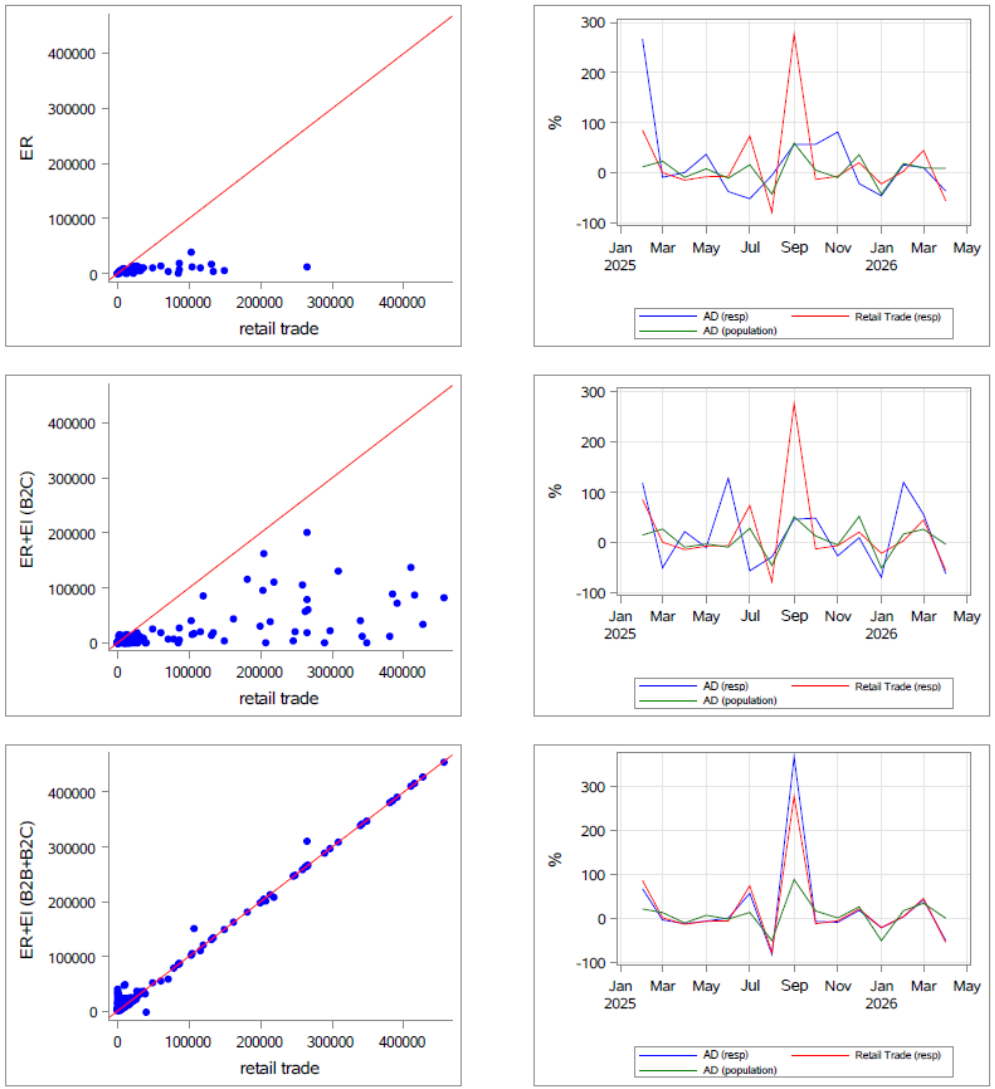
Results: Micro-level evidence by stratum - “Virtuous” strata:

ATECO 47.78.1 (class 1) – Retail sale of office furniture in specialised stores

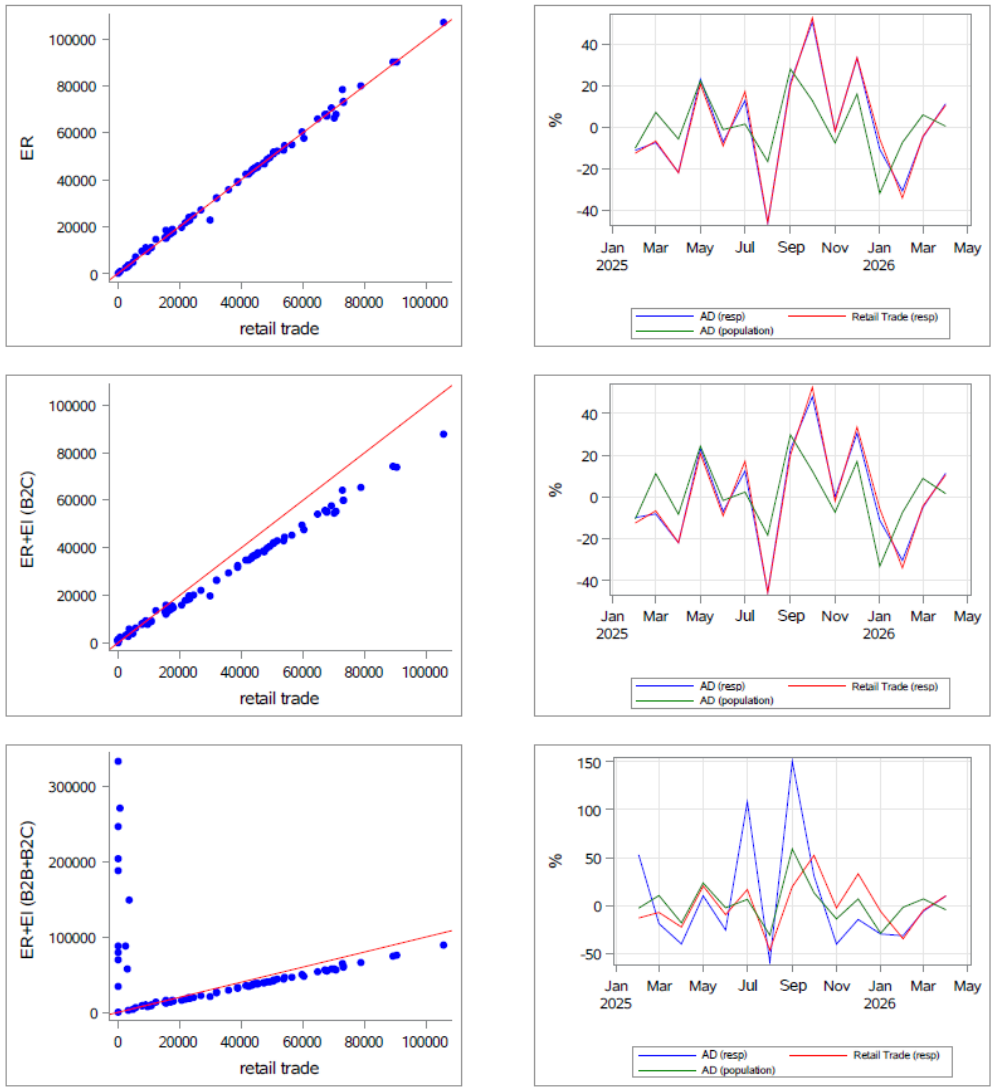


- ER alone provide limited coverage, while EI — particularly B2B — captures the largest share of turnover
- Despite being classified as retail trade, the sector includes a relevant share of B2B transactions, which are mainly captured through EI
- Survey data suggest that enterprises likely report **total turnover, including B2B activities**, rather than B2C sales only
- **AD accurately capture short-term dynamics**, supporting the use of **indirect estimation based on administrative sources**

	Type A	Type B	Type C
CCI	**0,859** H	**0,519** L	**0,241** VL
SCI	0,809 H	0,378 VL	0,080 VL
DCI	0,911 VH	0,713 M	0,724 M

Results: Micro-level evidence by stratum - “Virtuous” strata:

ATECO 47.51.2 (class 2) – Retail sale of textiles in specialised stores

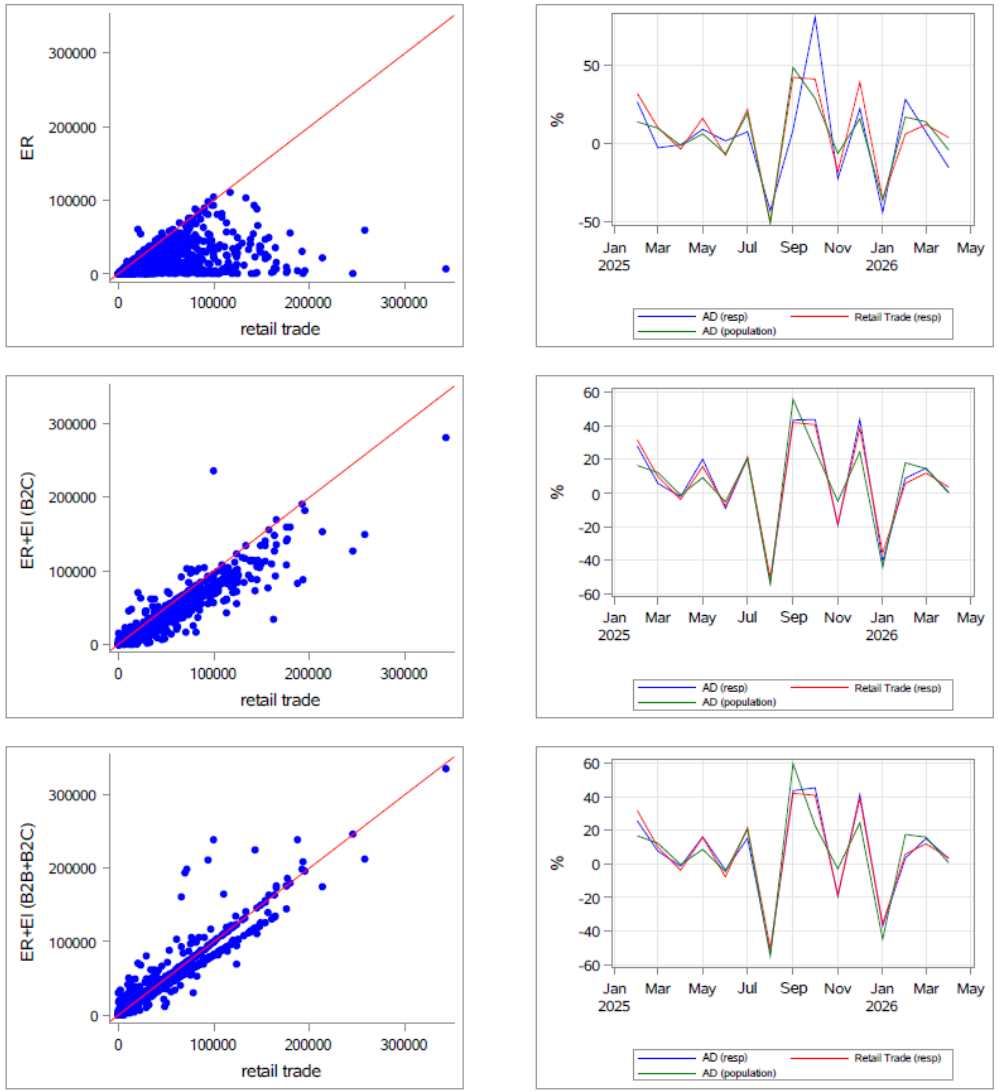


- **Great approximation** of ER alone, with short-term movements almost perfectly overlapping
- Adding **EI B2C** slightly reduces alignment, likely due to differences in coverage, timing, or classification between administrative and survey data, short-term dynamics show only minor divergences
- Including **EI B2B** worsens comparability, with **large divergences** in both **levels** and *short-term movements*, confirming the limited alignment of B2B transactions with the survey measure

	Type A	Type B	Type C
CCI	- VL	**0,952** VH	**0,971** VH
SCI	- VL	0,922 VH	0,950 VH
DCI	0,651 M	0,984 VH	0,993 VH

Results: Micro-level evidence by stratum - “Virtuous” strata:

ATECO 47.59.1 (class 1) – Retail sale of furniture in specialized stores

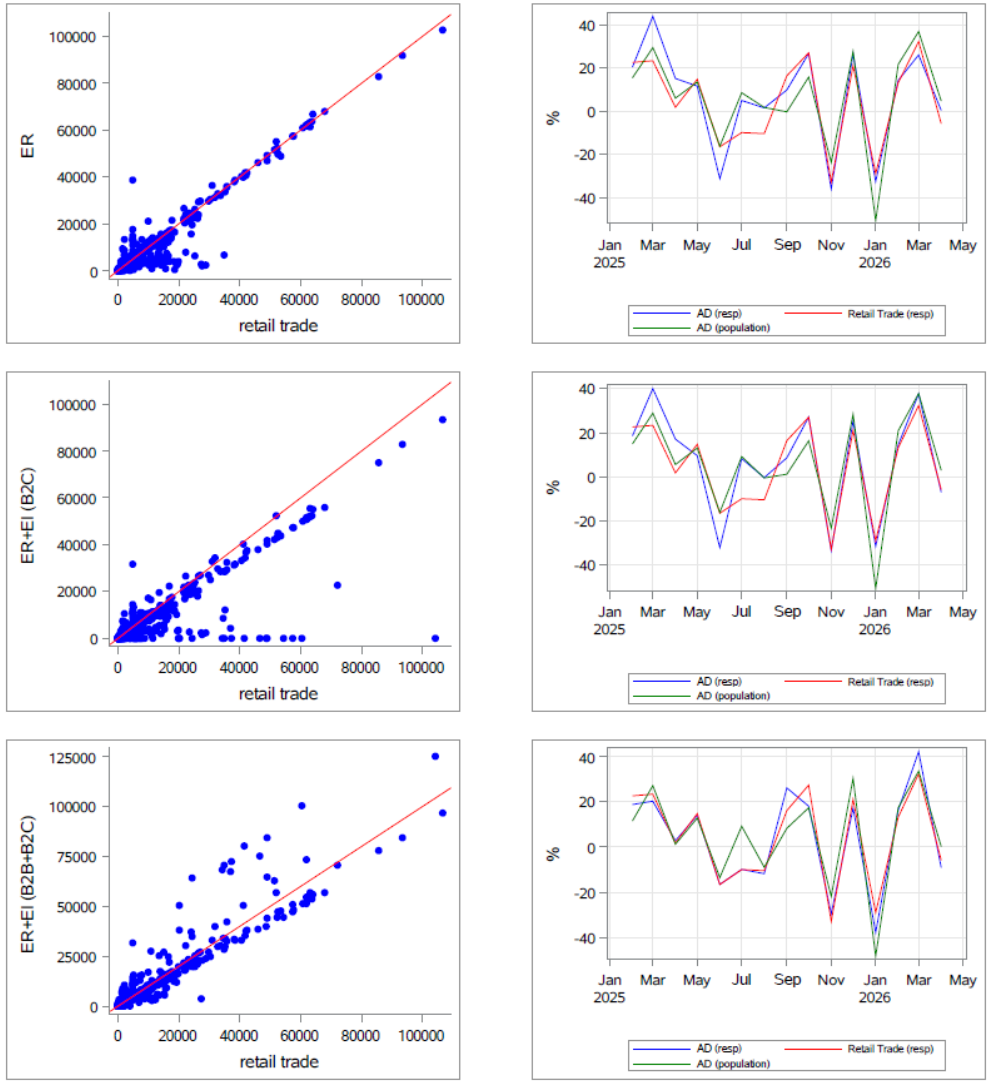


- **Sector peculiarities** includes a relevant share of EI transactions, involving both B2C purchases requiring an invoice and B2B sales to business customers (e.g. offices, hospitality and professional activities)
- **ER alone** provide incomplete coverage of turnover in furniture retail, due to the higher value and lower frequency of transactions typical of the sector
- **Combined** use of **ER**, **EI B2C** and **EI B2B** provides a closer approximation in terms of levels and short-term dynamics

	Type A	Type B	Type C
CCI	**0,938** VH	**0,951** VH	**0,589** L
SCI	0,889 H	0,927 VH	0,394 VL
DCI	0,990 VH	0,976 VH	0,879 H

Results: Micro-level evidence by stratum - “Virtuous” strata:

ATECO 47.89.0 (class 1) – Retail sale via stalls and markets of other goods

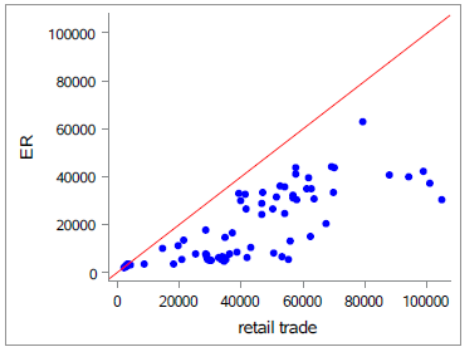


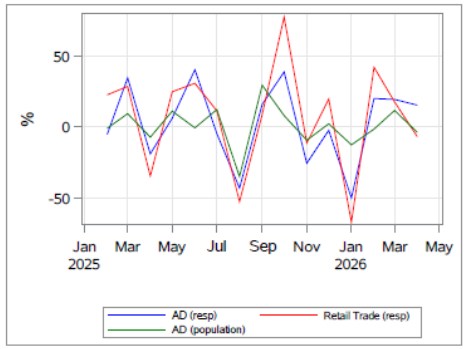
- **ER** provides the closest visual approximation to survey retail sales
- Addition of **EI B2C** does not improve the agreement, likely reflecting differences in coverage and the heterogeneous composition of the sector
- **Diagnostic indicators** favour the combined use of ER, EI B2C and EI B2B, which provides the best overall approximation to survey estimates
- The findings highlight the complexity of integrating administrative sources in highly heterogeneous retail sectors

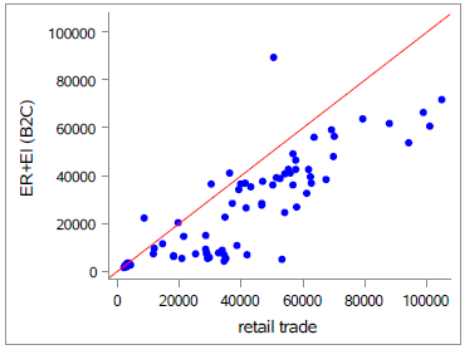
	Type A	Type B	Type C
CCI	**0,935** VH	**0,893** H	**0,886** H
SCI	0,901 VH	0,864 H	0,879 H
DCI	0,971 VH	0,923 VH	0,893 H

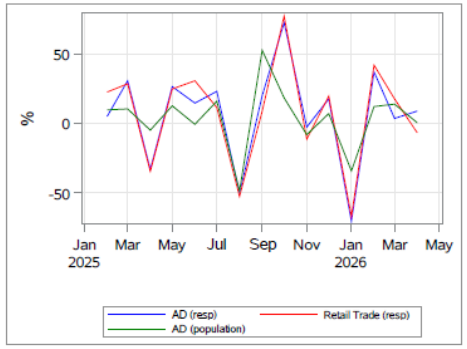
Results: Micro-level evidence by stratum - “Virtuous” strata:

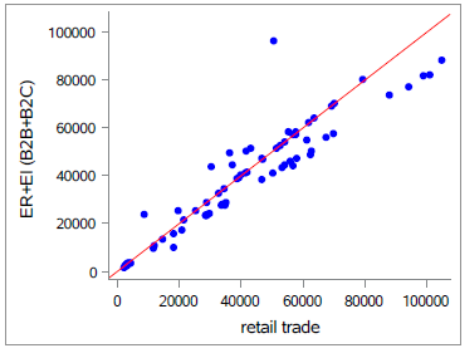
ATECO 47.52.2 (class 1) – Retail sale of sanitary ware and bathroom fixtures

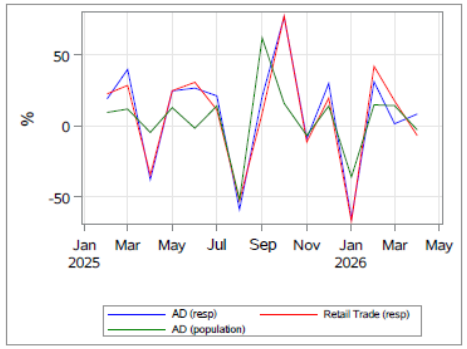












- **ER, EI B2C** and **EI B2B**: strong relationship between survey estimates and AD, confirmed by the diagnostic indicators
- EI progressively improves the approximation, suggesting that ER alone does not fully capture the sector’s sales structure
- Result consistent with sector’s characteristics: sanitary equipment purchases often involve higher-value transactions documented through EI
- Contribution of **EI B2B**: suggests the relevance of business-related transactions possibly linked to professional activities related to renovation and installation

	Type A	Type B	Type C
CCI	**0,928** VH	**0,856** H	**0,632** M
SCI	0,886 H	0,762 H	0,487 L
DCI	0,972 VH	0,963 VH	0,820 H

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Future strategy for AD-based estimation

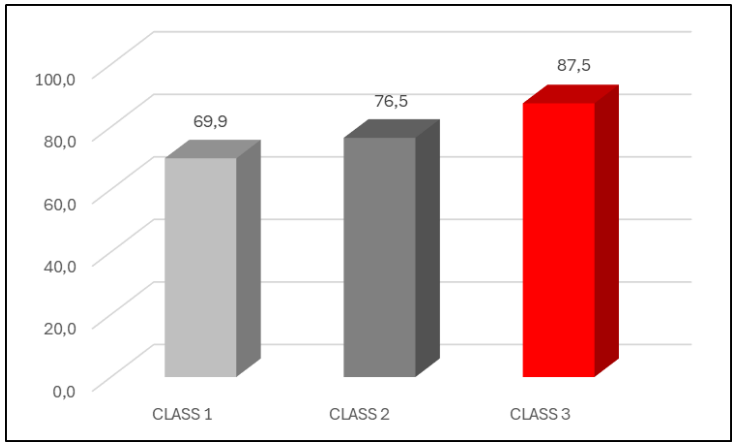
Table 3 – Composition of the survey sample and target business population eligible for AD

Size class	Total Sample		Selected Sample		Total Population		Selected Population	
	n.	frac.	n.	frac.	n.	frac.	n.	frac.
1-5	5.285	65,8	4.317	53,8	339.033	89,0	303.042	79,6
6-49	1.095	13,6	746	9,3	39.964	10,5	25.673	6,7
50+	1.647	20,5	727	9,1	1.748	0,5	738	0,2
Total	**8.027**	**100,0**	**5.790**	**72,1**	**380.745**	**100,0**	**329.452**	**86,5**

Note: 'Total sample' refers to the RTS sample for the year 2026. 'Selected sample' refers to enterprises belonging to strata with a *Very High/High* CCI range.

- 70% + of the enterprises could be replaced by AD with strong concentration among micro-enterprises
- '50+' enterprises: very small share of the population (0.5% TP, 0.2% SP, ~20% SS): deliberately oversampled due to their economic relevance
- AD could primarily replace direct surveys for micro-enterprises, which:
  - represent the largest share of the business population
  - show lower response rates
  - show higher reporting burden

Average response rate by employee size (year 2025)



Note: Percentage values

Remarks and future work

- **Promising results from experiments**: using tax data for short-term statistics on Retail Trade shows great potential for the near future
- **Positive indicators**: coverage, accuracy, bias, timeliness, … enable replacing non-respondents, reducing surveys, estimating turnover, and expanding monthly indicators across the economy
- **Reduced statistical burden**: significant impact from lowering the statistical burden on respondents
- **Impact on NSI operations**: changes in work organization and processes for National Statistical Institutes (NSI) require skilled professionals for data monitoring and interpreting AD
- **Collaboration with Revenue Agency**: close and ongoing cooperation between NSI and the Revenue Agency remains crucial for process efficiency and accurate data interpretation
- **Strategic guidelines for 2027**: clear objectives set for January 2027 for RTS, and progressive extension to other STS, supporting a more efficient e sustainable production process

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Thank you!

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