

A Study on the Use of Electronic Invoices for Compiling Industry Same-Store Sales Indicators

STATISTICS DEPT., MOF
October 23, 2025

I. Introduction

Taiwan's cloud invoice system has been implemented since 2009. By the end of 2024, more than 630,000 business entities have adopted the system, and electronic uniform invoices (e-invoices) accounted for over 87% of all invoices issued. Businesses are required to upload invoice data to the Ministry of Finance (MOF) within a prescribed time frame, making the data both timely and representative. During the COVID-19 pandemic in 2020, the Department of Statistics, MOF utilized e-invoice data to compile same-store sales statistics for various industries to assess the degree of impact and pace of recovery.

Given the high potential of e-invoice applications and their usefulness in constructing real-time indicators of private consumption—an area traditionally lacking in Taiwan—this study builds upon the preliminary framework developed during the pandemic. Drawing upon international experiences and employing statistical methods, representative industries were selected, and outliers in the data were adjusted to improve the quality and stability of the results. Finally, sample same-store sales indicators were compiled for selected industries to examine their consistency with overall trends and their sensitivity to business cycle fluctuations.

II. Concept and International Compilation of Same-Store Sales

1. Basic Concept

The same-store sales indicator measures the change in sales of stores that have been operating for one year or longer. It is a commonly used metric in the Retail Trade. Because retailers often expand their business operations by opening new outlets—and may launch promotional campaigns or discounts to attract

(Contents on this site have been translated using artificial intelligence (AI) or machine translation technology)

customers—total sales can increase (or decrease) accordingly. The same-store sales indicator, by excluding the effects of store openings and closures, allows for a more accurate assessment of existing store performance and supports more effective business decision-making. In short, the same-store sales indicator for period ‘t’ represents the rate of change in total sales (S) for stores that existed in both period ‘t’ and period ‘t-1’. The formula is as follows:

$$\text{Same-store sales indicator at time } t = \frac{S_t}{S_{t-1}} \times 100\%$$

2. International Compilation Practices

A review of national statistical offices in the United States, the United Kingdom, France, Germany, and the Netherlands found no official compilation of same-store sales statistics. Only Japan’s Ministry of Economy, Trade and Industry (METI) publishes similar data in its Current Survey of Commerce.

In contrast, same-store sales indicators are more commonly produced and used in the private sector. For example, major U.S. retail chains such as Walmart, McDonald’s, and Starbucks report same-store sales as key performance metrics. Additionally, Redbook Research Inc. surveys approximately 9,000 large general merchandise retailers across the U.S. to compile a Redbook Same-Store Sales Index¹, published weekly (Sunday to Saturday) and monthly. The coverage of this index represents roughly 80% of the total retail sales reported by the U.S. Census Bureau, making it highly representative. The index is expressed as a year-over-year growth rate; for instance, a 6.2% increase as of February 25, 2025, indicates that same-store sales that week grew 6.2% compared to the same period in the previous year.

III. Taiwan’s Pilot Compilation Approach and Its Innovations

In recent years, the share of sales recorded through electronic invoices in Taiwan has increased from 21% in 2017 to 44% in 2024. Given the abundance and timeliness of e-invoice data, this study explores applications in compiling Taiwan’s Same-Store Sales Indicator, with the ambition of expanding beyond the

¹ The SSI (Johnson Redbook Same-Store Sales Index) is defined as a sales-weighted average of the year-over-year percentage change in same-store sales, where same-store sales refer to the sales of retail outlets that have been in operation for at least 12 months.

retail sector. The pilot study covers the period from January 2020 to December 2024 (a total of five years). The major steps of compilation are summarized as follows.

1. Defining the Scope of Same Stores

Using transaction data from e-invoices, businesses were identified based on their business administration numbers. Same stores were defined as businesses that continued operations during both the “same period of the previous year” and the “same period of the previous month.” This allows for both month-over-month and year-over-year comparisons of sales performance.

2. Selecting Representative Industries

Following international practice, the analysis was conducted by industry category. As the adoption of e-invoices varies across sectors, industries with sufficiently representative e-invoice sales data were first identified. The study adopted the division-level industry classification (88 categories) and used the business tax-based same-store sales indicator—derived from self-declared business tax data—as the reference population for validation. The representativeness of e-invoice² samples was verified in three stages:

(1) High correlation with the business tax same-store sales indicator

For each division, the Pearson correlation coefficient between e-invoice-based and business tax-based same-store sales indicators was computed. Industries with a coefficient above 0.7, indicating a strong positive linear correlation and similar movement trends, were retained. In practice, since e-invoice adoption is uneven across sectors, 29 divisions met this first-stage criterion.

(2) Consistent distribution with the business tax indicator

Even when correlations are high, the magnitude of change may differ between the two datasets. Therefore, the Runs test was applied to examine whether the distributions were statistically similar. This second-stage test eliminated an additional 3 divisions.

(3) Threshold for e-invoice sales ratio

If the proportion of e-invoice same-store sales within total business sales (the

² All values have been adjusted for outliers, following the approach in Section 4.

e-invoice ratio) is too low, it may not adequately represent the industry as a whole. Considering differences in industry size, volatility, structure, and market characteristics, stratified sampling principles were applied to subjectively determine the threshold ratios (see Table 1). This third stage excluded one more division.

Table 1 Thresholds for E-Invoice Same-Store Sales Ratios

Unit : %

Business Tax-Based Same-Store Sales (%)		<10%	10-20%	20-30%	30-40%	40-50%	>50%
CV							
Establishments (End-2024) (S)							
S<100		30	35	40	50	60	70
100<=S<500		20	25	30	40	50	60
500<=S<1,000		15	20	25	35	40	50
1,000<=S<5,000		10	15	20	30	35	40
5,000<=S		5	7	10	15	20	25

Source: Compiled by this study.

Among the industries that were not retained, Retail Trade—being the central focus of same-store sales research—was included as an exceptional case to enhance applicability. In addition, to improve analytical usefulness, the study further incorporated 9 classes under Retail Sale in Non-specialized Stores, including Convenience Stores, Department Stores, and others.

Furthermore, considering the recent surge in demand for emerging applications and the growing economic importance of computers, electronic and optical products, this industry was also included in the pilot compilation.

In total, 37 industries were selected for the pilot study—comprising 27 divisions, 1 group, and 9 classes. Besides Retail Trade, the selected industries also include Basic Metals, Electronic Parts and Components, Accommodation and Food Products & Beverage Service (see Table 2). This ensures broad coverage beyond a few specific industries. However, since the selected industries were determined through multiple filtering steps and e-invoice adoption remains insufficient in some sectors, compiling a single, aggregate same-store sales indicator for all industries would not be meaningful and was therefore not undertaken.

Table 2. Industries in Taiwan’s Pilot Same-Store Sales Study

01 Agriculture and Animal Husbandry			05 Extraction of Crude Petroleum and Natural Gas		
C. Manufacturing (15 Divisions)					
08 Food Products and Prepared Animal Feeds		12 Wearing Apparel and Clothing Accessories		13 Leather, Fur and Related Products	
14 Wood and of Products of Wood and Bamboo		15 Paper and Paper Products		17 Petroleum and Coal Products	
18 Chemical Material and Fertilizers		19 Other Chemical Products		24 Basic Metals	
26 Electronic Parts and Components		27 Computers, Electronic and Optical Products		29 Machinery and Equipment	
30 Motor Vehicles and Parts		31 Other Transport Equipment and Parts		34 Repair and Installation of Industrial Machinery and Equipment	
47-48 Retail Trade (1 Division, 1 Group, and 9 Classes)					
471 Retail Sale in Non-specialized Stores					
4711 Convenience Stores, Chain		4712 Department Stores		4719 Other Retail Sale	
4751 Pharmaceutical and Medical Goods		4821 Gasoline and LPG Stations		4831 Computers, Computer Peripheral Equipment and Software	
4841 Motor Vehicles		4843 Motor Vehicles, Motorcycles Parts and Accessories		4871 Retail Sale via Mail Order Houses or via Internet	
Other Service Industries (9 Divisions)					
52 Support Activities for Transportation		54 Postal and Courier Activities		55 Accommodation	
56 Food and Beverage Service Activities		66 Security, Commodity Contracts, and Auxiliary to Financial Service Activities		67 Real Estate Development Activities	
70 Head Offices; Management Consultancy Activities		77 Rental and Leasing Activities		93 Sports and Amusement and Recreation Activities	

Source: Compiled by this study.

3. Compiling Both Weekly and Monthly Indicators

E-invoice data are updated every Wednesday by the Fiscal Information Agency, MOF. Thus, in addition to monthly indicators, weekly same-store sales indicators can also be compiled. To reduce short-term effects such as temporary closures or holiday sales spikes (e.g., higher weekend sales in Food Products & Beverage Service Activities), a cumulative weekly indicator is adopted. Weeks are defined by date: days 1-7 as week 1, 1-14 as week 2, and so on. The four-week cumulative value represents the monthly same-store sales indicator.

4. Outlier Treatment

To address invoice cancellations, returns, and errors, outliers are removed using the interquartile range (IQR³) rule. For each period’s year-over-year and month-

³ The interquartile range (IQR) = the third quartile (Q3) - the first quartile (Q1). During the study, the

over-month growth rates, data exceeding $Q3+1.5\times IQR$ are treated as outliers if both rates surpass the threshold.

5. Data Extraction and Compilation Schedule

A review of data from 2022 and 2023 shows that cumulative weekly data captured on the first and second Wednesdays after each reference month covered about 66%-99% and 93%-100% of businesses, respectively. Balancing timeliness and accuracy, data are therefore extracted on the second Wednesday after the reference month. Including about three additional days for processing, the monthly same-store sales indicator can be completed within three weeks after the end of each month—faster than comparable statistics derived from business tax data or other similar surveys.

IV. Review and Analysis of Compiled Same-Store Sales Indicators

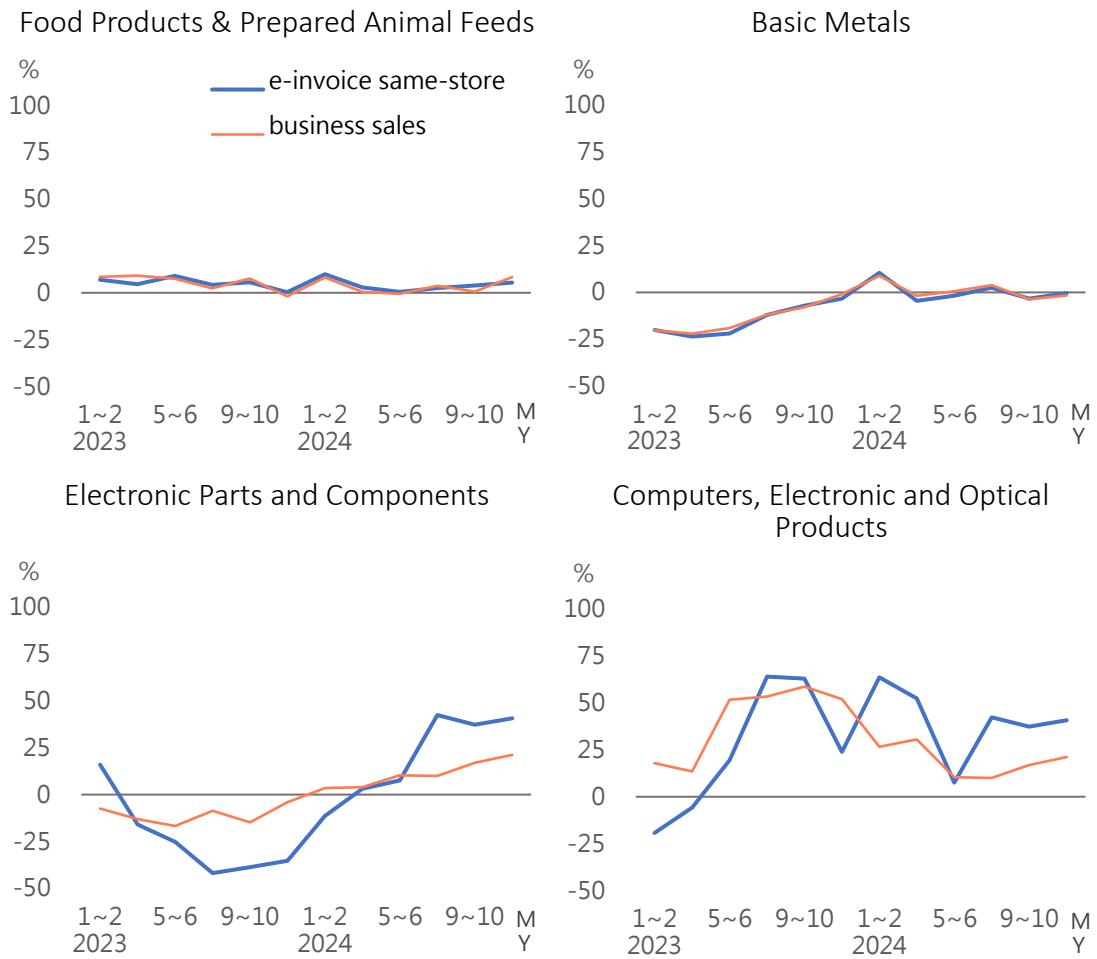
1. Comparison with Overall Business Sales Trends

The year-on-year trends between e-invoice same-store sales and total business sales (the population data) differ among industries and are related to the proportion of e-invoice transactions in each sector. Taking Food Products and Prepared Animal Feeds, Basic Metals, Electronic Parts and Components, and Computers, Electronic and Optical Products Manufacturing as examples, the study compares the pilot results and population growth rates from 2023 to 2024 (Figure 1).

In Food Products and Prepared Animal Feeds and Basic Metals Manufacturing, the same-store sales and total business sales show similar trends and growth rates. This is mainly because both industries focus on the domestic market, and e-invoice same-store sales account for more than 60% of total sales, making the indicator highly representative. In contrast, in Electronic Parts and Components, and Computers, Electronic and Optical Products Manufacturing, where exports account for a high share and many transactions are exempt from issuing uniform invoices, e-invoice same-store sales represent less than 20% of total sales, resulting in greater discrepancies from the overall sales trends.

three-standard-deviation rule was also tested for setting the upper limit, but its filtering effect was less effective than the IQR method.

Figure 1. YoY growth rates of e-invoice same-store sales and business sales



Source: Compiled by this study.

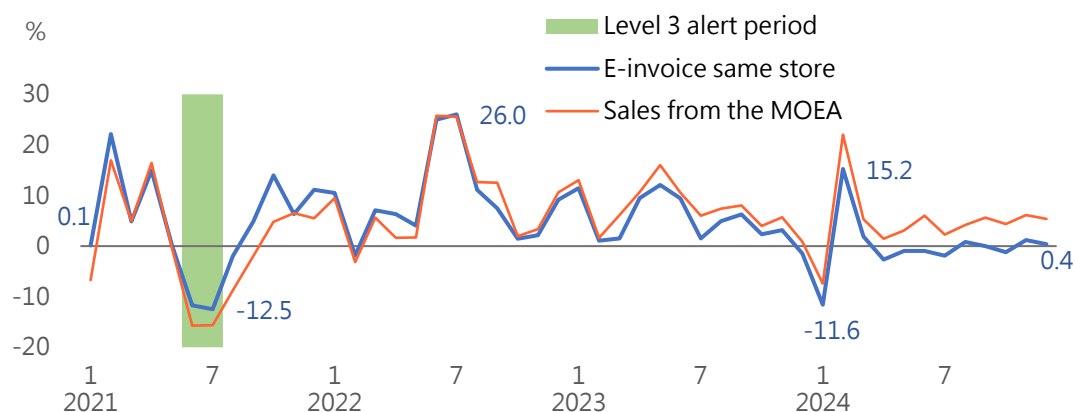
2. Responsiveness to Industry Business Cycles

From 2021 to 2024, the same-store sales of Retail Sale in Non-specialized Stores reached their lowest point in June-July 2021 (Figure 2), showing double-digit declines. This reflected the spread of COVID-19 and the impact of the nationwide Level 3 epidemic alert implemented from May to July that year. In 2022, with the post-pandemic rebound in mall traffic and the reopening of national borders bringing back tourism demand, all months recorded positive growth. By 2024, private consumption had stabilized, and year-on-year changes fluctuated only slightly around zero, except for January and February, which showed a 12.5% decline and 15.2% increase, respectively, due to the Lunar New Year holding falling on different dates across the years.

When compared with the Ministry of Economic Affairs' (MOEA) survey data, both series exhibited broadly similar movements, though some discrepancies

remained—possibly due to changes in store establishments and market turnover under competitive dynamics.

Figure 2. YoY Growth Rate of Retail Sale in Non-specialized Stores Sales



Source: Compiled by this study and the Department of Statistics, MOEA.

V. Conclusion

The Department of Statistics, MOF first attempted to compile same-store sales using e-invoice data during the COVID-19 pandemic, which clearly demonstrated its potential for real-time economic monitoring. Building on that experience, this study introduced several improvements, including the selection of representative industries and the removal of outliers. In practice, alternative approaches exist, each with its own advantages and drawbacks, and choices among them inevitably involve a degree of subjective judgment. In other words, this pilot compilation remains experimental in nature, and future refinements will depend on the progress of e-invoice applications in Taiwan and advancements in AI-based data processing techniques.

VI. References

1. Starbucks (2024), Starbucks Reports Q4 and Full Fiscal Year 2024 Results.
2. McDonald (2024), McDonald's Reports Third Quarter 2024 Results.
3. Walmart (2024), Walmart Reports Second Quarter Results.
4. Redbook Research Inc. (2022), Johnson Redbook Retail Sales Index, March 08, 2022.
5. Redbook Research Inc. (2022), Retail Sales Monthly, February 2022.
6. Vega, Clara and Harris, Ethan S. (1996), What Do Chain Store Sales Tell Us About Consumer Spending?, *Economic Policy Review*, Vol. 2, No. 2, October 1996.