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Deflation of services turnover indexes

The deflation of Wholesale Trade

Cross cutting topic (11) – Production of a deflated index of turnover

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Introduction

- The Italian survey on services turnover collects turnover in euro excluding VAT and other taxes
- Annual Turnover is also collected by Structural Business statistics
- Level enterprise

The index of services turnover implicitly contains price movements. In order to obtain a measure of the change in the volume of services, it is necessary to deflate the turnover.

Deflation is obtained dividing by a deflator.

The deflated turnover index is the most reliable proxy for the production index.

Introduction

Three different approaches:

- **input indicators.** Hours worked or deflated wages and salaries can be used to measure the value of output. This proxy is often used for mainly non-market sectors output (libraries, education and health);
- **output indicators.** For example, for the deflation of postal services a weighted average of letters, parcels and in general of all deliveries can be used. This type of indicator is also suitable for transport of passengers and goods;
- **price indexes.** Each service is deflated dividing the turnover by the corresponding output price index; if not available, an alternative price index can be used, for example the consumer price indexes (HICP). The latter method is based on the assumption that the producer prices grow to the same extent as the selling prices. Clearly this proxy is more robust for services aimed at consumers (Business to Consumer) rather than for enterprises (Business to Business).

Main steps

- The building of the matrix of the deflators;
- the definition of the weighting system;
- the calculation of the volume indexes;
- the results.

The Index of Production Services

The compilation of the Index of Production Services is achieved according to the Italian classification of economic activities (ATECO 2007). The covered sectors are the 2-digit activities:

- Wholesale and retail trade and repair of motor vehicles and motorcycles (G45)
- Wholesale trade, except of motor vehicles and motorcycles (G46)
- Land transport and transport via pipelines (H49)
- Water transport (H50)
- Air transport (H51)
- Warehousing and support activities for transportation (H52)
- Postal and courier activities (H53)
- Accommodation (I55)
- Food and beverage service activities (I56)

The Index of Production Services

- Publishing activities (J58)
- Motion picture, video and television programme production, sound recording and music publishing activities (J59)
- Programming and broadcasting activities (J60)
- Telecommunications (J61)
- Computer programming, consultancy and related activities (J62)
- Information service activities (J63)
- Legal and accounting activities (M69)
- Management consultancy activities (M702)
- Architectural and engineering activities; technical testing and analysis (M71)
- Advertising and market research (M73)
- Other professional, scientific and technical activities (M74)
- Employment activities (N78)
- Travel agency, tour operator reservation service and related activities (N79)
- Security and investigation activities (N80)
- Cleaning activities (N812)
- Office administrative, office support and other business support activities (N82)

Deflated turnover

According to the Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019 on European business statistics (EBS), the National Institute of Statistics, starting from 2024, will have to disseminate the deflated turnover indicators for the services sector, with reference periods starting in January 2021. In particular, it is required to deflate the turnover Wholesale and retail trade and repair of motor vehicles and motorcycles (G45) and Wholesale trade, except of motor vehicles and motorcycles (G46), the section G of NACE classification and, separately the turnover of all other services excluding G (sections H, I, J and M excluding 701, 72 and 75).

Among the possible methods to produce volume indexes, the deflation by an appropriate output price index, is considered to be the first feasible choice.

The alternative choice of using a consumer price index is used as a secondary option. This method is based on the assumption that the prices of manufacturing companies grow at the same rate as sales prices. Clearly this proxy is more robust for services aimed at consumers (Business to Consumer) rather than businesses (Business to Business).

The matrix of deflators

The construction of the deflators for section G and for all the others service sectors except G (TOTXG) is carried out separately.

TOTXG

The price indexes used to construct the matrix of deflators are the production price indexes of services (SPP) for the BTB component and the harmonized consumer price indexes (HICP) for the BTC component.

The aggregation of price indexes is based on data from the matrix of USE (2015), produced by the Directorate of National Accounts.

Values of final household consumptions and intermediate consumptions, are used to assign weights to the HICP and SPP respectively.

The matrix of deflators

Section G - divisions 45 and 46

To deflate section G a different approach is used, as there are no series of output price indexes available.

Starting from the most detailed break-down, each service has been associated with the corresponding price or, in the absence of this, the most representative of the sector.

Different situations:

- **one-to-one correspondence** the deflator coincides with the identified price;
- **one-to-many correspondence** the deflator is a synthesis of two or more different prices and synthesis is a weighted arithmetic mean.

The weighting coefficients are based on estimates of the net turnover referring to the base year 2015.

The weighting system

In order to aggregate turnover indexes at higher levels of NACE, the indexes at the lowest level are aggregated by using weights based on information on turnover for section G and value added for all the other service sectors (TOTXG).

These data are provided by Structural Business Statistics and are available for each activity referring to the base year (2015).

Technically:

- list of services classified according to the NACE codes;
- the corresponding turnover and value added;
- the aggregation rules.

The weighting system

The first two columns refer respectively to the groups and divisions (sections) of the NACE classification.

Indexes Aggregation System

ATECO_C	ATECO_A	AGGREGATION_LEVEL	FATT3	VA3	FATTS	VAS	FATTR	VAR	
451	45		30	80338252	5248937	113653390	13070398	7068707	4015897
451	G		50	80338252	5248937	641927704	75578028	1251516	694506
452	45		30	13325505	4699320	113653390	13070398	1172469	3595392
452	G		50	13325505	4699320	641927704	75578028	207586	621784
453	45		30	16831329	2732869	113653390	13070398	1480935	2090884
453	G		50	16831329	2732869	641927704	75578028	262200	361596
454	45		30	3158304	389272	113653390	13070398	277889	297827
454	G		50	3158304	389272	641927704	75578028	49200	51506
461	46		30	26429767	9864004	528274314	62507630	500304	1578048
461	G		50	26429767	9864004	641927704	75578028	411725	1305142
462	46		30	20546168	1422594	528274314	62507630	388930	227587
462	G		50	20546168	1422594	641927704	75578028	320070	188229
463	46		30	108156625	9163730	528274314	62507630	2047357	1466018
463	G		50	108156625	9163730	641927704	75578028	1684872	1212486
464	46		30	128806237	17819918	528274314	62507630	2438245	2850839
464	G		50	128806237	17819918	641927704	75578028	2006554	2357817
465	46		30	26786510	3626976	528274314	62507630	507057	580245
465	G		50	26786510	3626976	641927704	75578028	417282	479898
466	46		30	32846060	6193681	528274314	62507630	621761	990868
466	G		50	32846060	6193681	641927704	75578028	511678	819508
467	46		30	166164018	12154154	528274314	62507630	3145412	1944427
467	G		50	166164018	12154154	641927704	75578028	2588516	1608160
469	46		30	18538929	2262573	528274314	62507630	350934	361967
469	G		50	18538929	2262573	641927704	75578028	288801	299369

The weighting system

The first two columns refer respectively to the groups and divisions (sections) of the NACE classification.

Indexes Aggregation System – level 1

ATECO_C	ATECO_A	AGGREGATION_LEVEL	FATT3	VA3	FATTS	VAS	FATTR	VAR	
451	45		30	80338252	5248937	113653390	13070398	7068707	4015897
452	45		30	13325505	4699320	113653390	13070398	1172469	3595392
453	45		30	16831329	2732869	113653390	13070398	1480935	2090884
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466	46		30	32846060	6193681	528274314	62507630	621761	990868
467	46		30	166164018	12154154	528274314	62507630	3145412	1944427
469	46		30	18538929	2262573	528274314	62507630	350934	361967

The weighting system

FATT3 and VA3 are the weights respectively calculated with the turnover or value added and are referred to the the 3-digit NACE codes.

FATTS and VAS are weights respectively calculated with turnover or value,added, referred to the divisions level (2-digit).

FATTR and VAR are the final weights given by the ratio of the previous two and then multiplied by 10^7 .

Indexes Aggregation System – level 2

ATECO_C	ATECO_A	AGGREGATION_LEVEL	FATT3	VA3	FATTS	VAS	FATTR	VAR	
451	G		50	80338252	5248937	641927704	75578028	1251516	694506
452	G		50	13325505	4699320	641927704	75578028	207586	621784
453	G		50	16831329	2732869	641927704	75578028	262200	361596
454	G		50	3158304	389272	641927704	75578028	49200	51506
461	G		50	26429767	9864004	641927704	75578028	411725	1305142
462	G		50	20546168	1422594	641927704	75578028	320070	188229
463	G		50	108156625	9163730	641927704	75578028	1684872	1212486
464	G		50	128806237	17819918	641927704	75578028	2006554	2357817
465	G		50	26786510	3626976	641927704	75578028	417282	479898
466	G		50	32846060	6193681	641927704	75578028	511678	819508
467	G		50	166164018	12154154	641927704	75578028	2588516	1608160
469	G		50	18538929	2262573	641927704	75578028	288801	299369

The turnover volume indexes

At this point having available:

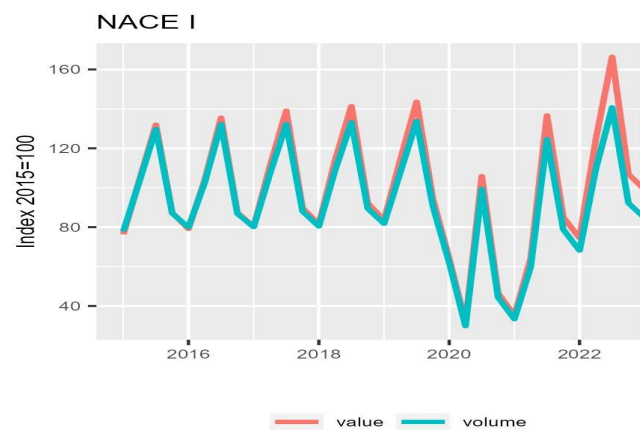
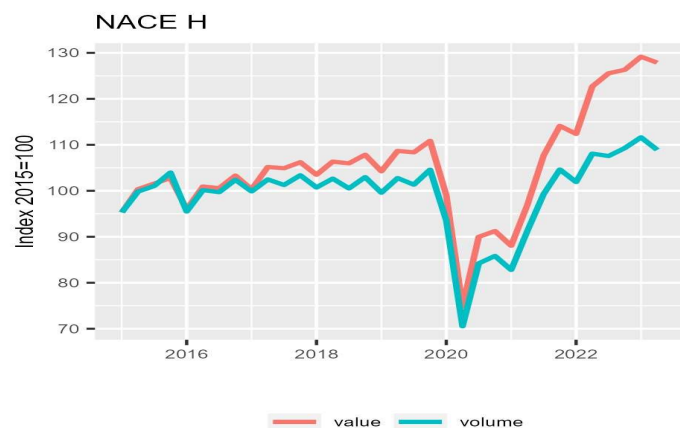
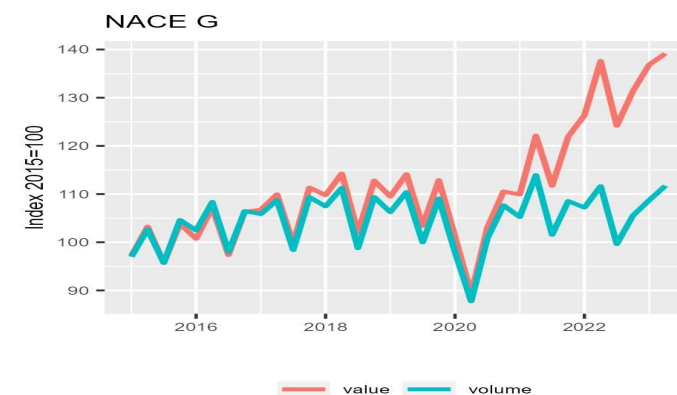
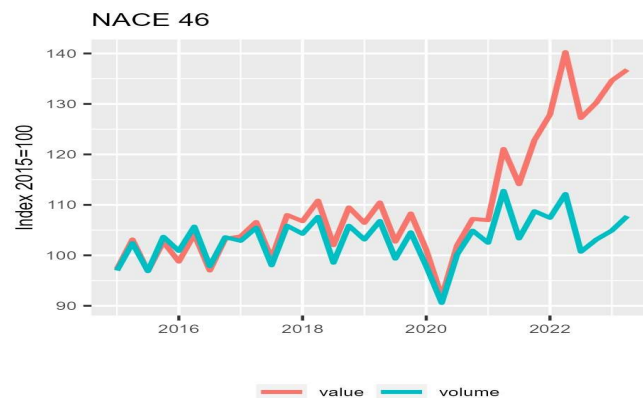
1. the raw indexes of turnover for the 3-digit levels and their aggregates;
2. the matrix of deflators;
3. the weights;

the deflated indexes are calculated dividing the raw indexes by the deflators.

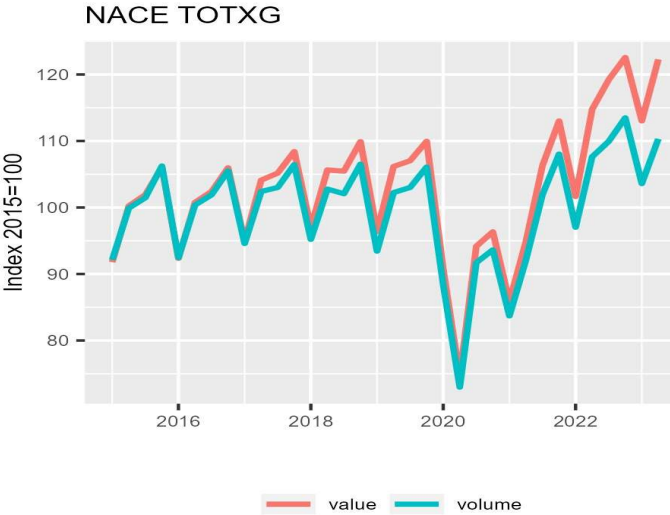
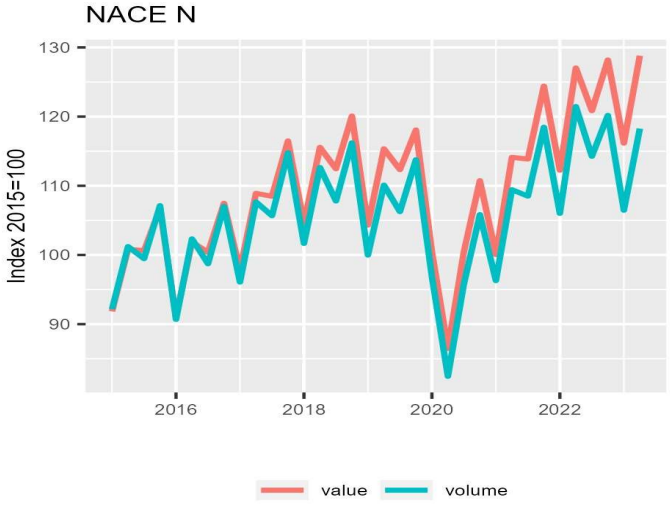
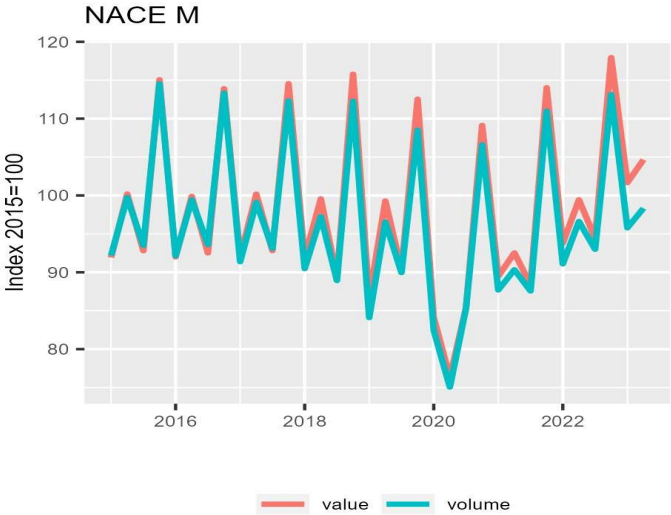
In order to obtain the 2-digit indexes and the totals (G and TOTXG) we use the weights to get the upper aggregations.

All the indexes are then adjusted for seasonality and calendar effects.

Plots of value and volume turnover indexes – Yearly average



Plots of value and volume turnover indexes – Yearly average



Conclusions

Currently the services turnover index is calculated and released on a quarterly basis, but will become monthly starting from the data referring to January 2024. The deflation process and the main results refer to quarterly data but, the full process has been set up for monthly indicators.

We have a complete and exhaustive indicator of the volume of production considering the volume of turnover together with the indicators of industry and constructions. The followed approach is also consistent with the deflation system used by the National Account Department.

Future considerations

Weakness

The transition to monthly indexes introduces uncertainties on some prices (SPP) which, remaining quarterly, will have to be temporally disaggregated and estimated in some way and forecasted accordingly.

Strength

Some sectors are supported by additional quantitative information. Among these, for example Accommodation and Food and beverage service activities (section I of the NACE). The deflated indexes of this sector could be supported by using number of nights in hotels or other accommodation facilities. Similarly for the Transport activities (section H of the NACE), in addition to the deflated indexes, the number of plane or train tickets could be considered.

The automation of the entire process, through an R procedure, allowing the direct access to all the databases involved, the estimation of the weighting system, the calculation of the deflators and, finally, the deflated turnover. The seasonal adjustment procedure is not completed yet. The direct approach will be used to calculate seasonally adjusted indexes for all the aggregation levels.

Thank you for your kind attention

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