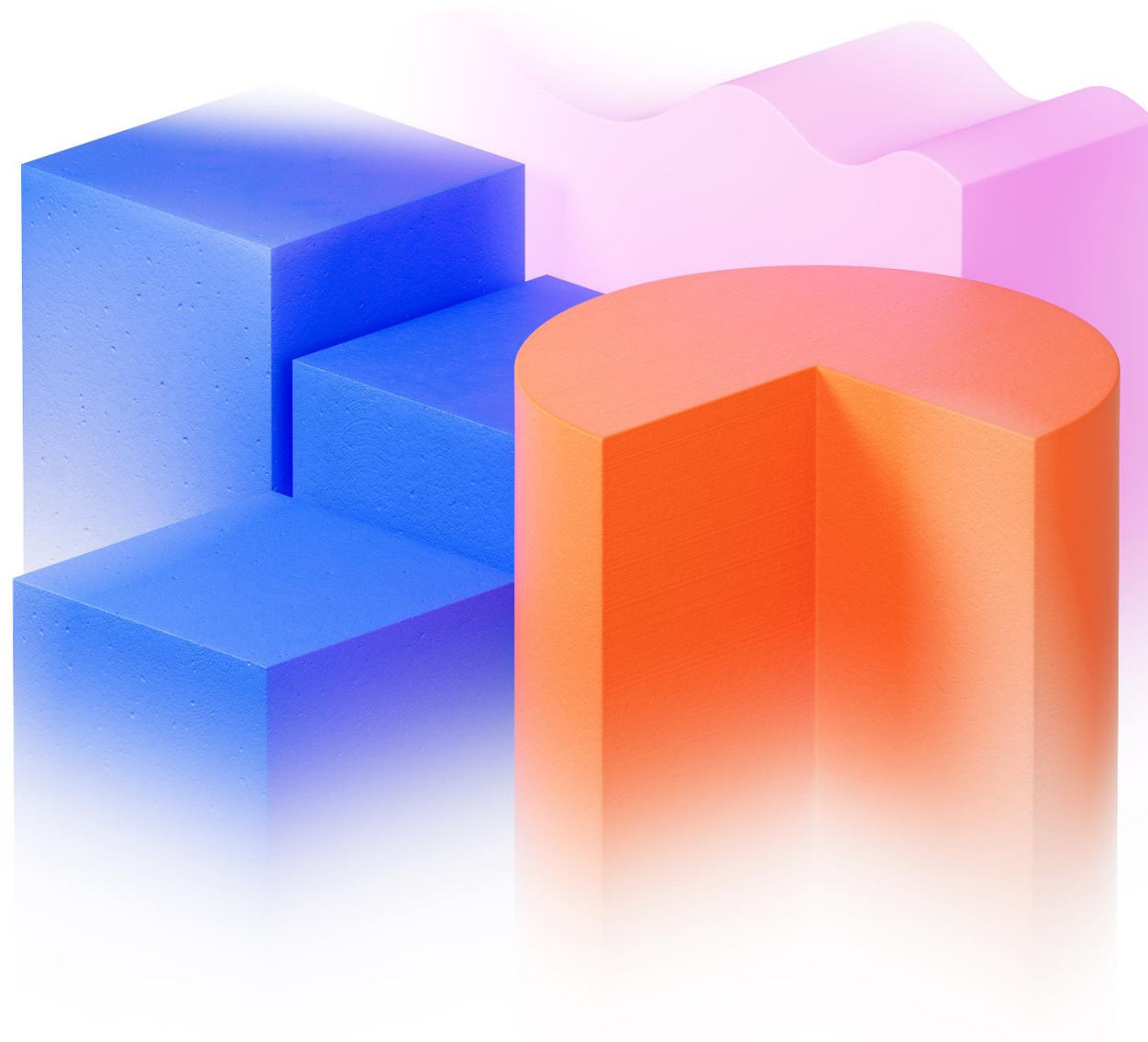


Measuring Gross Value Added in constant prices

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Introduction

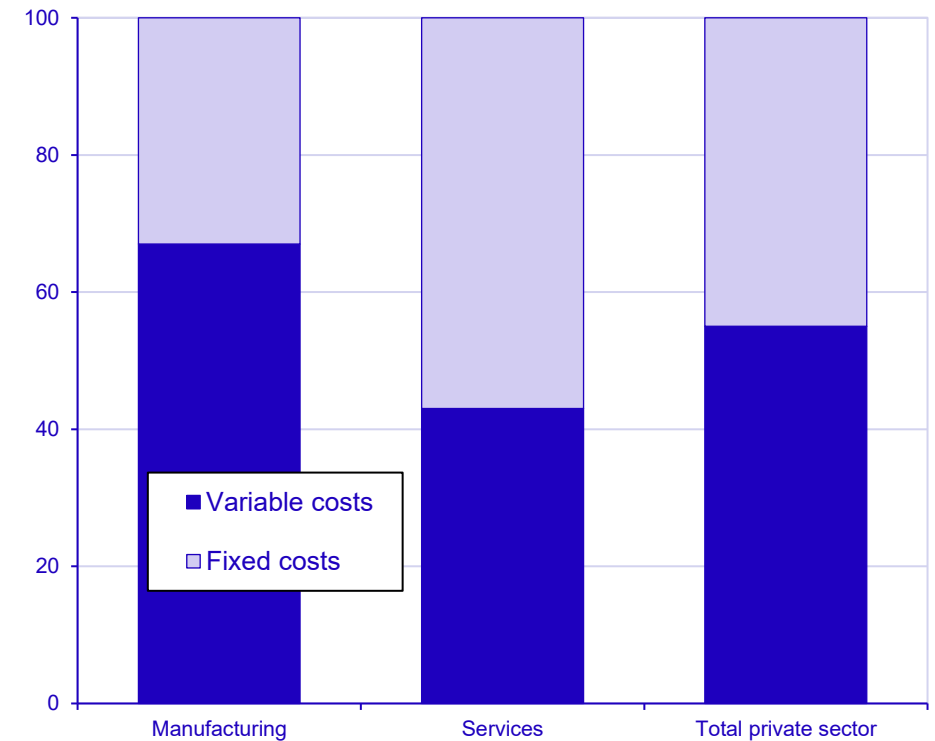
- **Methodological advancement:** Sweden has introduced quarterly measurement of both gross output and intermediate consumption, enabling direct estimation of gross value added (GVA) without relying on input-output assumptions.
- **Double deflation framework:** Independent deflation of output and input using appropriate price indexes allows for accurate volume measurement of GVA, isolating real economic changes from nominal price effects.
- **Implementation and Quality Assurance:** This paper and presentation outlines the process of constructing deflators by aggregating price indexes, and Statistic Sweden's approach to ensuring analytical reliability and data quality.

Gross Value Added

- **GDP and Business Cycles:** Economic growth is measured by changes in GDP. Comparing short-term GDP growth to a sustainable long-term rate helps identifying the economy's position in the business cycle.
- **New Production-based GDP Measurement:** Statistics Sweden can now directly calculate quarterly GDP using the production approach, thanks to new data on intermediate consumption. This enables direct estimation of Gross Value Added (GVA).
- **Limitations of Previous Methodology:** Earlier, intermediate consumption was assumed to grow in line with output, implying a constant input/output ratio – an assumption that fails during economic turning points.

Fixed vs. variable costs

- **Impact of Cost Structure:** GVA is sensitive to discrepancies between output and input growth, especially when fixed costs are high. Fixed costs constitute over 40% of private sector expenses in Sweden, particularly high within service industries.
- **Analytical Significance:** Measuring both output and intermediate consumption quarterly enhances the ability to detect economic turning points and support more accurate policy analysis.



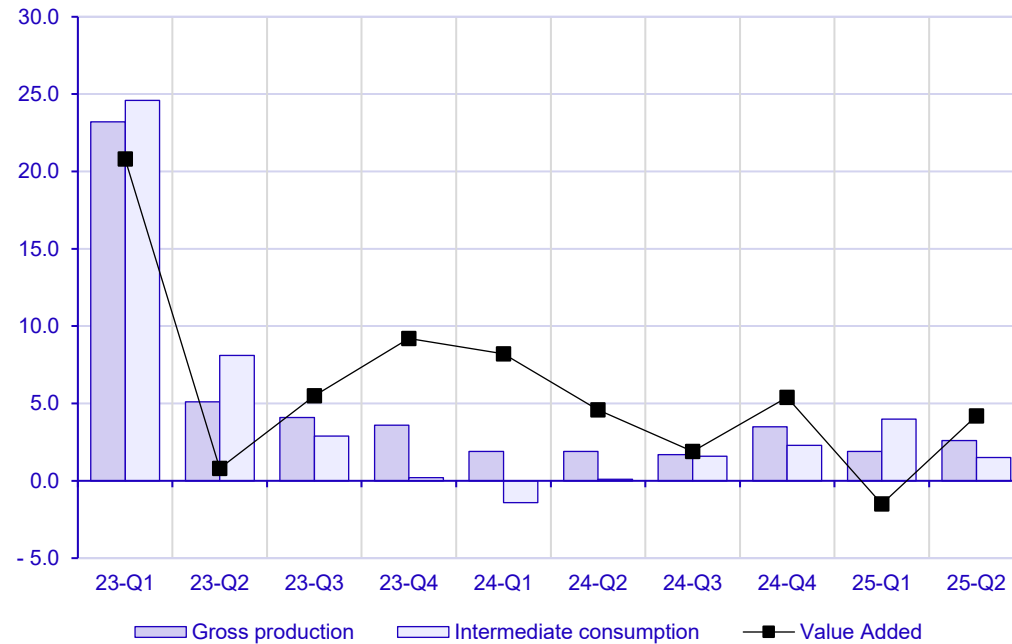
Real vs. Nominal GVA

- **Value vs. Volume Distinctions:** Changes in input share reflect shifts in the value of production and intermediate consumption, which may stem from price effects rather than actual changes in volume.
- **Need for Price Adjustment:** To accurately assess cyclical developments, it is essential to separate price effects from real changes by adjusting output and intermediate consumption values using price indexes, also known as double deflation.
- **Implications for Economic Analysis:** Apparent growth in production at current prices may be entirely due to rising prices, underscoring the importance of volume-based measurement for meaningful economic interpretation.

A practical example from a Swedish services industry

Value estimates

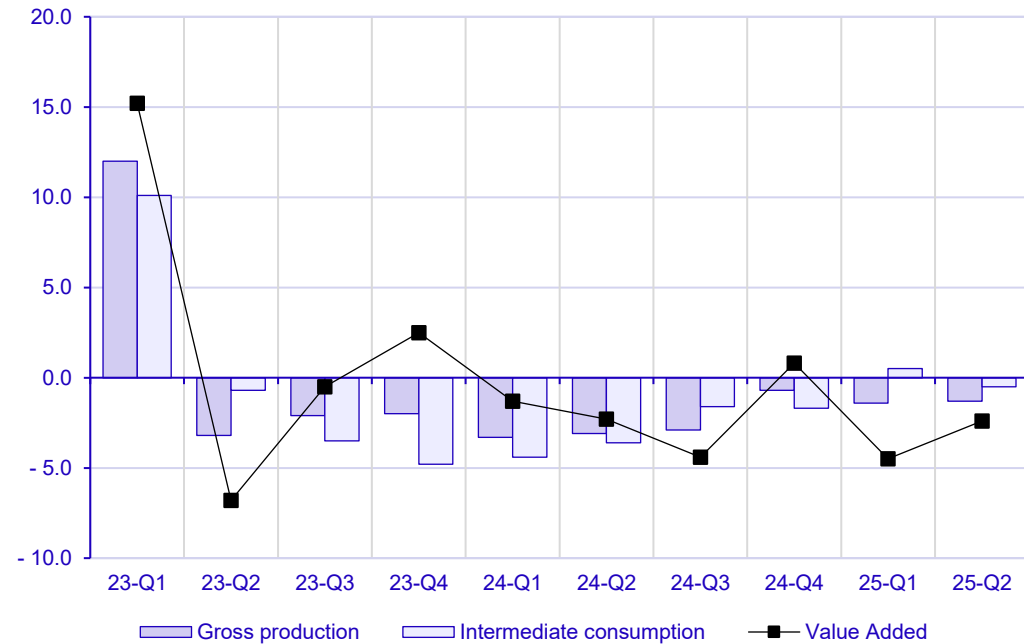
Production, Intermediate consumption and Value added, yearly percentage change, current prices



Source: Quarterly economic statistics, Statistics Sweden

Volume estimates

Production, Intermediate consumption and Value added, yearly percentage change, current prices



Source: Quarterly economic statistics, Statistics Sweden

Double deflation

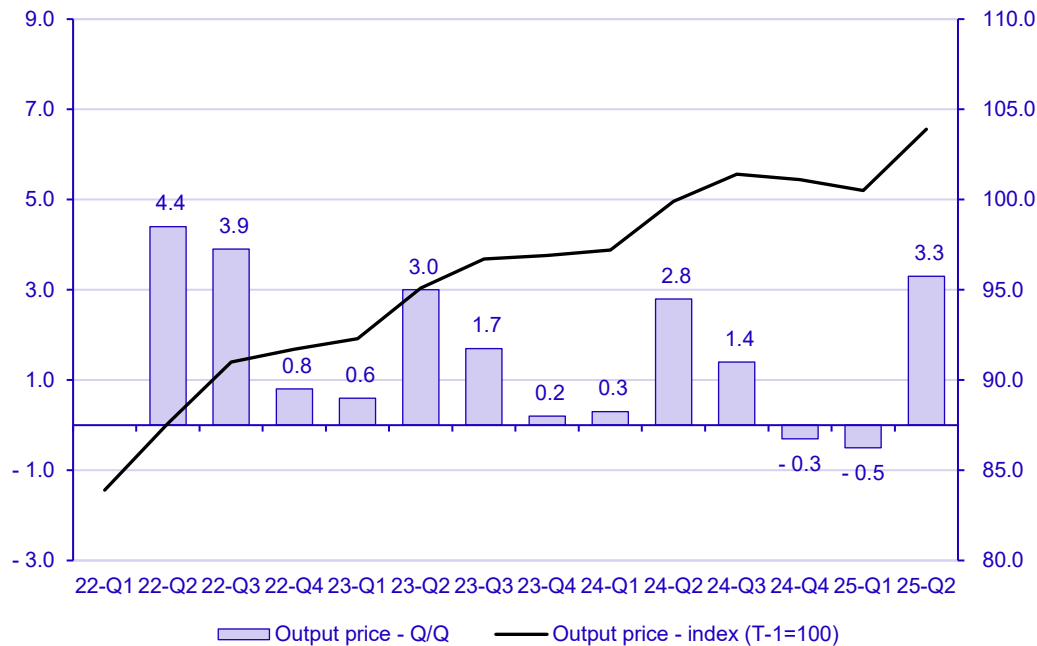
- **Nominal vs. Real Analysis:** Distinguishing between nominal and real changes in economic analysis, with volume estimates of gross value added (GVA) being the key indicator of real economic development.
- **Divergence in Output and Input Trends:** Differences in the growth of output and input values may result from structural factors like productivity shifts or from varying price developments between outputs and inputs.
- **Double Deflation Methodology:** Applying double deflation – separate deflation of output and input using relevant price indices – enables accurate estimation of real GVA by isolating volume changes from price effects.

Creating Industry Deflators

- **Constructing Industry Deflators:** Industry-specific deflators are derived by linking product-level prices indexes classified by SPIN (Standard Classification of Products by Industry) to industry classifications based on SNI (Swedish Standard Industrial Classification). Price indexes are, in most cases, collected from PPI/SPPI for production and Price Indexes for Domestic Supply for intermediate consumption.
- **Aggregation and Weighting:** Price indexes are aggregated to national accounts product groups (in most cases similar to SPIN) and weighted using annual production and intermediate consumption data to reflect the relative importance of each product within an industry.
- **Output and Input Deflators:** Separate composite deflators for output and input are constructed for each industry, enabling conversion from nominal values to real values.

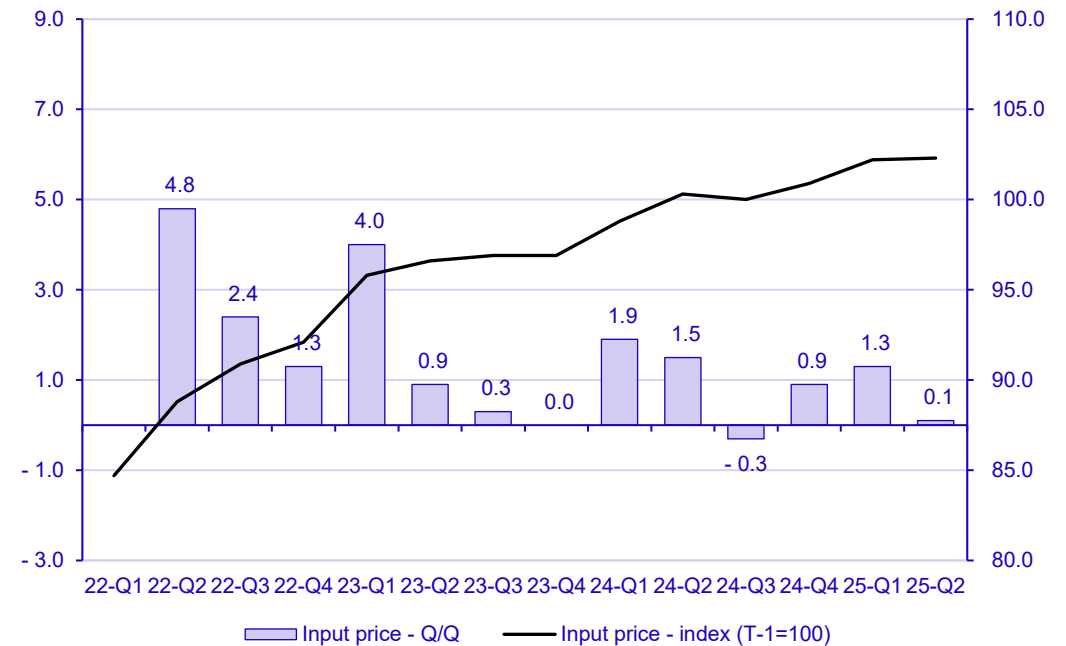
A practical example from a Swedish services industry

Industry deflator for production
Example from NACE I55-56



Source: Quarterly economic statistics, Statistics Sweden

Industry deflator for intermediate consumption
Example from NACE I55-56



Source: Quarterly economic statistics, Statistics Sweden

General limitations

- **Time Lag in Data:** Weighting matrices are based on annual production and consumption data, which are subject to a considerable time lag.
- **Assumption Limitations:** Assuming constant production and input structures over time may be unreliable, especially during period of rapid economic change.
- **Impact on Quarterly Statistics:** Shifts in product importance are not captured in quarterly data, potentially leading to revisions when annual figures are updated.

Challenges in Quality Assurance

- **Organisational Ownership:** The process of creating industry deflators has historically had no clear organisational ownership at Statistics Sweden. Each product has created their own deflators, in some cases using different sets of weight matrices and price indices.
- **Documentation and Knowledge:** The lack of organisational ownership has resulted in insufficient documentation and limited knowledge transfer which has resulted in several production errors in recent years.
- **Structured Collaboration:** A key challenge has been the lack of structured collaboration between price statisticians and economists. This has hindered the development of robust workflows and the quality of the deflation process.

A harmonized framework for deflation

- **Strengthening Quality Assurance:** To address these issues a project was initiated.
- **Training Package:** A comprehensive training package was developed for staff across statistical domains to unify methodological understanding.
- **Standardized Templates:** A standardized template for work procedure descriptions and documentation has been developed, enabling a more transparent and reproducible process.
- **Quarterly Meetings:** Quarterly deflation meetings has also been introduced, bringing together representatives from relevant domains to discuss methodological issues, review results, and identify areas for improvement.

Enhancing Analytical Capabilities

- **Interactive Report:** An interactive report in SAS Visual Analytics has been developed. The tool enables drill-down analysis from industry output and input series to underlying price effects, and further to the specific product price indices and their respective weights.
- **Bridges the Former Grey Zone:** This analytical tool resolves and clarifies the area of creating deflators which was formerly lacking structure. This provides economists and price statisticians with a powerful means of identifying and understanding price-driving factors within different industries.

Thank you!

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