

Frequently Asked Questions about chain-linking method

- Why did Statistics Estonia start calculating GDP by chain-linking method?
- What kind of advantages does chain-linking method have?
- Which are the disadvantages of chain-linking method?
- The adoption of chain-linking method has brought about several new indices: values at previous year prices, chain-linked volumes by reference year 2000, chained indices and contribution to GDP growth. What is the difference between these indices?
- What is the difference between base year and reference year?
- Based on what indices can the change in the GDP and its components be found?
- Why do the growth rates of GDP components calculated by chain-linking method differ from those calculated at constant prices?

Why did Statistics Estonia start calculating GDP by chain-linking method?

In Estonia, fixed base year 2000 had been applied to constant price calculations since 2001. A weak point of the constant price calculations by fixed base year is that the price structure of the base year reflects ever less the real economic situation as the accounting period becomes more distant. Therefore, after a certain period (usually in every five years), fixed base year has to be moved ahead and the respective GDP data has to be re-based i.e. recalculated according to the new base year. In addition, over years, product structure changes, especially in fast growing economies, for that reason the product structure of fixed base year reflects the real situation of the accounting year ever less accurately as the accounting period becomes more distant. Therefore, the closer the base year to the accounting year is, the more exact constant price calculations are.

A single fixed base year is not applied to chain-linking since every previous calendar year is used as a base for calculations, ie every year preceding the accounting year serves as a base year, therefore calculations must be made at previous year prices. Obligation to make national accounts calculations at previous year prices proceeds from the Regulation (EC) No 1392/2007 of the European Parliament and of the Council of 13 November 2007 amending Council Regulation (EC) No 2223/96 with respect to the transmission of national accounts data.

What kind of advantages does chain-linking method have?

1. The real growth of GDP components is calculated using the most up-to-date (last year's) weights. Therefore, growth rates reflect the economic changes more accurately even far away from the reference year.
2. Regular re-basing is no longer necessary. Re-referencing will not change growth rates. In principle, reference year can be chosen arbitrarily. Usually, reference year is changed, for example in every five years, like in case of fixed base year.
3. Improved international comparability of the GDP and the growth of its components. Almost all the EU Member States and the majority of developed countries (eg USA, Canada, Japan, Norway, Switzerland) apply the chain-linking method to the GDP constant price calculations.

Which are the disadvantages of chain-linking method?

1. Loss of additivity of volumes in all years except the reference year and the year following the reference year. Non-additivity arises for purely mathematical reasons, whereas the discrepancies cannot be interpreted as indications of quality. Reason for non-additivity is that chain-linked volumes are calculated by separately extrapolating both aggregate numbers and its components. In addition, different weights are applied to the calculations of different periods (weights of fixed base year vs previous year). Thus, the reason is purely mathematical by nature and does not refer to a low quality of calculations. The farther away from the reference year, the larger the discrepancies are.
2. Chain-linking for variables with a potentially changing sign is aggravated, eg change in inventories. In this case, contribution to the GDP growth is only calculated.

3. In case of chain-linking method, computational complexity should be pointed out as this method involves more computational stages than the fixed base year calculation method — in addition to deflating, indicators should be chained according to reference year.
4. Chain-linked indices are more complicated for the users of statistics to interpret, this concerns in particular the volume levels when compared to a fixed base year, eg in relation to non-additivity.

The adoption of chain-linking method has brought about several new indices: values at previous year prices, chain-linked volumes by reference year 2000, chained indices and contribution to GDP growth. What is the difference between these indices?

1. Values at previous year prices: quarterly indices of accounting period calculated (deflated) on the base of the average prices of previous year.
2. Chained index: since values of the GDP components at previous year prices are not comparable by different years due to the changing base years, special indices are calculated for chain-linking consecutive years.
3. Chain-linked volumes by reference year: values calculated with chained indices on the base of reference year (value of the reference year is multiplied by the chained index of accounting period).
4. Contribution to the GDP growth is calculated for all GDP components. Above all, this is needed in case of such indices which have both negative and positive values in time series and for which chain-linking is aggravated because of that (eg in case of changes in inventories). Simply saying, contribution to the GDP growth is the value gained by multiplying the change of computable component and the share thereof in the GDP.

What is the difference between base year and reference year?

1. Base year: the year preceding the accounting period (t-1) the prices of which are taken as a base for the calculations of accounting periods.
2. Reference year: a year (currently, 2000) that is used as a base for presenting chain-linked indices and volumes. In case of chained indices, this year = 100. After some time, reference year can be changed (eg from 2000 to 2005). Chained indices and values change when changing the reference year, but the growth rates remain exactly the same.

Based on what indices can the change of the GDP and its components be found?

Since values of the GDP components at previous year prices are not comparable due to the changing base years, special indices are calculated for chain-linking consecutive years, and based on them, the chained volumes are calculated by the reference year. Chained indices or chain-linked volumes have to be used for calculating the change of the GDP and its components. Changes of the GDP components calculated on the base of these indices give the same results.

Why do the growth rates of GDP components calculated by chain-linking method differ from those calculated at constant prices?

Growth rates of the GDP components calculated by chain-linking method differ to some extent from the growth rates calculated at the constant prices of fixed base year. Main reasons for the discrepancies between the growth rates calculated at constant 2000 prices and the chain-linked growth rates are as follows:

1. Since price structure of the previous year is used as a base in case of chain-linking method, and price structure of the fixed base year (2000) is used as a base at constant price calculations, larger discrepancies emerge in the growth rates gained by different methods if cyclical changes in prices and volumes are involved. The less volatile the price change in time series is, the smaller are the discrepancies arising from the calculations by two different methods.
2. Similarly to the volatility of prices, changes in product structure have an impact on the results of calculations as well. The more the product structure changes in time series, the bigger discrepancies arise, as a rule, from the calculations of growth rates by chain-linking method and at constant 2000 prices.
3. The use of volume indices brings about bigger discrepancies for some components between the growth rates calculated by the two calculation methods.

In addition to the chain-linking method, the numbers of 2004–2007 have been revised based on the Supply and Use Tables and the corporations' annual reports.