nominal Expenditure

1. Fixed base GDP Calculation

YEAR	EXPENDITURE		PRICE		QUANTITY (real)	
	Computers	*Trucks*	*Computers*	*Trucks*	*Computers*	*Trucks*
1	100	106	$1.00	$1.00	100.0	106.0
2	105	98	$.80	$1.05	131.3	93.3
3	103	104	$.60	$1.10	171.7	94.5
4	99	100	$.40	$1.15	247.5	87.0

Nominal GDP in year 1

$\Rightarrow P_{com} * Com + P_{truck} * Truck$ (all these in year 1)

$(1)(100) + (1)(106)$

$\Rightarrow$ Nominal GDP in year 1 = 206

Nominal GDP in year 2

$\Rightarrow P_{com}^{t=2} \cdot Com^{t=2} + P_{truck}^{t=2} \cdot Truck^{t=2}$

(105) (98)

$\Rightarrow (0.8)(131.3) + (1.05)(93.3)$

$\Rightarrow 203.005$

real GDP in year 2 fixed-base year approach

fix price to a particular year "year 1; base"

$rGDP = P_{com}^{t=1} \cdot Com^{t=2} + P_{truck}^{t=1} \cdot Truck^{t=2}$

$= (1)(131.3) + (1)(93.3)$ using year 1

$= 224.6 \rightarrow$ real GDP in year 2 as base

nominal in year 1 = 206

↳ 2 = 203.005

real in year 2 = 2246 ← (using year 1 as the base year)

real in year 1 = nominal in year 1 (.206)

growth in year 2 =

↳ nominal growth ⇒ $\left(\frac{203.5}{206} - 1\right) \times 100$ ≃ 2% ~~0.02%~~

Price + Quantity ~~Effect~~

→ real growth ⇒ $\left(\frac{2246}{206} - 1\right) \times 100$

↳ "Exclude the Price ~~Effect~~"

fixed base approach ⇒ Overestimate / Underestimate

⇒ revise base year → change entire series of growth ⇒ Strange isn't it??

Chain weight Method.

→ Estimate growth of real GDP

↳ Back out the level of real GDP matched with the estimated growth

↳ Calculate

↓

average growth

~~Geometric average~~ growth

Geometric

Value of GDP in year t" using 2010 Price

2. Chain-Volume-Measure calculation

t	GDP (2009's Price) $\sum_i P_{i,2009} Q_{i,t}$ unit: $	GDP (2010's Price) $\sum_i P_{i,2010} Q_{i,t}$ unit: $	GDP (2011's Price) $\sum_i P_{i,2011} Q_{i,t}$ unit: $	GDP (2012's Price) $\sum_i P_{i,2012} Q_{i,t}$ unit: $	GDP (2013's Price) $\sum_i P_{i,2013} Q_{i,t}$ unit: $
2009	201	206	215	225	232
2010	204	212	221	230	234
2011	210	223	224	242	245
2012	220	230	244	262	262
2013	225	235	250	266	272

2009

real 2010 ⇉ $GDP_{2009} \times CI^{2010}$

204

$CI^{200} \Rightarrow PI^{2010}$ ⇉ Value of Q in 2010 using P in 2009 / Value of Q in 2009 using P in 2009

201

CVM real GDP 2010

$\Rightarrow 201 \times \frac{204}{201} = 204$

$\Rightarrow$ (real GDP in 2009) $\times CI^{2010}$

⇉ 204

$$\text{CVM GDP}_{2012} \Rightarrow (\text{real GDP}_{2009})(CI)^{2012}$$

$$\Rightarrow (201)\left(\frac{204}{201}\right)\left(\frac{223}{212}\right)\left(DI^{2012}\right)$$

$\Rightarrow$ Value of 2012 using 2011 Price / Value of 2011 with 2011 Price

$$\frac{244}{224}$$

$$\Rightarrow (201)\left(\frac{204}{201}\right)\left(\frac{223}{212}\right)\left(\frac{244}{224}\right)$$

$$\Rightarrow 233.74$$

CVM

real GDP 2011

$\Rightarrow$ real GDP 2009 $\times$ CI^{2011}

CI^{2010} $\times$ DI^{2011} $\rightarrow$ growth using price in ~~2009~~ 2010 as base year

DI^{2010} $\rightarrow$ 204

DI^{2011} $\rightarrow$ 201

$\Rightarrow$ $\frac{\text{Value in 2011 using 2010 Price}}{\text{Value in 2010 using 2010 Price}}$

$\Rightarrow$ 223

$\Rightarrow$ 212

$\Rightarrow (201)\left(\frac{204}{201}\right)\left(\frac{223}{212}\right) = 214.58$

① Calculate the real GDP growth using 2009 as fixed base year!

② Calculate the real GDP growth using 2009 with CVM approach
→ real GDP (CVM-GDP)

③ Recalculate real GDP / growth using 2010 as the fixed base year

④ ~~Recalculate~~ Recalculate CVM real GDP / growth using 2010 as the starting date.