Student ID.....

EE312 Macroeconomics, 1/2015 (Sec. 046402)

Problem Sets 1 : Ch.1 Introduction and Ch 2. Measurement

1. Exogenous variables and Endogenous variables. Consider a closed economy described by the following equations(DAE model);

   $$\begin{aligned} C &= c_0 + c_1 Y \\ I &= i_0 + i_1 Y \end{aligned}$$

   Equilibrium is defined where $Y = C + I$. At equilibrium, $Y = \dfrac{1}{(1 - c_1 - i_1)}(c_0 + i_0)$.

   (a) What are the exogenous variables in this model? (underline: C, I, Y, $\underline{c_0}$, $\underline{c_1}$, $\underline{i_0}$, $\underline{i_1}$).

   (b) What are the endogenous varibales in this model?(underline: $\underline{C}$, $\underline{I}$, $\underline{Y}$, c_0, c_1, i_0, i_1).

2. Consider the following economy that is producing onlygoods A (apples) and goods B (bananas). Prices and quantities for 2005 and 2013 are displayed in the following table:

Goods	2005			2015		
	P	Q	P_tQ_t	P	Q	P_tQ_t
A (Apples)	40	125	5,000	60	100	6,000
B(Bananas)	100	50	5,000	80	75	6,000
total			10,000			12,000

   (a) Calculate the Nominal GDP, the Real GDP (using 2005 prices) and the GDP deflator in each year;s

   2005 = base year

   $$\begin{aligned} rGDP^{2005} &= \sum_i P_i^{2005} Q_i^{2005} \\ &= (..40.. \times ..125.) + (..100... \times ..50..) \\ &= ...10,000..... \end{aligned}$$

   $$\begin{aligned} rGDP^{2013} &= \sum_i P_i^{2005..} Q_i^{...2013..} \\ &= (..40.. \times ...100..) + (...100... \times ...75....) \\ &= .....11,500..... \end{aligned}$$

   $$\begin{aligned} GDP\ \text{deflator}_{2005} &= \frac{\text{GDP}_{2005}}{\text{real GDP}_{2005}} \times 100 \\ &= ...100.... \end{aligned}$$

   $$\begin{aligned} GDP\ \text{deflator}_{2013} &= \frac{\text{GDP}_{2013}}{\text{real GDP}_{2013}} \times 100 \\ &= ...104.35.... \end{aligned}$$

   (b) Calculate the Nominal GDP, the Real GDP (using 2013 prices) and the GDP deflator in each year;

   2013 = base year

$$
\begin{aligned}
rGDP^{2005} &= \sum_i P_i^{..2013...} Q_i^{2005..} \\
&= (..60... \times ..125..) + (...80... \times ...50...) \\
&= ...11,500..... \\
rGDP^{2013} &= \sum_i P_i^{..2013.....} Q_i^{...2013...} \\
&= (...60... \times ..100...) + (...80.. \times ..75....) \\
&= ..12,000.... \\
GDP \text{ deflator}_{2005} &= \frac{\text{GDP}_{2005}}{\text{real GDP}_{2005.}} \times 100 \\
&= ....86.96..... \\
GDP \text{ deflator}_{2013} &= \frac{\text{GDP}_{2013}}{\text{real GDP}_{2013.}} \times 100 \\
&= ....100.....
\end{aligned}
$$

3. Chain-Volume-Measure GDP - CVM. Given the following information, calculate CVM GDP in 2009, 2010, 2011, 2012 and 2013. The base year is 2009. Show how to calculate.

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	205	215	225	232
2010	204	210	220	230	234
2011	210	223	225	240	245
2012	220	230	244	260	264
2013	225	235	250	266	270

CVM GDP 2009 = nominal GDP 2009 = real GDP (2009's price) = ...201....

Direct Index (DI)

$$DI_{2010} = \frac{\sum_i P^{2009} \times Q^{2010.}}{\sum_i P^{2009} \times Q^{2009}} = ...\frac{204}{201}.....$$

$$DI_{2011} = \frac{\sum_i P^{2010} \times Q^{2011}}{\sum_i P^{2010} \times Q^{2010.}} = ...\frac{223}{210}....$$

$$DI_{2012} = \frac{\sum_i P^{2011} \times Q^{2012}}{\sum_i P^{2011} \times Q^{2011.}} = ...\frac{244}{225}...$$

$$DI_{2013} = \frac{\sum_i P^{2012} \times Q^{2013}}{\sum_i P^{2012} \times Q^{2012.}} = ...\frac{266}{260}...$$

Chain Index (CI)

$$CI_{2010} = ...DI_{2010} .....= ...\frac{204}{201}.$$

$$CI_{2011} = ...DI_{2010} \times DI_{2011} = .\frac{204}{201} \times \frac{223}{210}.....$$

$$CI_{2012} = ...DI_{2010} \times DI_{2011} \times DI_{2012} = ..\frac{204}{201} \times \frac{223}{210} \times \frac{244}{225}.....$$

$$CI_{2013} = ...DI_{2010} \times DI_{2011} \times DI_{2012} \times DI_{2013} = .\frac{204}{201} \times \frac{223}{210} \times \frac{244}{225} \times \frac{266}{260}.....$$

Chain Volume Measure (GDP)

$$\text{CVM}GDP_{2010} = ...GDP2009....\times...CI_{2010}... = ...201...\times...\frac{204}{201}. = 204.....$$

$$\text{CVM}GDP_{2011} = ...GDP2009....\times...CI_{2012....}... = ...201....\times....\frac{204}{201} \times \frac{223}{210}... = ..216.63$$

$$\text{CVM}GDP_{2012} = ...GDP2009....\times...CI_{2012....}... = ...201....\times....\frac{204}{201} \times \frac{223}{210} \times \frac{244}{225}... = ..234.92$$

$$\text{CVM}GDP_{2012} = ...GDP2009....\times...CI_{2013....}... = ...201....\times....\frac{204}{201}\times\frac{223}{210}\times\frac{244}{225}\times\frac{266}{260}... = ..240.34...$$