Chp2Problems

September 19, 2023

0.1 Questions for review

1. It measures *total income of everyone in the economy* and *the total expenditure on the economy's goods and services*. This is possible because, in a closed economy, every transaction should have a buyer and a seller. So, what a buyer spends as an expenditure on a good is what a seller recevies as income from producing the good.

2. Consumption consists of durable and non-durables. Investment consists of items bought for future use. Government expenditures are purchases made by various levels of government. Net exports account for trade with other countries.

3. The CPI measures the change in relative prices of the basket of consumption for the typical consumer. It differs from the GDP deflator in that (i) it depends one what is actually bought by consumers, instead of what is produced in a given year, (ii) it keeps the basket of goods and services involved in its calculation fixed over time, and (iii) it includes the consumption of foreign goods in its computation, while the deflator depends on net exports.

4. The CPI and PCE deflator are similar in (i) and (iii) from the previous point, but different in (ii).

5. Individuals are either (i) employed, (ii) unemployed, or (iii) not in the labor force. The unemployment rate is the ratio of unemployed to labor force participants.

6. They use either the household or establishment survey, where the latter collects employment information from the various firms and agencies in the economy. There are subtle differences, but the main one is that the establishment survey has a much larger sample size than the household survey.

0.2 Problems and applications

1. At the Bureau of Economic Analysis, you will find that the real GDP for the second quarter increased at an annual rate of 2.4 percent.

   At the Bureau of Labor Statistics, you will find that the the non-seasonally adjusted CPI is 3.2% since July 2022. This makes sense; if you go to the Bureau of Labor Statistics CPI inflation calculator, it says that \$1 in July of 2022 has the same buying power as \$1.03 today.

   Lastly, at the Bureau of Labor Statistics, you will find that the unemployment rate in July of 2023 was 3.5%.

2. The value added of the farmer is \$1. The value added of the miller is $(\$3 - \$1) = \$2$. The value added of the baker is $(\$6 - \$3) = \$3$. The bread's contribution to GDP is thus $(\$1 + \$2 + \$3) = \$6$, which is also the value of the final transaction.

3. If there are no market transactions, than this exchange of value is no longer showing up in GDP. Before, the butler was selling his labor and receiving income, which would have showed up in GDP.

   It seems that this should affect GDP in the way that owner-occupied housing affects GDP, where an imputation is made based on how much the butler could make if he was providing his waiting sevices on the open market, since he is still providing them. That way, it would be as if the family were paying the rents to themselves.

4. We calssify the given transactions as the following:

   1. Government (since it is a public school)
   2. Investment
   3. Net exports
   4. Consumption
   5. Investment

5. The following data (in billions) can be found at the Bureau of Economic Analysis:

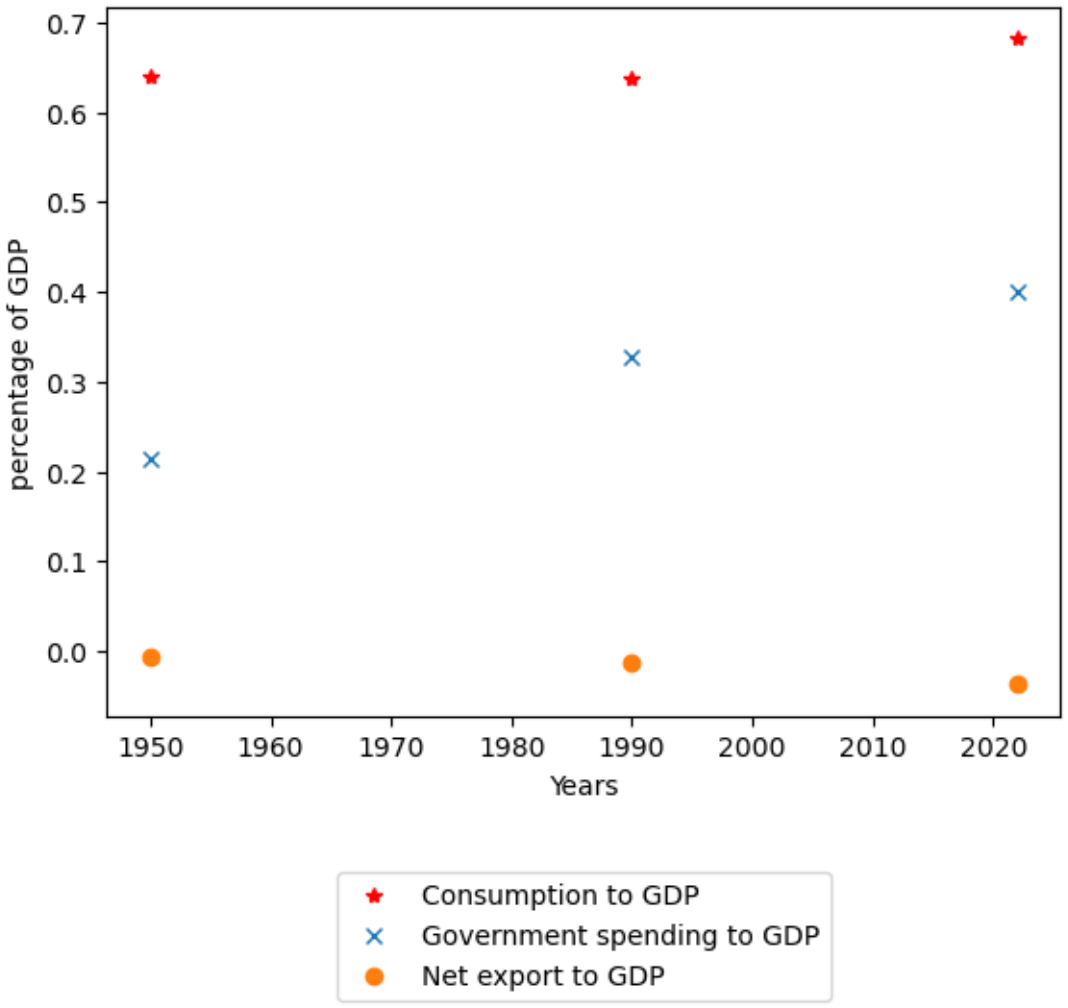
Year	GDP	C	I	G	NX	G2	Imports
1950	299.8	192	56.5	63.9	-1.8	–	11.6
1972	—-	—-	——	—-	—	100.7	—-
1990	5,963.1	3,809	993.4	1,952.9	-74.9	405	629.7
2022	23,315.1	15,902.6	4,113.5	9,342.3	-861.4	904	3,401.4

From here, it is straightforward to compute the ratio with the "GDP" colum in the denominator and each of the remaining columns capturing a particular component of GDP in the numerator.

Below is a graph of these ratios; the trends are easier to see there.

[1]:
```
import numpy as np
import matplotlib.pyplot as plt

gdp_data = np.array([299.8, 5963.1, 23315.1])
cons_data = np.array([192, 3809, 15902.6])
gov_data = np.array([63.9, 1952.9, 9342.3])
nex_data = np.array([-1.8, -74.9, -861.4])

cons_to_gdp = cons_data/gdp_data
gov_to_gdp = gov_data/gdp_data
nex_to_gdp = nex_data/gdp_data

years = [1950, 1990, 2022]

plt.plot(years, cons_to_gdp, "r*",)
plt.plot(years, gov_to_gdp, "x")
plt.plot(years, nex_to_gdp, "o")
```

```
plt.xlabel('Years')
plt.ylabel('percentage of GDP')
plt.legend(['Consumption to GDP', 'Government spending to GDP', 'Net export to␣
↪GDP'],
           bbox_to_anchor=(0.5, -0.2), loc='upper center')

plt.show()
```



6. First, consider the following identities/definitions:

   - GDP = C + I + G + NX
   - GNP = GDP + factor payments from abroad - factor payments to abroad"
   - NNP = GNP - depreciation
   - National income = NNP - statistical discrepancy
   - Compensation of employees: "wages earned by workers"

- Proprietors' income: "income of noncorporate businesses"
- Corporate profits: "income to businesses after paying workers and creditors"
- Personal income = National income - indirect business taxes - corporate profits - social insurance contributions - net interest + dividends + gov. transfers to indivduals + personal interest income
- Disposable personal income = personal income - personal taxes

- With these in mind, we can make the following computations using the data from the passage:
  - GDP = C + I = 1,000,000 + 75,000 = 1,075,000
  - NNP = GDP - depreciation = 1,075,000 - 125,000 = 950,000 = National income, since there is no statistical discrepancy.
  - Compensation of employees = 600,000
  - Proprietors' income = 150,000
  - Corporate profits = 950,000 - 600,000 - 150,000 = 200,000
  - Personal income = 950,000 - 140,000 - 50,000 - 200,000 + 150,000 = 710,000
  - Disposable personal income = 710,000 - 60,000 = 650,000

7. Using the data from the data, we can compute the following:
   - 2010 nominal GDP = (200 * 2) + (200 * 3) = 1,000
   - 2020 nominal GDP = (250 * 4) + (500 * 4) = 3,000
   - 2010 real GDP = 1,000 ; since 2010 is the base year.
   - 2020 real GDP = (250 * 2) + (500 * 3) = 2,000
   - 2010 GDP deflator = $\frac{1000}{1000} = 1$
   - 2020 GDP deflator = $\frac{3000}{2000} = 1.33$
   - 2010 CPI = 1 ; since 2010 is the base year, which represents the basket of a typical consumer.
   - 2020 CPI = $\frac{(200*4)+(200*4)}{(200*2)+(200*3)} = 1.6$

- Now we compare percent changes in the price indices:
  - For the GDP deflator, we have $\frac{1.33-1}{1} = .33$ or a 33% increase in the price level.
  - For the CPI, we have $\frac{1.6-1}{1} = .6$ or a 60% change in the price level.

  So, the Laspeyres index, the CPI, say that the price level changed significantly more than the Paasche index, the GDP deflator, says it did. This makes sense; when the basket of goods are fixed, the jump from to \$2 to \$4 for hamburgers does not take into account that over twice as many hamburgers are sold in 2020. This is captured in the GDP deflator, which is why it states that prices didn't increase as the CPI says they did.

-	Price for red	Quantity for red	Price for green	Quantity for green
Year 1	\$1	10	\$2	0
Year 2	\$2	0	\$1	10

8.

- Year 1 CPI is
$$\frac{(10 * \$1) + (0 * \$2)}{(10 * \$1) + (0 * \$2)} = 1$$
since year 1 is the base year in which the consumer basket is fixed.

  Year 2 CPI is
$$\frac{(10 * \$2) + (0 * \$1)}{(10 * \$1) + (0 * \$2)} = 2$$
since the price of red apples went from \$1 to \$2.

- Nominal spending in year 1 is unchanged from year to year. In each case, it is $(10 * \$1) = 10$; since the more expensive green (red in year 1 and red in year 2) is ever purchased in a given year.
- With year 1 prices as the base year, real spending in year 1 is $(10 * \$1) = 10$, but real spending in year 2 is $(10 * \$2) = 20$.
- In year 1, the deflator is given by $\frac{\$10}{\$10} = 1$, but in year 2 the deflator is $\frac{\$10}{\$20} = .5$.
- The CPI says that the basket of consumption is twice as expensive than it was before. But it doesn't allow for the possibility of substitution on the part of consumers.

  The deflator says that the same basket is half as expensive as it would have been the previous year. But Abby is equally happy eating one red apple or one green apple. Since she buys 10 apples of either color at the *same price*, then the deflator suggests that the cost of living has decreased when it really hasn't.

  This example shows us that each measure has its drawbacks and should be used with caution when making conclusions about consumer welfare.

9.

- 10 children are not in the adult population; 10 retirees, and 10 adults discouraged from looking for a job means that the number of adults *not in the labor force* = 20.

  Thus, labor force = 70 and the labor force participation rate = $\frac{70}{90} * 100 = 77\%$.
- 10 adults looking for work means that unemployment = 10 and the unemployment rate is $= \frac{10}{70} * 100 = 14.29\%$
- In the household survey, employment is $= 25 + 20 + 5 + 10 = 60$, since adults with two jobs are counted once and business owners are included.

  In the establishment survey, employment is $= 25 + 20 + 2 * 5 = 55$, since business owners are not included and people with two jobs show up on multiple payrolls and are counted twice.

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