NYU STERN

The Global Economy
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Group Project #1: Macroeconomic Data

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1. *National Accounts in Beerblastia.* Several years ago, a group of entrepreneurial Stern graduates pooled their resources and purchased an island in the Caribbean that they named Beerblastia. After a few years of rapid growth, Beerblastia's economy has begun to stagnate. On the principle that there's no good policy without good data, the head of the government has asked you to serve as the country's first Chief National Accountant and compile a set of aggregate statistics for last year.

   On your first day on the job, you receive reports from the following local producers:

   - Local coffee shops sold \$15,000 worth of coffee to local consumers. Their expenses were: purchases of coffee from local growers (\$3,000), wages and fringe benefits (\$8,000), and rent (\$4,000).
   - Coffee growers sold coffee beans to coffee shops (the \$3,000 noted above) and Starbucks* (\$5,000). (Asterisks denote foreign companies.) Expenses include labor (\$4,000) and land rental (\$4,000).
   - Local fruit producers harvested and sold \$50,000 worth of bananas: 60% to domestic consumers, 20% to Chiquita*, and the remainder to a local subsidiary of Dole*. Labor costs were \$30,000. They also spent \$20,000 on new banana-picking machinery produced by a French* company.
   - The Dole subsidiary produced \$20,000 worth of canned bananas, all of which were sold to domestic consumers. Dole paid \$5,000 in wages to locals and repatriated the remaining income to its foreign owners.
   - The government raised \$2,000 from Beerblastians in taxes, paid government administrators \$2,000, and paid \$1,000 in pensions to retired Beerblastians.
   - Two Beerblastians got short consulting jobs in the US that paid them \$500 each.

   Your mission: take these reports and construct national accounts. Your accounts should include

   (a) measures of value added for local producers (10 points);

(b) GDP (5 points);

(c) measures of the expenditure components (consumption, investment, government purchases of goods and services, and net exports) (10 points);

(d) show how saving and investment are related (10 points); and

(e) measures of the government's revenues, expenses, and surplus or deficit (5 points).

Answer. The core of the answer is these numbers (all expressed in thousands):

		Final Sales			
Producer	Value Added	C	I	G	NX
Coffee shops	12	15			
Coffee growers	8				5
Fruit producers	50	30	20		–10
Dole Sub	10	20			
Govt production	2				
Total	82	65	20	2	–5

(a) Value added for each producer is sales revenue minus intermediate inputs. In some cases, we can connect that to payments to labor and capital, but it's not necessary. Note that value added is not the same as final sales: sales at the last stage of the value chain. Thus, for example, the Dole sub has final sales of 20k, but since the fruit input costs 10k, value added is only 10k. Note that we have ignored the consultants: they're potentially a source of local income, but the production is done outside the country and doesn't appear in local value-added or GDP.

(b) Each final sale is allocated in the table to the appropriate expenditure category. GDP is the sum of value added by all (local) producers, and also the sum of the expenditure components (final sales).

(c) Given the expenditure components, we compute (gross domestic) saving as

$$S \;=\; Y - C - G \;=\; 82 - 65 - 2 = 15.$$

(d) S computed above equals $I+NX$. As it must! One way to think about this: investment of 20 is financed by saving (15) and foreign capital ($NX = -5$ corresponds to a purchase of 5 of local assets by people in other countries).

(e) Revenues are 2k, expenses are 3k, so the surplus is -1k (a deficit). Note that pensions are an expense of the government, even though they are not a purchase of a good or service and do not contribute (directly) to GDP.

2. *Prices and quantities in Darkenbourg.* Earlier this month, the Kingdom of Darkenbourg applied for admission to the European Union. The ultra-efficient

"Eurocrats" at the European Commission returned the application in just three days, arguing that crucial aggregate statistics were missing. The government has hired you as a consultant to rectify the omissions. Reviewing the application, you discover that it reported only GDP at current prices (ie, nominal GDP) and did not report either real GDP or inflation.

You begin your contract by spending one day a week at the Royal Office of Statistics teaching the staff about national accounting. They tell you that Darkenbourg produces only three products, who quantities and prices are listed below:

	Food		Energy		Computers	
Year	Quantity	Price	Quantity	Price	Quantity	Price
1995	100	12	100	15	80	20
2005	120	18	100	15	160	10

Your job is to compute the following statistics from this data so that Darkenbourg's application can be amended and resubmitted:

(a) Nominal GDP, real GDP, and the price deflator for both years. Use 1995 as the base year. (10 points)

(b) A consumer price index for both years. As before, use 1995 as the base year. (10 points)

(c) The annualized rates of inflation over the period 1995-2005 based on the GDP deflator and the CPI, respectively. Explain briefly why the two measures of inflation are different. (5 points)

(d) Rich and poor people consume similar baskets of goods, with the exception being computers: poor people do not buy computers. Which group has the higher rate of inflation, rich or poor? (A qualitative answer is sufficient.) (5 points)

Answer. The calculations are summarized by:

	Nominal GDP	Real GDP	GDP Deflator	CPI
1995	4300	4300	1.000	4300
2005	5260	6140	0.857	4100
Growth (%)	22.3	42.8	–14.3	–4.6
Annualized (%)	2.04	3.62	–1.54	–0.5

(a) Nominal GDP is the sum of the product of current prices times current quantities; in 1995, for example, it equals $12 \times 100 + 15 \times 100 + 20 \times 80 = 4300$. Real GDP here is the sum of 1995 prices times current quantities; in 2005, for example, it equals $12 \times 120 + 15 \times 100 + 20 \times 160 = 6140$. (In the jargon of the professionals, 1995 is the base year.)

(b) The CPI is the sum of current prices times (in this case) 1995 quantities; in 2005, it equals $18 \times 100 + 15 \times 100 + 10 \times 80 = 4100$.

(c) Growth rates are computed this way. The total growth rate between 1995 and 2005 is the ratio of the 2005 figure to the 1995 figure, minus one. And if you want to make it a percentage, you multiply by 100. Thus the growth rate g of the CPI (the CPI-based inflation rate, in other words) is the solution to

$$1 + g \;=\; 4100/4300 \;=\; 0.9535,$$

so that $g = -4.65\%$. The annualized growth rate solves

$$(1 + g)^{10} \;=\; 4100/4300$$

or

$$(1 + g) \;=\; (4100/4300)^{1/10}$$

so that $g = -0.475\%$. Growth rates for other variables are computed the same way.

Notice that this inflation is different from one computed from the GDP deflator. Why? Roughly, because they weight goods differently. The details are a P2C2E.

(d) Here's another weighting example. Since the poor in this example don't buy computers, and computers have prices that are falling rapidly, their inflation rate will be higher than the inflation rate for rich people.

As it turns out, the logic is right but the example gives you the wrong idea. Our best estimates are that the poor have had lower inflation rates in recent times than the rich. Why? Because the poor buy things at Wal-Mart, whose prices have stayed low, and the rich buy services, whose price has gone up.

3. *Saving and investment in the US and China.* In recent years, China has run a substantial trade surplus (net exports) (over 5% of GDP) and the US a similar deficit. The Chinese surplus has become a political issue in the US; it implies that China is a net purchaser of foreign assets as well as a net exporter of goods. Using "Country Data" from the Economist Intelligence Unit (EIU) or another source, download the expenditure components of GDP (measured at current prices) for both countries for the period 1990-present. Use them to

(a) Graph saving, investment, and net exports as ratios to GDP. Define saving here as $S = Y - C - G$. (10 points)

(b) Comment on the changes in saving and investment rates that led to the emerging Chinese surplus and American deficit. (10 points)

(c) Do you see the trade "imbalances" as good or bad for the US? China? Why? Your answer might include speculation about the factors that generated these differences. (10 points)

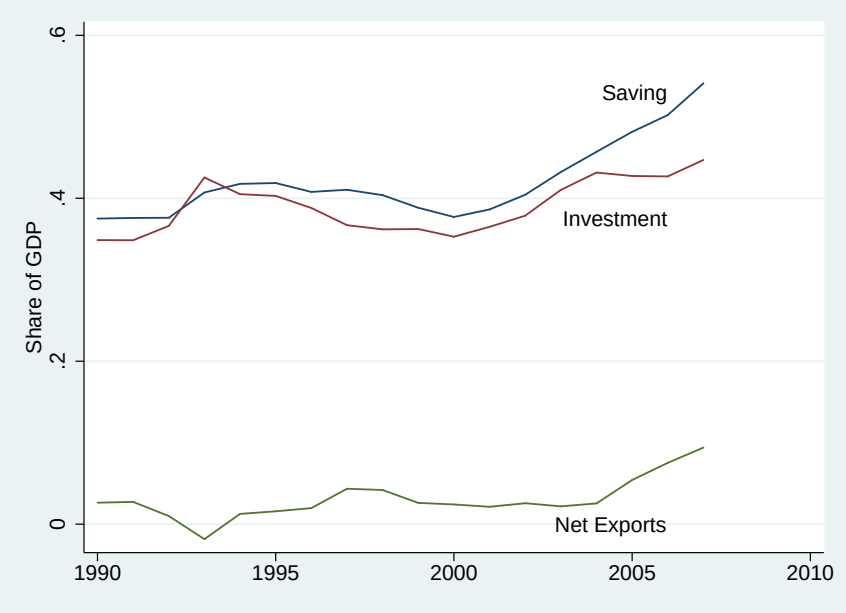

Figure 1: Saving and investment in China.

Answer.

(a) See the figures. They're constructed so that net exports is the difference between saving and investment.

(b) The most striking feature of the figures is that both saving and investment are substantially higher in China than the US. Over the recent past, the saving rate has increased in China, and decreased in the US. Since the trade balance (net exports) is the difference between saving and investment, the changes in saving rates have led to a trade surplus in China and deficit in the US. Any discussion of the Chinese trade surplus, then, should also address the Chinese saving rate: the two are intertwined.

The question is why the saving and investment rates are so different. Ideas welcome. One line of thought is that capital markets are poorly developed in China, so people save a lot to insure themselves against misfortune: poor pensions, bank failure, inflation, health care costs, and so on. We often see that as countries develop, saving rates go down, so perhaps we'll see that in China over the next couple decades.

(c) Some see disaster, others see capital moving around the world to the most profitable opportunities. How would you argue for one or the other? Which do you think it is?

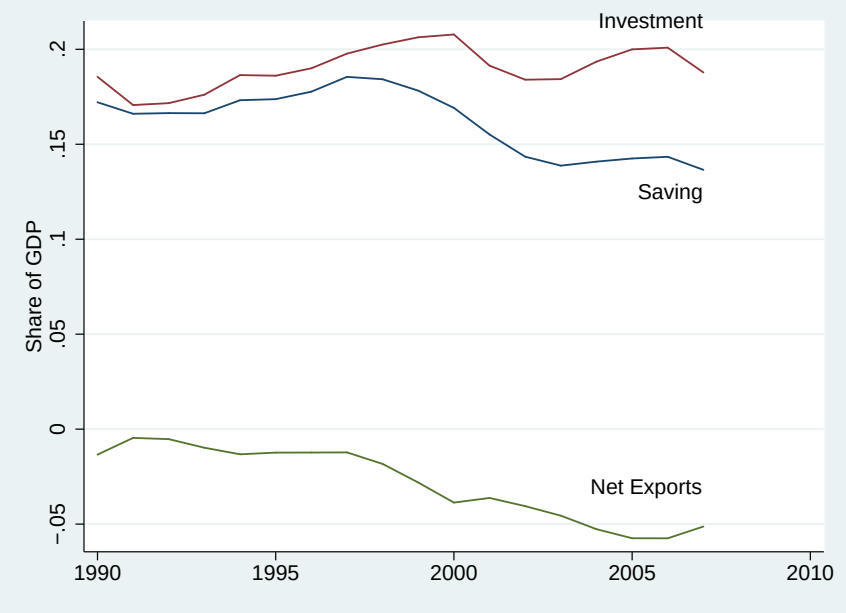

Figure 2: Saving and investment in the US.