Lecture 1a

1a. Measuring the Macroeconomy
The National Income and Product Accounts

THE FLOW OF PRODUCTION AND SALES

Production

The U.S. Department of Commerce's Bureau of Economic Analysis has estimated that in the third quarter of 2007—that is, adding up the months of July, August, and September—the United States economy produced goods and services at a rate of $14,179.9 billion worth a year.

That doesn't mean that in July, August, and September we produced $14 trillion plus worth of stuff: we only produced a quarter of that: $3,545.0 billion. What the Bureau of Economic Analysis said was that, if we were to maintain that quarter of the year's pace of production for an entire year, then in that year we would have made $14 trillion plus.

Confused? Don't blame yourself. It is confusing.

The BEA's estimates of the current-dollar value of production—its estimates of nominal Gross Domestic Product—are a flow, not a stock. They are measured in terms of how many dollars worth of stuff are made in a given unit of time.

It is like an automobile's speed: if you drive 60 miles an hour for fifteen minutes—a quarter of an hour—you don't go 60 miles but instead 15. If you produce $3,545.0 billion worth of stuff in three months you are making things and providing services at a rate of $14,179.9 billion per year.

Sales

Not all but almost all of the value of the stuff made in the fourth quarter of 2007 was sold. Nominal gross final sales of domestic product in that quarter proceeded at a rate of $14,148.8 billion per year. The difference between $14,179.9 and $14,148.8—$31.0 billion—is inventory accumulation: the difference between production and sales piles up as "inventories" of goods that firms own but that they want to sell. The inventories of goods that had been produced but had not been sold were greater at the end of September than they had been at the start of July.

How much greater?

If you say $31.0 billion, you are wrong: inventories were growing—inventory investment was proceeding—in the third quarter at a rate of +$31.0 billion *per year*. It proceeded at this pace for three months: a quarter of a year. Increasing business inventories at a pace of +31.0 billion per year for a quarter of a year means that at the end of September the Bureau of Economic Analysis's estimate was that inventories were $31.0 billion per year x 1/4 year = $7.8 billion higher than they had been at the start of July.

Confused? You should..

The smartest people in the world at this get confused—one example is Princeton Professor and former Federal Reserve Vice Chair Alan Blinder in the White House, back when he was a member of President Clinton's Council of Economic Advisers: he divided rather than multiplying by four in his head and thus got an answer that was off by a factor of 16, and none of the young hotshots sitting in the room felt sure enough to try to correct him on the spot.

How to Keep Track

Thus there are three pieces of advice:

1. Don't try to do this stuff in your head—it is just too hard.
2. Remember what your high-school physics teacher said: no naked numbers. Every number that you write down has to come with its units attached to it. If you keep units attached to numbers then it is harder to divide when you should multiply.
3. Do every problem twice, at least.

Remember: just as rate x time = distance, and just as distance/rate = time and distance/time = rate, so flow x time = change in stock and change in stock/time = flow.

Imports and Exports

One more wrinkle. Does the $14,148.8 billion per year of nominal gross final sales of domestic product in the third quarter of 2007 mean that Americans and others resident in the United States were then buying stuff at a rate of $14,148.8 billion a year? No.

Total nominal gross final sales to American residents were at a pace of $14,847.2 billion per year in that quarter.

Where does this difference come from? The difference is net imports: we bought more currently-produced goods and services from foreigners than we sold to them. That is our *trade deficit.* In the fourth quarter of 2007 American businesses sold good and services abroad at a pace of $1,685.2 billion per year, while American residents bought goods and services made outside the United States at a pace of $2,383.6 billion per year. Thus our *trade deficit* in that quarter was at a pace of $698.4 billion per year, our net exports were -$698.4 billion per year. How did we pay for this deficiency of exports relative to imports? Well, in net we sold some of our property and assets to foreigners, and we also borrowed from foreigners.

How much in assets did we sell of borrow?

$698.4 billion?

Again, no. Our net exports in the third quarter of 2007 were -$698.4 billion *per year*, which means that net foreign investment in the United States was then growing at a pace of $698.4 billion *per*

year, which means that over three months net foreign investment in the United States grew by $698.4 billion per year x 1/4 year = $174.6 billion.

NIPA Summary

Anybody not confused? If anybody isn't confused yet, there is more that could follow. But it is best to stop and present a summary table of all the numbers we have talked about for the third quarter, July-September, of 2007:

Production in the Third Quarter of 2007 (Billions of Dollars at Annual Rates)

Gross Domestic Product:	$14,179.9
- change in inventories	$31.0
= final sales of domestic product	$14,148.8
- net exports	- -$698.4
= final sales to domestic purchasers	$14,847.2

Gross exports	$1,685.2
- gross imports	$2,383.6
= net exports	-$698.4

From the Department of Commerce Bureau of Economic Analysis's National Income and Product Accounts.

The measure of the size of the American economy that nearly everybody focuses on and that is referred to the most is the Gross Domestic Product—GDP. The word "product" in this measure is important. It is a measure of how much America's businesses make, not how much they sell—that would be Final Sales of Domestic Product. The difference between the two is, as noted above, the change in inventories: Did businesses as a whole add to or subtract from their stock of goods being made and finished products in transit and waiting on store shelves? Did businesses "invest" in inventories by adding to their stock, or disinvest by reducing it? If this "inventory investment" item is positive then GDP will be greater than final sales; if this item is negative then GDP will be less.

And GDP is not what Americans buy for their households to use, for their businesses to build up capacity, and for their government to use in its functioning. That would be final sales to domestic purchasers.

Why does everybody focus on GDP rather than on either of the two final sales measures? Mostly for historical reasons: the National Income and Product accounting system was set up before World War II to focus on the "product" measures, and nobody has felt it important to make that change.

Real and Nominal Magnitudes

The $14,179.9 billion per year number that we have been talking about is what economists call a nominal GDP number: a measure of the value in dollars of the production of marketed goods and services. That number was higher in the third quarter of 2007 was higher than it had been a year or two earlier.

In the third quarter of 2006 the pace of nominal GDP had been $13,452.9 billion per year. In the third quarter of 2005 the pace of GDP had been $12,741.6 billion per year. Nominal GDP was thus 11.3% higher in the third quarter of 2007 than it had been two years earlier—a rate of growth in the pace at which America was producing marketed goods and services of 5.6% per year: an average over those two years waiting a year meant that the pace at which the American economy would have been producing sellable stuff—measured in dollars—would be 5.6% higher.

Why this "measured in dollars"? Because the BEA's nominal GDP estimates do not just grow when we produce stuff at a faster rate. They also grow when prices on average go up. Prices are going up and down all the time: some prices rising, some prices falling. But on average, in normal years, more dollar prices are rising than falling. So the BEA's estimates of nominal GDP would grow in an average year even if Americans were not producing any more goods and services.

That means that the answer to the question "is nominal GDP growing?" is not the same as the answer to the question "is America making more valuable goods and services?" We would like the answer to the second question, but the estimates of nominal GDP answer only the first.

And so the BEA has another measure: not nominal GDP measured in dollars but real GDP measured in "constant dollars": real GDP is nominal GDP adjusted for changes over time in the average dollar price of goods and services produced and marketed in the United States.

Ask the BEA what the pace of growth in the rate at which America was producing real marketed goods and services was, and it will tell you that real GDP between the third quarter of 2005 and the third quarter of 2007 grew at a pace of 2.5% per year. The difference between the 2.5% per year rate of growth of real GDP and the 5.6% rate of growth of nominal GDP over the period 2005:III to 2007:III is inflation: the fact that on average the dollar prices that goods and services sold for grew over that interval at a rate of 3.1% per year.

The BEA thus tells us that while nominal GDP was being produced at a pace of $12,741.6 billion per year in the third quarter of 2005, the value of that production at the average prices of 2005 was instead $12,683.6 billion per year—by July-September 2005 prices were a little bit higher than the average price in 2005. And by the third quarter of 2007 the BEA will tell you that while its estimate of nominal GDP is that $14,179.9 billion per year of marketed goods and services were being produced, its estimate of real GDP is that only $13,321.1 billion per year in chained 2005 dollars of marketed goods and services were being produced.

What is this "chained 2005 dollars"?

It is a way of telling us that the BEA is calculating the change in the average of all the prices in the economy in a particular and sophisticated way. It is attempting to separate out those changes in the flow of nominal GDP that are due to increases or decreased in the pace at which valuable goods and services are being produced and hitting the loading dock from those changes in the flow of nominal GDP that are due to increases or decreases in the average level of prices. This is not a straightforward task. If this was a full-year course, at this point it would be time digress into the index-number problem—into why this is not a straightforward task. But this is not a full year course.

The Circular Flow of Economic Activity

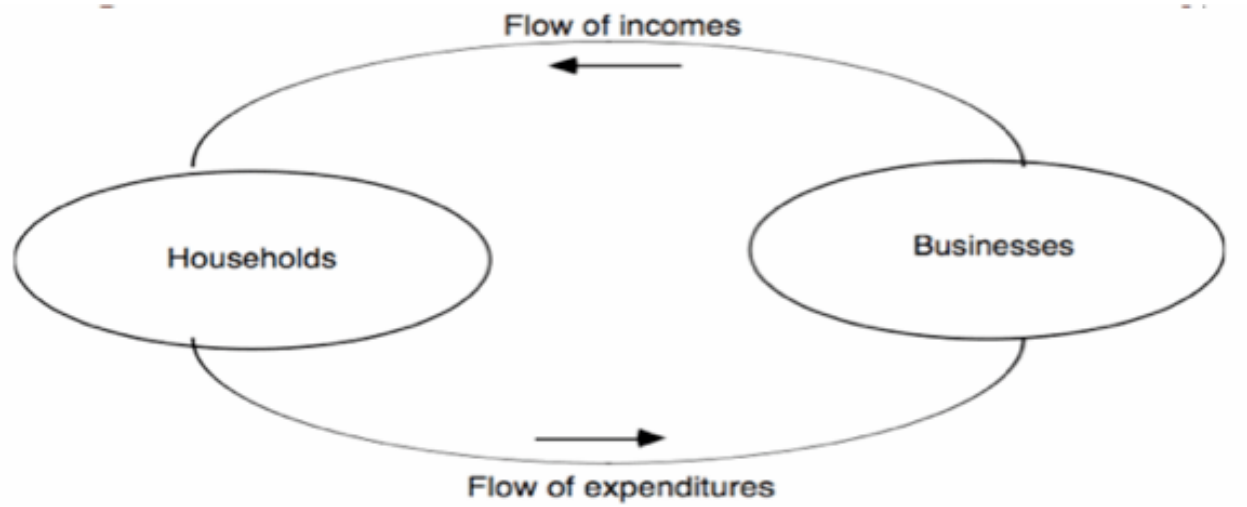
Back at the start of the nineteenth century a market economy where almost everybody specialized in one particular kind of job was a new thing. For most of human history most people had spent most of their time working to provide for their own households: growing their own food, weaving and sewing their own clothes, building their own houses, with purchases and sales in the market restricted to a relatively small part of total economic activity. But starting in the eighteenth century economic growth brought us to a place where, in northwestern Europe at least, for the first time most of what was produced was not consumed by the household that had made it, but was then sold in the marketplace and the money earned used to buy things that others had made.

This market economy disturbed a great many people. "What if it all went wrong?" they asked. "Could we wind up with a situation in which the yoga instructors were offering too many lessons on achieving inner peace that the weavers couldn't buy, and the weavers had woven too much cloth that the farmers couldn't buy, and that the farmers had grown too much food that the yoga instructors could not buy—so everyone was unable to satisfy their needs because they could not sell what they had produced, and because they could not sell what they had made they could not afford to buy what others had made.

Say's Law and the Circular Flow

It was French economist Jean-Baptiste Say who first proposed an answer back in 1803. He claimed that such a "general glut" was almost inconceivable, for every seller was also a purchaser. In a market economy, Say argued, every transaction has two sides, and nobody sells without intending to buy, and so purchasing power flows throughout the economy in a circle. Businesses produce and sell because they then intend to spend the money they earn hiring workers and rent capital: what they pay workers and capitalists in wages, salaries, rent, income, and dividends becomes their household incomes. But workers and capitalists only sell and rent their hours and their resources to businesses because they then intend to spend the money they earn buying goods and services. And those goods and services that they buy—well, those are the goods and services that the businesses make. So businesses sell final products to households and buy factor services from households, and households buy final products from and sell factor services to businesses.

The Circular Flow of Economic Activity



A version of the circular flow diagram. Households spend money buying the products made by businesses, and businesses turn around and spend the same money buying the factors of production that households own—workers' time and attention, finance, the use of land and other natural resources.

The Components of GDP

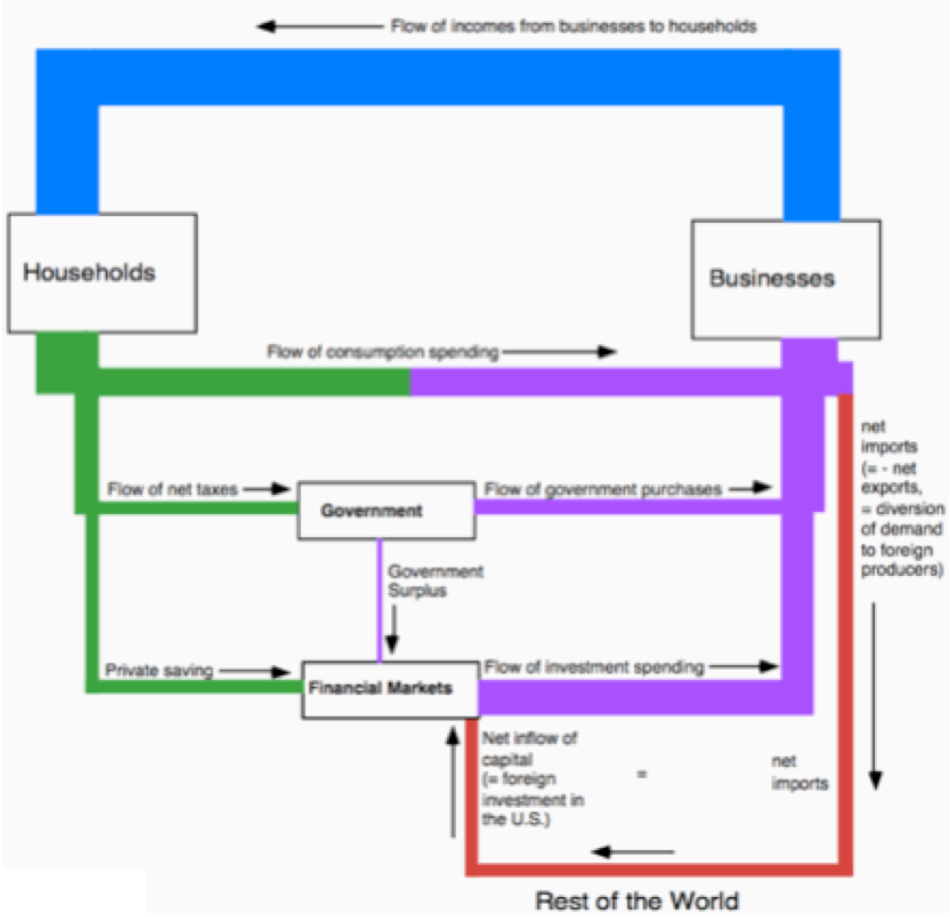
We are going to want to keep finer track of the flow of purchasing power through the economy than just to say that households buy things (goods and services) from businesses and businesses buy things (labor-time and capital services) from households. We are going to want to keep track of what happens with the government, with financial market intermediaries, and with the rest of the world as well.

So let us start with household spending. Households take their incomes and divide them up into three parts: some they spend buying goods and services from businesses, some they u to pay taxes, and some they save and deposit in financial intermediaries—banks, mutual funds, 401(k) account holders, brokerages, et cetera. In the third quarter of 2007, households spent at a rate of $9,865.6 billion/year on consumption goods and services. Households also paid to governments at a rate of $2,467.8 billion/year in net taxes—the difference between tax checks written to governments and income support checks (like Social Security) written from governments to households. And total private savings were $1,851.9 billion/year: the sum of direct savings by households, and indirect savings on behalf of the households that owned them by businesses that took some of their profits and decided not to pay them out as dividends but to save them. That was how households disposed of the $14,185.3 billion/year in net incomes they received in the third quarter of 2007

The federal, state, and local governments, in that quarter, took their $2,467.8 billion/year in net taxes, added to it $238.4 billion/year in net government borrowing, and spent $2,700.9 billion/year buying goods and services for the government. "Wait a minute," you say: "2467.8 + 238.4 =

2706.2, not 2700.9." Yep. The difference between 2706.2 and 2700.9 is the "statistical discrepancy." The Commerce Department's Bureau of Economic Analysis does not track ever single purchase and sale in the economy. Rather, it makes estimates. And these estimates are not quite consistent with each other. As long as the statistical discrepancy is small, we are not unhappy.

The Circular Flow of Economic Activity II



Another, finer version of the circular flow diagram. Households spend some of their money buying consumption goods, pay money to governments in taxes, and save the rest. Governments take the net taxes they collect and borrow and use the proceeds for government purchases Savings less government borrowing plus the inflow of finance from abroad are spent on investment goods to boost productive capacity. The balancing item is net imports—final demand not satisfied by U.S. but instead by external production, the flip side of external finance to fund investment.

In the third quarter of 2007, financial intermediaries and businesses received $1,851.9 billion in private savings plus the $698.4 billion/year in net investment in the United States by foreigners. Of this $2,550.2 billion/year total, $238.4 billion/year was loaned to the government, and $2,311.9 billion/year was spent by businesses in gross private investment.

Add up the $9,865.6 billion/year in consumption spending, the $2,700.9 billion/year in government purchases, and the $2,311.9 billion/year in business investment spending, and then subtract off the -$698.4 billion/year in net exports, and we are back to our total of $14,179.8 billion/year for GDP in the third quarter of 2007.

What did the foreigners do with the extra $698.4 billion/year more that they sold us in imports than they bought in exports? Dollar bills are not of much use outside the United States, after all. The answer is that they took them and invested them in the United States: that's the $698.4 billion/year in loans from abroad and purchases of property and assets in the United States that we saw flowing into financial intermediaries above.

Thus we see the kernel of truth in Jean-Baptiste Say's idea: every transaction does have two sides, for every buyer there is a seller, and purchasing power does proceed throughout the economy, greasing a flow of production, sales, income, and purchases that in the U.S. economy now amounts to more than $14 trillion worth of commodities every year. In 1803 Jean-Baptiste Say was confident that nothing would interrupt or disturb this flow. By 1829—after watching the depression of 1825-6 in England—he had a different view. But that is for the next lecture: our first lecture on depression economics proper.