Macroeconomics: an Introduction

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Chapter 2
National Income

Outline

Preview

We all have an understanding of the concept of income on an individual level and what our own income is. But how should we measure the income of a whole economy? What is the relation between our income and the value of what we produce? To find the nation's income do we just add up the incomes of the household, business, and government sectors? And how does the rest-of-the-world enter the picture? What does the nation spend its income on, and what does it save? How does savings relate to investment?

These are all questions we will answer in this chapter, starting with the simplest kind of society, Robinson Crusoe. By understanding that case we can readily grasp the national income concepts for a complex economy. Finally, we will look at the national income of the U.S., find out the major sources of that income and what Americans spend it on.

2.1 Robinson Crusoe's National Income

In Daniel Defoe's classic adventure novel, Robinson Crusoe is shipwrecked alone on a tropical island. He sets about gathering food and making things that he needs using the few tools and materials that he is able to salvage from the shipwreck. Robinson Crusoe is a one person economy. His income is what he produces. It is not money but the coconuts he gathers, the fish he catches, and the objects that he makes.

Crusoe spends part of his time producing things for immediate use: fish caught in the lagoon, coconuts gathered nearby, and furniture to make his life more comfortable. Crusoe also puts part of his effort into making tools which will enhance his productivity in the future, for example a raft that takes him out to better fishing spots. Finding evidence that cannibals visit his island, Crusoe also builds a stockade to protect himself. We see that his time is divided between producing consumption goods for his immediate use, capital goods that are an investment in an improved standard of living in the future, and goods that would be purchased by government in a more complex society.

Crusoe is obliged to decide how much of his income, the things he produces, will be allocated to consumption now, how much to investment so he can consume more in the future, and how much to defense. His opportunities to consume, invest, and defend are limited by his ability to produce. The portion of his income that is not consumed or expended on defense is his savings, and that is invested in capital goods which will increase his income in the future.

Even though Crusoe's economy is just a one person economy (until he finds a native he calls Friday who has just narrowly escaped being a consumption good for the cannibals) and uses no money, it teaches us some fundamental rules that apply even to the most complex modern economies. These are:

- **The income of a society is the value of what it produces.**

- **Income is divided between three alternative uses: consumption, investment, and government.**

- **To increase any one of these uses, society must either increase its income or reduce one or both of the others.**

- **Savings, the amount of income that is not consumed by households or government, is equal to the investment in new capital goods.**

- **An increase in income requires investment in capital goods that make the economy more productive.**

The choices facing any society are basically the same that Crusoe faced, and they are reflected in the issues that occupy public debate today: Are we investing enough in modern factories and equipment to produce the growth in income that we would like? Or are Americans on a consumption binge that is reducing economic growth? Should something be done to encourage Americans to save and invest more? What effects does government spending have on our economy? What will be the economic fall-out from the defense build-up we see today?

Crusoe alone decided how to allocate his income between consumption, investment, and defense, but in our economy these decisions are made separately by the four sectors of the economy. The household sector makes consumption decisions while firms decide how much to invest in capital goods. Households do not receive the goods they produce directly, but rather they receive money which they can spend or save. Similarly, government through legislative bodies makes spending decisions and levies taxes to pay for them. While these decisions are made by different agents in different sectors of the economy, they must always obey the rule that in any economy the amount consumed by households, plus government purchases, plus investment in capital goods is equal to total income. Income, in turn, cannot exceed the productive capacity of the economy.

Now let's see how a simple model of the economy can help us understand how the sectors of a complex economy interact. A model in economics is much like a model in architecture or car design: it is a representation of the real thing which is useful for exploring some of the properties of the real thing but is vastly less complex. From a scale model of a proposed office building we can learn a lot about how the building will function for the people who will work in it, even though the model leaves out much of the complex structural detail of the real building. Similarly, economic models can help us see important aspects of an economy that is far too complex for humans to understand in all its details. A good strategy in using models is to start with the simplest version we can think of, and then make the model progressively more realistic and complex as we need to.

Exercises 2.1

A. Classify each of the following goods produced by Robinson Crusoe as consumption, investment, or "government:" a fishing net, a fish, a chair, a spear, a look-out tower, a cleared garden plot. Similarly, classify a theater ticket, a car, a taxi, a Boeing 747, a stealth fighter.

2.2 An Economy Producing Consumption Goods: Model I

Figure 2.1 depicts Model I. Here, we imagine an economy that produces only consumption goods. To keep Model I as simple as possible we further suppose that the only consumption good is cars. These cars are produced by firms which are staffed by the households and owned by the households. To put it in the language of economics, the two *factors of production* are *labor* and *capital*, and the households own both of them. There is no role for government or for the rest-of-the-world in Model I, so these sectors are omitted.

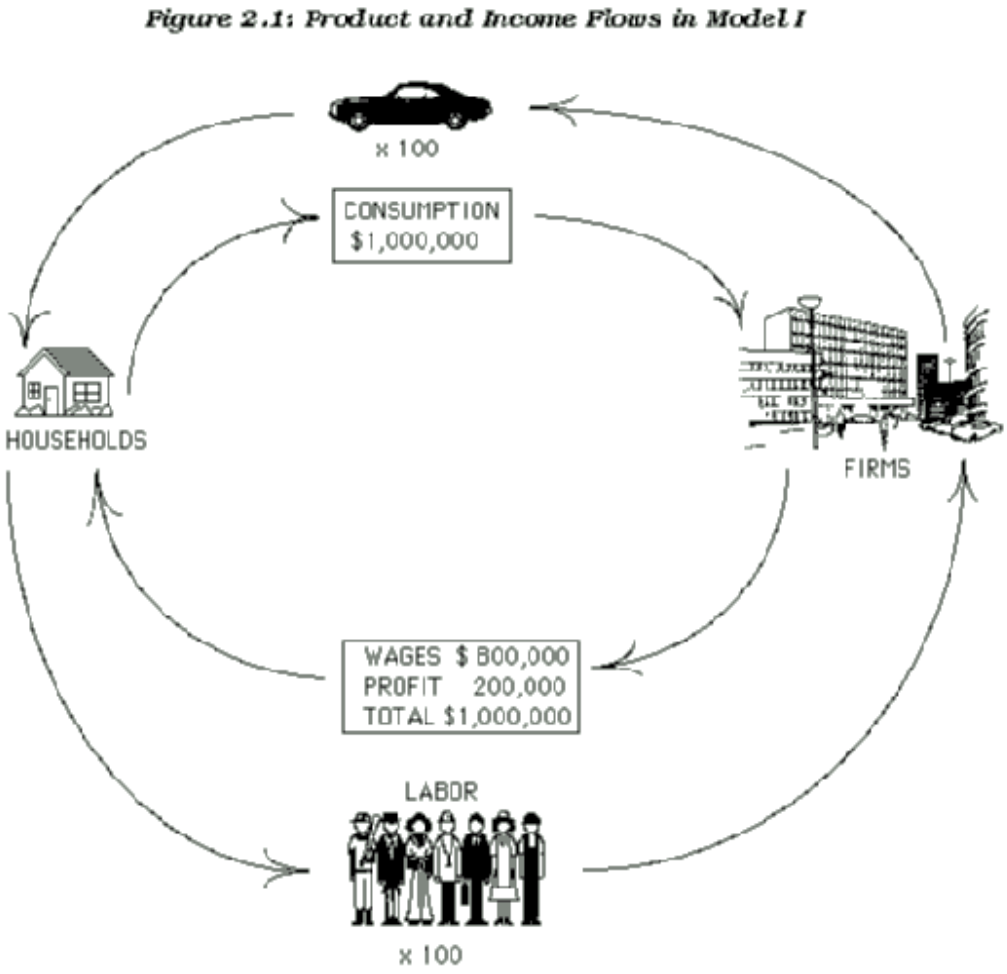
The two sectors of this economy are represented by icons in Figure 2.1. Even though Model I is clearly not realistic as a description of an actual economy, it will allow us to see some basic relationships that are present in the most complex economies.

The cars that are produced by the firms flow from the firms to the households in Figure 2.1 and labor services flow from the households to the firms. Let's suppose that the output of cars is one per worker per year. There are 100 workers, so the output of the firms is 100 cars per year. All 100 cars produced are delivered to the households.

The market for cars sets the price that households pay for a car, and let's suppose that turns out to be $10,000 per car. This implies that the annual consumption expenditure of households in Model I is $1,000,000 (= 100 cars • $10,000), where "•" means multiplication. .

That spending by households is income to the auto firms which distribute it to the factors of production, labor and capital. Suppose that in the labor market the wage has been established at $8,000 per year, so wages paid by the firms to households total $800,000 per year. Notice that firms are receiving more money from car sales than they pay out in wages. The difference is profit, in this case $200,000. The *factor incomes* that result from the production of autos are therefore $800,000 for labor and $200,000 for capital.

Figure 2.1: Product and Income Flows in Model I



Notice also that dollars flow clockwise in Figure 2.1, representing payments for the goods and services that flow *counter*clockwise. This illustrates the fact that there are two sides to any economy, the expenditure side and the income side, and they must be equal in dollar terms because every dollar spent on a good or service generates a dollar of income to the factors of production.

The market value of all the goods and services produced by an economy is called the National Product. It is $1,000,000 per year for Model I since that is the total expenditure for the cars that are produced.

The total of all factor incomes is called National Income. Since factor incomes account for all of the market value of the goods produced, it must be that National Income and National Product are equal. In other words, the total income of a society is the value of what it produces. This is a basic equality that holds even in the most complex economies.

Putting the value of what is produced in one column and the factor incomes arising from production in another column, we see the equivalence of these two sides of the Model I economy in the table below.

The left hand column shows that total expenditures in the economy are equal to National Product; the right hand column shows that the incomes of the two factors of production add up to National Income. Comparing the two totals, we see that National Product equals National Income as it always must.

Table 2.1: National Product and Income in Model I

Value of Goods Produced		Factor Income	
Consumption goods	$1,000,000	Wages	$800,000
		Profits	200,000
National Product	$1,000,000	National Income	$1,000,000

Exercises 2.2

A. Imagine that the price of cars jumps to $20,000 and the wage to $16,000 per year. Rework the model. What has changed and what has not? Has the income of the society changed?

B. Now suppose that an improvement in production technology makes it possible for factory output to reach 1.2 cars per worker. Has the income of the society changed? What do you imagine would happen to wages? Suppose that the new level of wages is $9,000 per year; show what the flows of goods and incomes look like now.

2.3 An Economy That Also Produces Capital Goods: Model II

Now let's make our model more realistic by recognizing that factories require capital goods, the equipment used in production. For example, car makers need trucks to deliver the new cars to consumers. These trucks are made by other firms in the business sector which sell their output to the car firms rather than to households. Figure 2.2 depicts Model II.

Notice that there are still only 100 workers, but now they can be employed making either cars or trucks. Recall that one worker can make one car per year, and we now suppose that it takes two workers to produce one truck per year. How many of each good will be produced and what will they sell for? This will be determined in the markets for cars and trucks, as firms seek to maximize their profit. *What we do know as economists is that the economy is constrained in its choices because resources are limited.* Since there are 100 workers and their efforts will be divided between producing the two goods, it must be that the numbers of car workers plus the number of truck workers = 100 workers.

Now it takes one worker to make one car per year and two to make a truck so we also know that

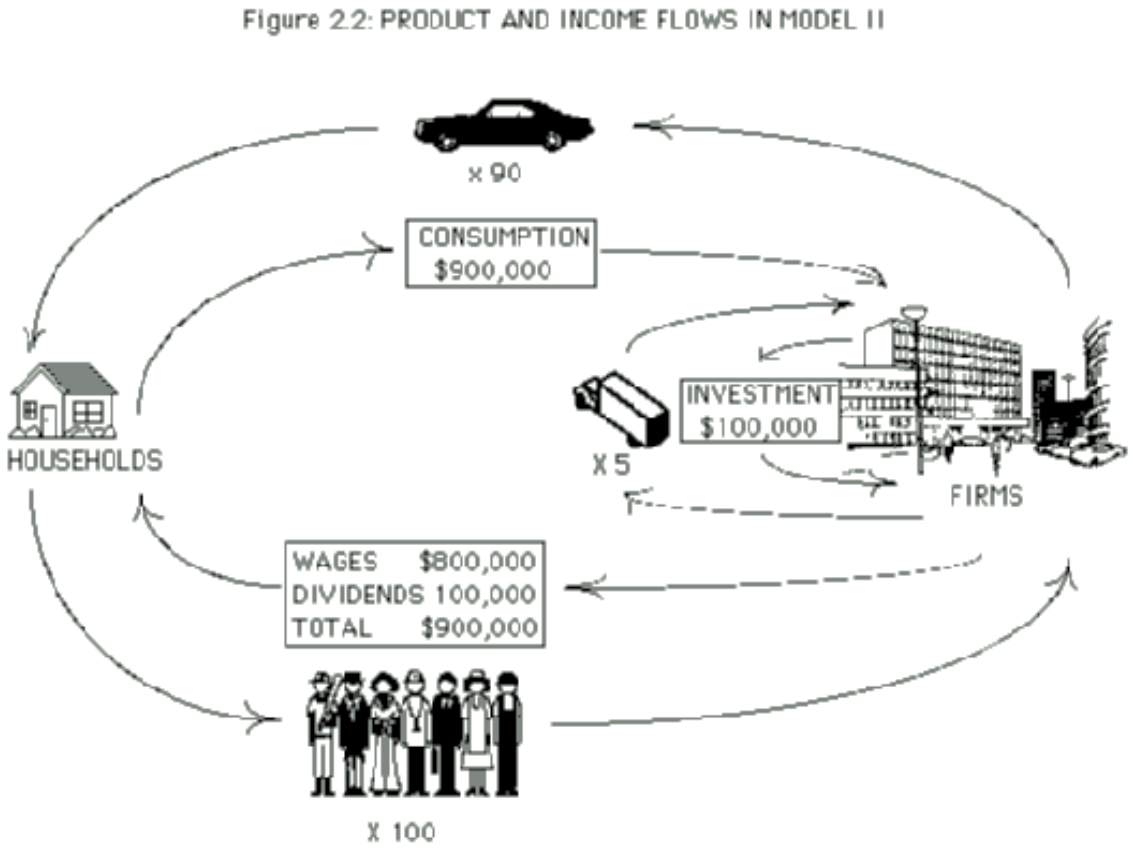
(cars per year • 1) + (trucks per year • 2) = 100 workers.

This simple relationship describes what is called the *production possibilities frontier* for this economy. Any combination of car and production and truck production which satisfies this equation is possible. For example the economy can produce 98 cars and 1 truck, or 96 cars and 2 trucks, but not 100 cars and 2 trucks. It is a frontier because the economy cannot go beyond it, although it may fall short of it. It is possible, for example, for the economy to produce only 98 cars and zero trucks, but then two workers will be unemployed. But we will assume that the economy is using its resources fully and efficiently.

We see from the production possibilities frontier that in order to produce one more truck society must sacrifice the consumption of two cars. The opportunity cost of a truck, what society must give up in order to have another one, is two cars. The idea of opportunity cost, that society must give up something to get more of something else, is one that many economists regard as the single most important concept in economics. This is why the economist's mantra is:

There is no such thing as a free lunch!

Figure 2.2: Product and Income Flows in Model II



To complete our model, we assume that supply and demand in both the car and truck markets have determined that a car sells for $10,000 and a truck for $20,000, and that the economy produces 90 cars and 5 trucks. This implies that 90 workers are employed by car firms and the remaining 10 by truck producers. This is the situation depicted in Figure 2.2, where the flow of 5 trucks is from truck producers to car producers, 90 cars flow from car producers to households, while labor flows from households to firms. Payments for these flow in the opposite direction, from households to firms to pay for cars, from auto firms to truck firms to pay for trucks, and from firms to households to pay for the factors of production.

To see what National Product and National Income are in Model II we look at car and truck firms successively. Sales of cars totals $900,000 per year (90 cars times $10,000 per car) and this is the value of the goods produced by these firms. Incomes to the factors of production include wages for 90 workers (the labor factor) at $8,000 per worker, which comes to $720,000. This leaves a profit of $180,000 which is the factor income going to capital. This profit belongs to the households that are the shareholders of the car-producing firms. However, not all of the profit will be paid out to the households because the auto firms have to pay for their capital investment in 5 new trucks that they paid $20,000 for each, a total of $100,000. The car firms can pay out the remaining $80,000 as a dividend to their owners.

This example illustrates the important distinction between profit and dividends. *Profit* is the amount left over from sales after deducting the costs of running the firm, while *dividends* are the amount actually paid out to the firm's owners, the shareholders. The dividend payment is usually less than the amount of profit because firms generally want to retain some of their profit to pay for capital goods. The portion of profits not paid out in dividends is called *undistributed profit* or *retained earnings*.

To summarize the role of the auto firms in the economy we construct a table much like the table of National Product and National Income introduced in the Model I, listing the value of product in the left column and the distribution of factor incomes in the right column:

Table 2.2: Auto Firms' Product and Factor Income in Model II

Value of Goods Produced		Factor Incomes	
Sales to Households:		Wages:	
90 cars @ $10,000 =	$900,000	90 workers @ $8,000 =	$720,000
		Profit of $180,000 allocated to -	
		Capital investment:	
		5 trucks @ $20,000	100,000
		Dividend payment to shareholders	80,000
Value of Product	$900,000	Total Factor Income	$900,000

Of course, the totals in the two columns are equal because the sales of cars become income to the factors of production.

But isn't the cost of those five trucks a cost of running the firm that should be subtracted from profit? It would be if those trucks were used up the year they were purchased, but the trucks are a *capital investment*, an addition to its existing fleet. As trucks wear out the firm incurs an expense, and we will introduce “depreciation” in the next model. For the moment, let's pretend that trucks don't wear out, so those five new trucks are an addition to the assets of the firm and thus to the property owned by the shareholders.

Now we can readily do the same analysis for the truck firms which are not making any capital investments of their own in Model II:

Table 2.3: Truck Firms' Product and Factor Income in Model II

Value of Goods Produced		Factor Income	
Sales:		Wages:	
5 trucks @ $20,000 =	$100,000	10 workers @ $8000 =	$80,000
		Profit of $20,000 allocated to -	
		Dividend payment to shareholders:	20,000
Value of Product	$100,000	Total Factor Income	$100,000

The sales of each industry and the total wage and dividend payments to the household sector are shown in Figure 2.2. Now let's summarize the whole economy of Model II with a statement of National Product and Income.

Table 2.4: National Product and Income in Model II

Value of Goods Produced		Factor Income	
Consumption goods	$900,000	Wages	$800,000
Investment goods	100,000	Profits	200,000
National Product	$1,000,000	National Income	$1,000,000

In the left hand column we add up the expenditures in the economy for consumption and investment goods. The total of these expenditures is the value of the goods produced, or National Product. In the right hand column we add up the factor incomes that result from the sales of the goods produced, namely wages and profits. The total of factor incomes is National Income. Since National Product and National Income are just two ways of accounting for the value of the goods produced in the economy they must be the same amount, $1 million in this case.

Model II reminds us that society has to choose between consumption goods and capital goods. Only by giving up some of one can it have more of the other. But why bother giving up consumption goods in order to invest in capital goods, that is, why would the economic agents of Model II choose to give up 10 cars so that car firms can have 5 trucks?

The pay-off to society from capital investment is higher productivity in the future. Imagine that before buying those 5 trucks, cars were individually driven to their new owners, but now one worker can deliver a whole truck load at once. This means that the same number of workers will be able to produce more cars next year. Next year the productivity of labor in producing cars will rise, say to 1.1 cars per worker. When that happens the production possibilities frontier will be:

$$(cars/1.1) + (trucks \bullet 2) = 100 \text{ workers}$$

Since the number of workers needed now to produce a car is not one but 1/1.1 or about .9. This new production possibilities frontier means that the society of Model II can now have more cars, or more trucks, or more of both than before.

We can also see from the table of National Product and Income that *Savings equals Investment* in the economy. Savings is what society has left after paying for consumption. In this case it is:

National Income:	$1,000,000
less Consumption:	-900,000
equals Savings:	$ 100,000

Notice that Savings is exactly the value of the investment in trucks, $100,000. It is not coincidental that savings equals investment in Model II. What we have here is a fundamental equality in macroeconomics that

holds in any economy. How does it work? National Product consists of consumption goods and Investment goods, but National Product is equivalent to National Income. We can write this equality as:

Consumption + Investment = National Income

then subtracting consumption from both sides we get

National Income - Consumption = Investment

or, in other words,

Savings = Investment.

This fundamental result tells us that if society is to invest in new capital goods to achieve higher productivity in the future, it must give up an equivalent amount of consumption now.

Exercises 2.3

A. Suppose that the car producers had bought 6 trucks this year instead of 5. Assume that prices and wages are as before and rework the model and the figure. Verify that income equals expenditure.

B. Suppose that the car makers did buy 5 trucks and that it resulted in a rise in worker productivity next year to 1.1 cars produced per year. (1) What is the new production possibilities frontier, and what is the maximum number of cars that the economy can produce? (2) How many cars are produced if the economy still produces 5 trucks? (3) Work out the Product and Factor Income table for car firms and for truck firms, assuming that the yearly wage rises to $8,800. (4) Verify the equality of income and expenditure and the equality of savings and investment.

C. The fraction of national income that is saved by US households has been unusually low during the last decade and much lower than in other major industrial economies such as Japan. Many observers are concerned that the US will lose its competitiveness in the world economy and experience slower economic growth as a result of the low savings rate. Can you explain how these concerns are motivated?

D. Imagine an economy that produces only pizzas and ovens. One worker can produce 1000 pizzas or 2 ovens per year, and there are 50 workers in all. Suppose also that workers earn $9,000 per year, pizzas go for $10 each, and the purchase price of a new oven is $5,000. (1) Write out the production possibilities frontier equation for this economy and graph it. (2) What is the opportunity cost to society of producing an oven? (3) Write out the accounts for this economy when it produces 6 ovens per year, verifying the relationships we established for Model II.

2.4 Gross National Product and Net National Product: Model III

In reality, capital goods like trucks wear out over time from use. *Depreciation is the decline in the value of capital goods due to usage*, and it is a cost to society which we need to account for in computing National Income.

To illustrate, suppose that the auto firms in Model II start the year with a fleet of 20 trucks that are used to deliver new cars to consumers and that during the year two trucks wear out and are scrapped. This loss of two trucks is depreciation and it is a cost of production to the auto firms and to society. Two new trucks are needed just to keep the auto firms' truck fleet intact. Therefore two of the five trucks produced during the year are not an investment in new capital goods but are just replacements for ones that wore out. Only the other three actually expand the truck fleet and are therefore investment in additional capital by the auto industry.

Summarizing the changes in the auto industry's truck fleet during the year we have:

Fleet at beginning of year	20
Trucks produced	+5
Trucks scrapped	-2
Fleet at end of year	23

Let's call this economy with depreciation 'Model III.' Clearly there is a distinction in this economy between the value of all goods produced during the year and the value of all goods produced *net of the capital goods that have to be replaced*.

The former is called, *Gross* National Product or GNP. It is the value of all goods and services produced by the economy. The latter is *Net* National Product, or NNP. It is GNP minus, or "net of," depreciation. The *net* output of the economy in Model III is three trucks and 90 cars after deducting depreciation of two trucks from the *gross* output of 5 trucks and 90 cars. (In accounting, 'gross' is an adjective applied to a quantity before a deduction; for example, in retailing, returns are deducted from gross sales to get net sales.) Recognizing that the dollar value of the depreciation of two trucks is $40,000 we can calculate the dollar values of GNP and NNP for Model III:

Gross National Product	$1,000,000
less Depreciation	-40,000
= Net National Product	$ 960,000

It is natural to apply the same concept to distinguish between gross investment and net investment. For Model III we have:

Gross Investment	$100,000
less Depreciation	-40,000
= Net Investment	$ 60,000

Now let's take a look at the product and income flows in Model III and see where they differ from Model II. First, the auto firms' profits are reduced by the $40,000 in depreciation expense as seen in Table 2.5.

Table 2.5: Auto Firms' Profits in Model III

Sales: 90 cars @ $10,000	$900,000
less Wages: 90 workers @ $8,000	-720,000
less Depreciation: 2 trucks @ $20,000 =	-40,000
equals Profit	$140,000

The product and factor incomes for the auto firms, shown in Table 2.6, also need to be revised to recognize that these firms now have a depreciation expense of $40,000 to replace the two trucks that have worn out.

Table 2.6: Auto Firms' Product and Factor Income in Model III

Value of Goods Produced		Factor Incomes	
Sales to Households:90 cars @ $10,000 =	$900,000	Wages:90 workers @ $8,000 =	$720,000
Gross value of product	900,000	Profit of $140,000 allocated to -	
		net investment: purchase 3 new trucks @ $20,000 =	60,000
less Depreciation: replace 2 trucks @ $20,000 =	-40,000	Dividend payment to shareholders	80,000
Net Value of Product	$860,000	Total Factor Income	$860,000

It may be helpful to compare Table 2.6 with Table 2.2 from Model II. On the "Value of Goods Produced" side we have subtracted depreciation of $40,000 from the gross value of product to obtain the net value of product, the contribution that the auto firms make to NNP. Correspondingly, on the "Factor Incomes" side we have subtracted $40,000 from profit, recognizing that net investment – 3 new trucks added to the fleet instead of 5 - is also $40,000 less than in Model II. The dividend of $80,000 is not affected.

The flows of products and income in Model III can still be represented by Figure 2.2. Five trucks still flow out of the truck industry bound for the auto industry; two of them replace trucks worn out this year, and the remaining three represent a net addition to the truck fleet. The payment for them is still $100,000, but $40,000 of that is depreciation cost for the auto firms while only $60,000 represents net investment. Thus, by recognizing depreciation we do not change the production or expenditure flows depicted in Figure 2.2.

Note that in this model only the auto firms have depreciation costs, so no revision is necessary in the product and income statement for the truck firms. (In reality, all firms have depreciation expense that is subtracted in calculating profit.) Bringing together the product and income statements for both truck firms and auto firms we have the table of National Income for the economy of Model III shown below.

This table looks only a little different from the table for Model II. Notice that National Income is smaller by the amount of $40,000 than it was in Model II because of depreciation. Also notice that it is Net National Product, the value of goods produced by the economy *net* of depreciation, that is equal to National Income. It makes sense that depreciation reduces the income of society. It is easy to verify that savings is again equal to investment, but now we understand 'investment' to mean *net* investment. The fundamental equivalence between savings and investment must hold because the portion of the output of the economy that is not consumed or used to replace worn out capital goods is a net addition to the capital goods available for use in the future.

Table 2.7: National Product and Income in Model III

Value of Goods Produced		Factor Income	
Consumption goods	$900,000	Wages	$800,000
Gross Investment	100,000	Profits	160,000
Gross Nat'l Product	1,000,000		
less Depreciation	-40,000		
Net National Product	$960,000	National Income	$960,000

Exercises 2.4

A. Confirm that savings equals investment in Model III.

B. Could this economy produce 100 cars as did the economy of Model I? Could this economy continue to produce one hundred cars per year, year after year?

C. Rework the model under the assumption that three trucks wear out and need to be replaced during the year.

D. Recall question D of Exercises 2.3 above. Suppose that the number of ovens in that economy at the beginning of the year is 40 and that during each year 10% of the ovens burn out and have to be discarded. Work out the accounts for that economy as we have for Model III.

2.5 Government Spending and Taxation: Model IV

Now we take another step in making our model more realistic by introducing the government sector. It purchases of some of the output of the business sector and collects taxes to pay for it. Let's suppose that government uses trucks for defense purposes, and that Congress has decided to buy 6 trucks per year. Obviously the economy cannot continue to supply 5 trucks to the business sector and 90 cars to the households sector while, in addition, producing 6 trucks for the government. Clearly, something has to give.

Since it takes one worker to build a car, and two workers to produce a truck regardless of who buys it, the production possibilities frontier for the economy of Model IV is

$$\text{cars} \bullet 1 + \text{business trucks} \bullet 2 + \text{gov't trucks} \bullet 2 = 100 \text{ workers.}$$

We see that if Congress is going to buy 6 trucks, then the economy must choose one of the following: 1) reduce the level of investment in new trucks for the auto producers, **or** 2) produce fewer cars for the households so that labor and capital can be shifted to the production of more trucks, **or** 3) do some of both. Let's assume that the workings of market forces are such that the economy does some of both, in particular it reduces car production by 10 and the production of business trucks by one. The capacity freed up by these reductions is sufficient to make room in the economy for the production of 6 trucks for government, since 5 trucks can be produced in place of 10 cars and one less business truck leaves a sixth truck for government.

Where will government get the money to pay for 6 trucks? Congress decides to impose an income tax of 10% on the profits of firms and the income received by households. If this is not enough to cover the full cost then the government will be running a deficit and the Department of the

Treasury must borrow what it needs. From whom will the Treasury borrow? It will borrow from the other two sectors, business and households, if they have savings to spare.

We start our analysis of this economy by taking a look at the situation for the auto producers in Model IV. Their profits and tax owed to the Treasury are as follows:

Table 2.8: Auto Firms' Profits in Model IV

Sales (80 cars @ $10,000)	$800,000
less Wages (80 workers @ $8,000)	-640,000
less depreciation (2 trucks @ $20,000)	-40,000
equals Profit Before Tax:	120,000
less Income Tax of 10%:	-12,000
equals Profit After Tax:	$108,000

Auto sales are lower than in Model III by $100,000 because the economy has made room for the production of more trucks by producing 10 less cars. The auto firms have fewer workers as well, the others now being employed making more trucks. The income tax is 10% of profit, leaving "profit after tax" of $108,000 available for purchase of additional trucks and for payment of dividends.

Capital Investment by the auto firms is also lower in Model IV because one of the trucks formerly available to the auto firms in Model III will now be purchased by the government. Since two trucks used by the auto industry still wear out, that leaves only two trucks to add to the fleet. Thus, net investment is now only 2 trucks costing $40,000 in total. The amount of the dividend paid to shareholders is decided by the directors of a corporation, and let's suppose that is $70,000. Even though this is a smaller dividend payment than the auto firms made to shareholders in Model III, the firms do not have enough money to pay the dividend and also buy the new trucks since these amounts ($70,000 and $40,000) add up to $110,000 while the firms' undistributed profit is only $108,000. Clearly, the auto firms will have to borrow $2,000 from somebody to make up the difference (and they will not be able to lend to government).

The table of product and factor incomes for the auto firms now looks like this:

Table 2.9: Auto Firms' Product and Factor Income in Model IV

Value of Goods Produced		Factor Income	
Sales to Households:80 cars @ $10,000 =	$800,000	Wages:80 workers @ $8,000 =	$640,000
Gross value of product	800,000	Profit of $120,000 allocated to -	
		Net investment: purchase 2 new trucks @ $20,000 =	40,000
		Dividend payment to shareholders	70,000
		Income Tax paid	12,000
less Depreciation:2 trucks @ $20,000 =	-40,000		
		- amount borrowed	-2,000
Net Value of Product	$760,000	Total Factor Income	$760,000

Note that the result of making room in the economy for production of government trucks is that fewer cars are produced for households and fewer trucks are added to the fleet used by auto producers. We can summarize changes in the business truck fleet during the year as:

Truck fleet beginning of year	20
Trucks produced during year	+4
Trucks scrapped during year	-2
Truck fleet at end of year	22

The consequence of adding only two new trucks to the fleet instead of three as in Model III will be slower gains in productivity in the future.

The truck firms have higher sales and profits in Model IV than they did in Model III. With production up to 10 trucks per year the profits of the truck firms will be:

Table 2.10: Truck Firms' Profits in Model IV

Sales: 10 trucks @ $20,000 =	$200,000
less Wages: 20 workers @ $8,000 =	-160,000
equals Profit Before Tax	40,000
less Tax of 10%	-4,000
Equals Profit After Tax	$ 36,000

Truck firms now employ more workers and produce more trucks than they did in Model III; factors of production have been shifted away from consumer goods to production of goods for government use. For simplicity we assume that truck firms pay a dividend just equal to their profit after tax so they have no need to borrow. Here is how the table of product and factor incomes looks for the truck producers in Model IV:

Table 2.11: Truck Firms' Product and Factor Income in Model IV

Value of Goods Produced		Factor Incomes	
Sales:10 trucks @ $20,000 =	$200,000	Wages:20 workers @ $8,000 =	$160,000
		Profit of $40,000 allocated to -	
		Dividend payment to shareholders	36,000
		Income Tax paid	4,000
Value of Product	$200,000	Total Factor Income	$200,000

The situation for households will also be somewhat different in Model IV as we can see by constructing a table showing the income and expenses of the Household sector in Model IV.

Table 2.12: Households' Income and Expenses in Model IV

Wages: 100 @ $8,000 =	$800,000
plus Dividends	106,000
equals Personal Income	$906,000
less Income Tax of 10%	-90,600
equals Disposable Income	$815,400
less Consumption Spending	-800,000
equals Personal Savings	$15,400

This table introduces some terminology used by economists to describe the household sector. Note that wage income has not changed from earlier models: 100 workers are still employed at $8,000 per year each. Adding to wages the dividends received from auto and truck firms we have the total income received by the households, which is called *personal income*. It does not include undistributed profits, the portion of profits not paid out as dividends, even though the firms are owned by the households. Income tax is collected from households on the portion of profits received by the households as dividends. Under the US tax system dividends are taxed twice: once as part of profits at the firm level and again as part of personal income at the household level. Although Pres. Bush persuaded Congress to tax dividends at a lower rate than

wages, we assume a single tax rate here. After subtracting the income tax from personal income the remaining amount is called *disposable income*. This is the income that households have available for spending. After paying for the 80 cars they purchased during the year, households have $15,400 left, which is *personal savings*. What will the household sector do with its savings? We have already seen that the auto firms need a loan, and we will soon see that the government does too.

One sector remains to be accounted for in Model IV, the Government sector. Recall that the 10 % income tax was introduced by Congress to pay for the 6 trucks. Let's see if it is sufficient to pay for them. The Income Statement of the Government looks like this:

Table 2.13: Government's Income and Expenses in Model IV

Income Tax Revenue from -	
Business Sector	$16,000
Household Sector	90,600
equals Total Tax Revenue	$106,600
less Government Spending	-120,000
equals Government Surplus or Deficit	-$13,400

We see that the Government Sector has a budget deficit of $13,400 because the 6 trucks it bought cost that much more than it is receiving in taxes. A persistent and large budget deficit has plagued our federal government most years since the early 1980's and has become a major political issue. The fundamental reasons for the deficit are the same as those that we have in our model: the government spends a lot more than it collects in taxes. Recently the shortfall is a whopping $400 billion per year! In both the model and in reality the government comes up with the money to pay its bills by borrowing.

Having calculated the income flows for all three sectors of the economy in Model IV, we are now ready to summarize the economy in the usual table of National Product and Income:

Table 2.14: National Product and Income in Model IV

Value of Goods Produced		Factor Income	
Consumption Goods	$800,000	Wages	$800,000
Gross Investment	80,000	Profits	160,000
Gov't Purchases	120,000		
Gross Nat'l Product	1,000,00		
less Depreciation	-40,000		
Net National Product	$960,000	National Income	$960,000

The left-hand column adds up the values of goods produced for consumption, gross investment, and government to get GNP, and then subtracts depreciation to get NNP. That is equal to National Income, the sum of factor incomes in the right hand column.

Another way to look at National Income is as the sum of payments made to each of the three sectors as shown in Table 2.15. The Household sector receives wages and dividends which is Personal Income, then we subtract the income tax to get Disposable Income. Next, the profit recorded by the Business sector is reduced by the dividends paid to the households and the income tax paid to the Government sector. Finally, the income of the Government sector is the sum of the taxes collected from the other two sectors.

Table 2.15: Sector Income in Model IV

Households		
Wages	$800,000	
+ Dividends	106,000	
= Personal Income	$906,000	
- Income tax	-90,600	
= **D**isposable **I**ncome		$815,400
Business		
Profits	160,000	
- Income Tax	-16,000	
= Profits after tax	144,000	
- Dividends paid	-106,000	
= **U**ndistributed **P**rofit		38,000
Government		
Tax revenues		106,600
National **I**ncome		$960,000

The combined incomes of the three sectors are National Income which is equal to NNP. Adding up the three components of NNP and setting them equal to the sum of the incomes of the three sectors we have the simple equation

Consumption +

Net **I**nvestment +

Government Purchases

=

Disposable **I**ncome +

Undistributed **P**rofit +

Tax Revenues

Using the bold letters in each of these components as abbreviations, we can rewrite the equation as

$$C + I + G = DI + UP + T$$

which we can easily rearrange as follows:

$$(DI-C) + UP + (T-G) = I$$

The terms on the left hand side are the savings of each of the three sectors: (DI-C) is personal savings, UP is the savings of the business sector, and (T-G) is the savings of government. This equation shows us that total savings in the economy must be equal to net investment.

This fundamental relationship is expressed in words as:

Personal Savings +

Undistributed Profits +

Government Savings

= Net Investment

The values of the components of the "savings = investment" equation for Model IV are:

(DI-C)	+	UP	+	(T-G)	=	I
$15,400	+	$38,000	+	(-$13,400)	=	$40,000
Household Savings	+	Business Savings	+	Government Savings	=	Net Investment

We see now that it was no coincidence that the households in Model IV were saving just enough ($15,400) to cover the government budget deficit (-$13,400) and also lend the auto firms the extra money ($2,000)

they needed to pay for new trucks. *It will always be true that savings equals investment!*

The continuing federal government budget deficit is one of the most hotly debated subjects in Washington these days, and this analysis helps us see why. Many observers fear that the deficit uses up personal savings that otherwise would be available to the Business sector to expand investment in modern capital goods that would make our economy more productive. If one sector saves less, the government sector in this case, then investment must fall unless another sector compensates by saving more. Some economists feel that this concern is exaggerated because they believe that the household and business sectors will increase their savings in response to government deficits since they understand that a deficit now means they will have to pay higher taxes later. Most economists, however, see no evidence that the household sector has increased its saving in response to government deficits. Those who advocate a tax increase to reduce or eliminate the deficit believe that the resulting cut in disposable income would cause households to cut back their consumption spending, making room in the economy for more production of investment goods. Meanwhile, much of the savings that finances net investment in the U.S. comes from abroad, as we see illustrated in the next model.

Exercises 2.5

A. Although the economy of Model IV is producing goods for the government sector that were not produced in Model III, GNP is the same in the two models. Explain why the increase in the production of trucks did not result in an increase in GNP.

B. It has been said that "Europe and Japan won the cold war." After explaining briefly what is meant by the production possibilities frontier, discuss how relatively low military expenditures in those countries could have helped them to grow more rapidly than the US or the USSR in recent decades.

C. Suppose Congress acts in Model IV to reduce the deficit by imposing a tax increase of $20,000 (a fixed amount, not a percentage of income) on the household sector. Show how the savings = investment equation would look if households did not alter their spending behavior in response to the additional tax. Did deficit reduction increase investment? Suppose now that households do reduce their consumption spending by $20,000 in response to having $20,000 less disposable income. How much can this economy now increase capital investment? How does this change the “savings = investment” equation?

D. Imagine that Congress enacts a citizen's benefit program in Model IV under which the Government sector sends each worker a transfer payment of $10 which is not subject to income tax. If this does not

cause households to alter their spending habits, which tables in the model change and what do they look like now?

E. It has been said that the real burden of government on society is not the amount of tax it collects but the amount it spends. Comment on this statement in light of our analysis of Model IV.

F. The income tax rate in Model IV is 10%, yet the amount of tax collected is more than 10% of National Income. How does this happen?

2.6 International Trade: Model V

There is one more channel of expenditure that we need to include in our model of the economy: international trade. Some of the goods that we produce are exported and sold abroad. The US is a major exporter of grain, airplanes, and computers. Exports account for about 10% of US GNP. Likewise some of the goods we buy are produced abroad and imported into the US. The US imports large amounts of petroleum, autos, and food products. Recall from Chapter 1 that we can think of other countries as a fourth economic sector called the rest-of-the-world, or ROW. By selling us the goods that we import, the ROW earns dollars which it can use to buy goods made here, resulting in exports from the U.S. to the ROW. Beginning the 1980s, foreign countries started to earn far more U.S. dollars from imports to the U.S. than they spent on goods exported from the U.S. The excess of U.S. imports over exports is called the *trade deficit* and it averaged about $100 billion annually during most of the 1980s. Though it narrowed for a time in the 1990s it has again grown until in 2004 it will be around $600 billion! That is about $2 billion per business day and a whopping number by any measure!

What has the ROW been doing with all those hundreds of billions of dollars it has been earning through our trade deficit? It has been lending those dollars back to us. For example, Japan, which accounts for about half of our trade deficit, has become a major lender to the US Treasury. More recently, China has become a major lender as well. By the end of the 1980s the U.S. had become a debtor nation, meaning that we owe more to foreigners than they owe to us. Now foreigners own substantial fraction of our national debt in the form of U.S. Treasury bonds.

Why do we have a huge trade deficit? Is the trade deficit harmful or helpful to our economy? What will happen if the ROW suddenly wants their money back? What, if anything, should we try to do about it? These are important questions hotly debated in the news media, by economists, and by politicians. Fortunately, by extending our simple model of the economy we can gain some understanding of them.

To incorporate imports and exports in our model we suppose that cars are traded internationally. Recall that in Model IV the economy produces 80 cars and 10 trucks. Now we assume that this economy exports 10 cars while it imports 11, all at a price of $10,000. The dollar amount of

Exports is therefore $100,000 and Imports $110,000. Consumption is higher by one car or $10,000 because the imported cars are purchased by households. Gross Investment and Government Purchases however are unchanged from Model IV. Has GNP changed? Not at all! GNP is the value of goods produced by the economy, and that is still $1 million.

Adding up the expenditures made by the four sectors we have Consumption ($810,000) plus Gross Investment ($80,000) plus Government Purchases ($120,000) plus Exports ($100,000), a total of $1,110,000. It seems that aggregate by all four sectors added together is no longer equal to GNP, but considerably greater. Why? Total expenditures ($1,110,000) differ from GNP (still $1 million) by exactly the amount of Imports (eleven cars worth $110,000). Why? Because those eleven imported cars, which are not produced by the Model V economy, are included in Consumption. If we subtract Imports from expenditures then we are counting only the goods produced in the Model V economy and that will be equal to GNP ($1,110,000 less $110,000 equals $1,000,000). Equivalently, we can subtract Imports from Exports to get *Net Exports* and add this to the purchases of goods by the other three sectors. The National Product and Income table for Model V therefore looks like this:

Table 2.16: National Product and Income in Model V

Value of Goods Produced			Factor Income	
Consumption		$810,000	Wages	$800,000
Gross Investment		80,000	Profits	160,000
Gov't Purchases		120,000		
Exports	100,000			
less Imports	110,000			
equals Net Exports		-10,000		
Gross National Product		1,000,000		
less Depreciation		-40,000		
Net National Product		$960,000	National Income	$960,000

Notice that GNP, NNP, and the components of National Income are all the same as in Model IV. This is because the output of the economy has not changed. Introducing international trade has had no net effect on auto firms because they are still producing 80 cars, it is just that 10 of them are delivered to foreigners instead of to domestic buyers. The truck producers are unaffected by this change. Therefore the value of production as well as the flows of income to the Household and Government sectors are unaffected.

What has changed is that households have increased their consumption by $10,000. They are purchasing the 70 domestically produced cars that are not exported as well as the 11 imported cars, a net increase in consumption of one car and $10,000. Here is what the Income Statement of the Household sector now looks like:

Table 2.17: Households' Income and Expenses

Wages (100 @ $8,000)	$800,000
plus Dividends	106,000
equals Personal Income	$906,000
less Income Tax of 10%	-90,600
equals Disposable Income	$815,400
less Consumption spending	-810,000
equals Personal Savings	$5,400

The changes here are the $10,000 increase in Consumption spending and a corresponding $10,000 reduction in Personal Savings. Obviously, households will no longer be able to lend the Treasury $15,400 to cover the government's budget deficit since they have saved only $5,400. Recall too that the business sector needs to borrow $2,000 to finance its investment in new trucks. Where will the additional $10,000 come from? Notice that foreigners have earned $10,000 more in sales of autos in the US than they spent on US cars, so they have $10,000 to lend. The ROW has thus become another source of savings in the economy and it lends that savings to other sectors.

To see how the four sectors interact as savers and borrowers we again express the "expenditures = income" relationship as a simple equation relating the sum of expenditures to the sum of sector incomes as in Model IV. However, now we have another expenditure component, net exports which is exports minus imports. Putting the equivalence into words we have:

Consumption +

Net **I**nvestment +

Gov't purchases +

(**EX**ports-**IM**ports)

=

Disposable **I**ncome +

Undistributed **P**rofit +

Tax revenues

Using EX to stand for Exports and IM for Imports, we write the equation symbolically as

$$C + I + G + (EX-IM) = DI + UP + T.$$

We can again rearrange the terms in the equation so that the savings of all the sectors are on the left and net investment on the right:

$$(DI-C) + UP + (T-G) + (IM-EX) = I$$

The first three terms are again the savings of the household, business, and government sectors respectively, and the new term (IM-EX) is the amount of dollars saved by the ROW since IM is the amount of dollars earned by the ROW and EX is the amount spent by the ROW. Putting the "savings = investment" equation in words:

Personal Savings +

Business Savings +

Government Savings +

Rest-Of-World Savings

= Net Investment

In Model V, ROW savings is $10,000, the excess of imports over exports. The specific numbers in the savings = investment equation for Model V are

(DI-C)	+	UP	+	(T-G)	+	(IM-EX)	=	I
$5,400	+	$38,000	+	(-$13,400)	+	$10,000	=	$40,000
Household Savings	+	Business Savings	+	Gov't Savings	+	ROW Savings	=	Net Investment

What does the ROW do with its savings of $10,000? It lends those dollars to the Government sector which needs to borrow $13,400 or it may lend some of them to the Business sector which needs to borrow $2,000 (Business Savings is $38,000 but Net Investment is $40,000). Why would the ROW want to lend those dollars rather than spend them on goods to take home? Borrowers pay lenders interest for the use of their money (the subject of the next chapter). It must be that foreigners find the interest rates offered in this economy attractive enough so that they would rather lend here than at home or somewhere else.

Why, then, does this economy have a trade deficit? Because the ROW finds that it would rather use part of its dollars earnings to buy loans than to buy cars for export. It is often suggested that the U.S. has a trade deficit because we are not sufficiently competitive. Model V shows us that there is no necessary connection between competitiveness and a trade deficit. If our goods are not attractive to foreigners then our exports will be meager, but that does not imply that we will have a trade deficit. A trade deficit implies that foreigners are interested in selling us goods in order to obtain dollars to lend in the U.S.

Are the inhabitants of Model V harmed by the fact that their economy has a trade deficit? Compare their situation with that in Model IV. The difference is that consumers in Model V enjoy a higher level of consumption (one extra car) than they would in Model IV. However, the loans from the ROW will have to be repaid at some time in the future. Model V has traded more consumption now for less consumption, or less of something, in the future. The mercantilist school of thought in 18th century France held that the welfare of a nation can be measured by its trade position, a deficit being a loss to the society and a surplus being a gain. What we see in Model V is that a trade deficit is not a gain or loss but indicates an exchange of goods for loans, and it not clear that the borrowing nation is worse off by having a trade deficit. All we can say for sure is that we have a higher level of consumption now at the cost of incurring loans that will be repaid later.

Given the fact that savings must equal net investment, it is not surprising that the trade deficit and the government budget deficit emerged together as the *twin deficits* of the 1980s. When the federal government began to run a large deficit in the early 1980s there had to be a corresponding increase in savings by another sector, or by reduced net investment. In succeeding chapters we will see that high interest rates in the U.S., caused in part by heavy borrowing by the U.S. Treasury, made it attractive for foreigners to save and invest some of the dollars earned from their exports to the U.S. Those dollars were lent to the U.S. Treasury rather than spent on imports from the U.S. (our exports).

Thus the U.S. has resembled Model V in having a large government deficit and a large trade deficit. In both economies, the trade deficit, being a source of saving for the economy from the ROW, allowed

consumers to maintain a high level of consumption because households did not have to provide the saving to finance the government deficit. As one wag put it “We Americans held a party and Japan lent us the money to pay for it.” The way that Japanese and other ROW savers obtained the dollars to lend to our government was by selling us more imports than they spent on exports from the U.S. Why was the ROW willing to lend us back the dollars they earned here? They must have had a reason, since there is nothing requiring them to sell more to us than they buy or to lend us anything. They did so because U.S. interest rates were higher than in Japan and Europe, so lending in the U.S. was attractive to ROW savers. Recently, China has joined the others, evidently with the intent to encourage U.S. purchase of their rapidly growing industrial output by lending us the funds to indulge ourselves!

The twin deficits have again become a key economic and political issue, as we saw in the 2004 Presidential contest. What if some time the ROW is no longer interested in making loans to us, yet we still insist on having a government that spends much more than it receives in taxes? The ‘savings = investment’ equation makes it very clear that there are only two options: 1) increase household savings by reducing consumption, or 2) have a lower level of net investment in new plant and equipment and therefore sacrifice some long term growth in the economy. (Business savings could be increased by reducing dividend payments, but that just reduces household income and savings.) It is not possible to change just one component of the equation and leave all the others unchanged! Thus economists are concerned that if the federal budget deficit remains large, and if U..S households do not boost their savings by curbing consumption, then investment in new plant and equipment would have to decline. That would inevitably mean slower growth for the U.S. economy.

Exercises 2.6

A. Japan is a country with a high rate of personal savings and a large trade surplus. If we were to redo Model V to depict Japan's situation, what might the quantities in the “savings = investment” equation look like?

B. Economists expect the savings rate in the U.S. to rise over the next decade as the "Baby Boomers" born in the 1950s reach the age when people typically boost their savings in anticipation of retirement. If Personal Savings does increase substantially, how might the components in the "savings = investment" equation change as a result?

C. Japan's government is committed to making markets there more open to goods from abroad. If conditions change so that Japan begins importing more goods, what might that do to alter consumption and investment within the US?

D. The Clinton administration suggested that the 1993 tax increases aimed at reducing the federal deficit would also help reduce our trade deficit. Explain how reducing the federal budget deficit could lead to a fall in the trade deficit and what that result depends on.

2.7 The National Income of the U.S.

Now let's take a look at the actual National Income and Product accounts for the U.S. They can be found in the *Survey of Current Business* in your college library or on the web at www.bea.doc.gov. The actual tables look very similar to those we have constructed for Model V but of course contain much more detail. Here is a simplified version of the National Income table for 2004.

Table 2.18: National Income of the US for 2004

	Billions of Dollars		% of NI
Wages & Salaries	5300		52
+ Fringe benefits	1270		12
= Employee Compensation		6570	64
Farm Income	19		<1
+ Non-farm proprietors	882		9
= Proprietors' Income		901	9
Corporate Profits		1167	11
Rental Income		173	2
Net Interest		546	5
Tax on production & imports		833	8
National Income		10,243	100
Statistical discrepancy		59	
Net National Product		10,302	

Source: *Survey of Current Business*, September 2004. Totals may not agree exactly because of rounding and statistical discrepancy.

Notice that we are talking about some real money here! A billion dollars is one thousand million dollars. The National Income of the U.S. is over $10,000 billion, or eight *trillion* dollars, per year. That's about $40 billion per working day!

We see that the largest share of National Income is employee compensation which accounts for about two thirds of the total. It is perhaps surprising that fringe benefits constitute about 20% of employee compensation. Business firms are divided into proprietorships - small businesses that are not incorporated - and corporations. Among the former are family farms, once a major part of the American economy and in pioneer days home to most of its people. But today farm proprietors' incomes are less than 1% of National Income. However, small business proprietorships as a whole account for about as large a share of National Income as do corporations, about a tenth each. Profits are income to the owners of firms, but firms also pay interest on loans they have received from the household sector. Both profits and net interest are factor payments to capital. One more item included in National Income is tax on production and imports; these include excise and other taxes collected on the basis of production rather than profits or income as well as customs duties on imports which national income accountants think of as part of the price of a product rather than as income to labor or capital.

Finally, notice next that National Income differs from Net National Product by an item called "statistical discrepancy." All national income account totals are based on a sampling of economic activity since an exhaustive and exact accounting would be prohibitively expensive. When the income and product sides are added up we simply do not get exactly the same answer, since each is an estimate from different sources. These statistical errors were not present in our models, but they account for the difference we see here between National Income and Net National Product.

When we look at Table 2.19 we see both Gross National Product and Gross Domestic Product, or GDP. The distinction arises because US-owned factors of production do not reside entirely within the US. There are both US-owned factories and US workers abroad. Similarly, some factors of production within the US are not U.S.-owned. Our GNP is the value of the output of US-owned factors of production while the GDP is the value of the output of all factors of production located within the US.

Table 2.19: Gross Domestic Product, Gross National Product, and Net National Product of the U.S. for 2004

Personal Consumption	Billions of $		% of GDP
Durable goods	976		8
+ Non-durable goods	2356		20
+ Services	4822		41
= Total Consumption		8155	69
Gross Private Investment			
Plant and Equipment	1198		10
+ Residential (housing)	660		6
+ Change in Inventories	55		<1
= Gross Investment		1913	16
Exports and Imports			
Exports	1164		10
- Imports	-1764		-15
= Net Exports		-600	-5
Government Expenditures			
Federal Government	804		7
+ State and Local	1370		12
= Government Purchases		2175	19
Gross Domestic Product		11,643	100
+ receipts from the ROW		380	
- payments to the ROW		-347	
Gross National Product		11,677	100
- Depreciation		-1374	-12
Net National Product		10,303	88

Source: *Survey of Current Business*, Sept. 2004. Totals not exactly because of rounding and statistical discrepancy.

In practice the difference between GDP and GNP is small for the U.S., but it may not be small for some countries that have large investments abroad. The US has followed other countries in adopting GDP as the standard statistical measure of the output of the economy. The news media refer to GDP rather than the GNP in their reporting. In our simple models there was no difference between ownership and location, so the distinction did not arise.

Several points are worth noting about the information in Table 2.19. Personal consumption is broken down into expenditures on durable goods such as cars, non-durables such as breakfast cereal, and services such as medical care. Services are by far the largest category and accounts for 41% of GDP! Gross private investment includes not only purchase of new plant and equipment such as office buildings and trucks, but also construction of new residential housing. The national income accountants treat homeowners and landlords alike as being in the business of renting homes to themselves or others. An implicit rental rate is estimated for owner-occupied housing, and that is included as part of Consumption in GDP and rental income in National Income. Newly constructed houses are therefore new capital goods for these "firms." Additions to inventories held by firms for later sale are a kind of capital investment. Inventories may fall as well as rise, so this component of investment can be negative.

Note that about 10% of the GDP was exported in 2001, but imports amounted to even more, about 15% of GDP. The resulting trade deficit, $600 billion, or about 5% of GDP, is huge by any historical standard.

We often forget that state and local governments together are a very large sector of the economy. We see here that their purchases of goods and services substantially exceed those of the federal government. Keep in mind that these expenditures do not include "transfer payments" such as social security or unemployment benefits which are not payment for a good or service but rather a redistribution of income. Nor does this category of government expenditures include interest payments on federal (national) or state debt.

Adding up all the uses of the GDP we are ready to make the adjustments necessary to get GNP. We add receipts of factor income from the ROW which represent the value of the product of US-owned factors of production not located in the US. For example, dividends received from IBM Japan represent part of the product of US-owned factors of production that is not counted in our GDP. Then we subtract payments to foreign-owned factors of production located in the US. Thus, dividend payments to Honda Motor Corp. are part of US GDP that is not part of our GNP but rather part of Japan's. After making these adjustments we come to GNP.

Note that depreciation amounts to about 12% of GDP. This is the replacement of capital goods that wore out during 2004. As a result of

recent changes in GDP accounting, this depreciation figure includes an estimate of the depreciation of capital goods owned by government, not just private capital. Depreciation is subtracted from GNP to give NNP, completing the linkage between the income and product sides of the economy represented in these two tables.

A few comments on how the media report these GDP numbers. The national income accounts are produced on a quarterly basis, so every three months there is a preliminary estimate announced for the past three months. However, the GDP number that is announced is GDP for the quarter *at an annual rate*. For example, GDP for the fourth quarter (October through December) of 2001 was $10,153. That means that if the economy kept up the same pace for a full year, the GDP for that year would be that amount. (That quarterly rate was higher than the annual total for 2001; why?) Likewise, the growth rate of GDP for the quarter is expressed at an annual rate; like saying that during the last quarter hour we traveled at a rate of 65 m.p.h.

The media usually announce only the "real " growth in GDP, meaning that GDP has been adjusted for price changes to reveal the change in the volume of goods and services produced. The GDP is also adjusted for seasonal variation because people are interested in seeing whether economic activity has accelerated or slowed down apart from the usual seasonal pattern.

Finally, let's look at how the savings of the four sectors add up to equal net investment in the US in 2001. The equivalence is only approximate because of "statistical discrepancies," meaning that the components of the national income accounts are not measured precisely so they do not add up exactly.

(D-C)	+	UP	+	(T-G)	+	(IM-EX)	=	I
$104	+	$484	+	-$367	+	$600		$766
Household Savings	+	Business Savings	+	Gov't Savings	+	ROW Savings	=	Net Investment

Source: *Survey of Current Business*, Sept. 2004. Totals do not agree exactly because of technical and statistical discrepancies.

What we see here is a situation similar the one we saw in Model V: ROW savings is a major source of savings in the U.S. economy. Households save very little, and Government 'Savings' in 2004 consisted of dis-savings or deficit to the tune of $367 billion. The Business sector saved $484 billion but spent $766 on new capital goods, requiring financing from other sectors. (Note that the net investment figure here is only for private investment, net of depreciation on private capital, while the depreciation figure in Table 2.19 also includes depreciation on government capital, a distinction that need not trouble the reader, but

may have!) Some of that came from the Household Sector, the lion's share was financed by foreigners who earned the $600 of ROW savings by selling us that much more in imports than we received from selling them exports. This is a truly startling situation. It is normal that developing economies attract investment from the ROW that is supplied mainly by more mature developed countries. Fast growing economies like that of Mexico typically have large trade deficits because they are investing heavily in new plant and equipment. Figuratively speaking, Mexico imports bulldozers and exports loans to be paid later.

But today we see the strange situation of what may be the most developed economy, the U.S., attracting investment from countries that are in many cases less developed. The world is investing most where the most investment has already been made, not where investment has been lacking in the past? Are foreign investors stupid? Not likely! It is more likely that as the leader in technology the U.S. is seen as the economy offering the greatest potential for gain in investment, and U.S. Government bonds represent the safest investment available. However, that perception will almost certainly shift again in the future.

Exercises 2.7

A. Check the library for the latest edition of the *Survey of Current Business* and locate the tables for National Income, GDP, and their components. Can you verify that savings equals investment? What are the sources of savings currently in the economy?

If foreign investors lose their faith in technology-driven rapid growth and profits in the US economy during coming years, how might this affect the terms that make up our Savings=Investment equation? And what might be the real consequences for us?

END.