

## Learning Objectives

1. Describe how the government budget surplus is related to national income.
2. Explain how net exports are related to national income.
3. Distinguish between the marginal propensity to consume and the marginal propensity to spend.
4. Explain why the presence of government and foreign trade reduces the value of the simple multiplier.
5. Explain how government can use fiscal policy to influence the level of national income.

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## I Introducing Government

### Government Spending

Government purchases of goods and services, **G**, are part of desired aggregate expenditures.

Transfer payments are not government purchases — they only affect aggregate expenditure through their effect on disposable income.

### Tax Revenues

Net tax revenue is defined as total tax revenue received by the government minus total transfer payments made by the government — it is denoted **T**.

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## The Budget Balance

The budget balance is the difference between government revenue and government expenditures:  $T - G$ .

When revenues exceed expenditures, there is a budget surplus. When expenditure exceeds revenues, there is a budget deficit.

## The Public Saving Function

We assume that  $G$  is autonomous with respect to national income,  $Y$ . However, as  $Y$  increases, net taxes rise — tax revenues rise and transfers payments fall.

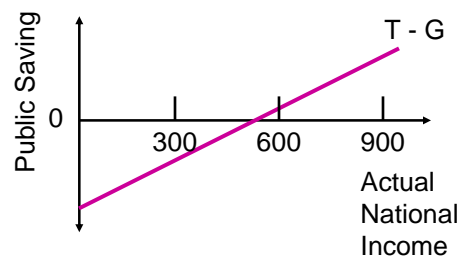
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## The Public Saving Function

As national income rises, the budget surplus (public saving) increases.

The slope of the public saving function is equal to the net tax rate.



Y	G	T = 0.1 x Y	T-G
150	51	15	-36
300	51	30	-21
525	51	52.5	1.5
600	51	60	9
900	51	90	39

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## Provincial and Municipal Governments

When measuring the overall contribution of government to desired aggregate expenditure and to public saving, all levels of government must be included.

This is particularly important in Canada, where the combined purchases of provincial and municipal governments are larger than those of the federal government.

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## Summary

1. All levels of government add directly to aggregate expenditure.
2. Governments also collect taxes and make transfer payments.
3. Government purchases and taxation, taken together, imply the public saving function,  $T-G$ .

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## 2 Introducing Foreign Trade

### The Net Export Function

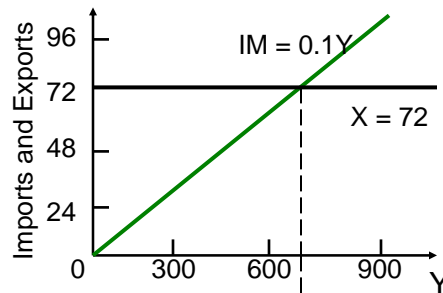
Canada's exports are autonomous with respect to Canadian national income. In contrast, desired imports rise as Canadian national income increases.

The marginal propensity to import is the change in imports that results from a \$1 change in national income.

Overall net exports,  $X - IM$ , falls as national income rises. This relationship is called the net export function.

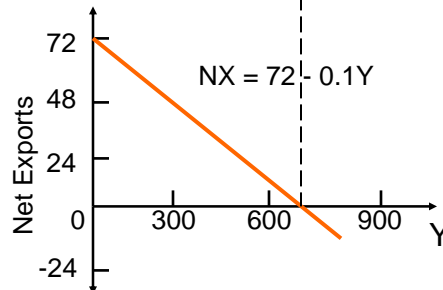
### What Does the Net Export Function Look Like?

Y	X	IM = 0.1 x Y	NX
0	72	0	72
300	72	30	42
600	72	60	12
720	72	72	0
900	72	90	-18



The NX function is drawn holding constant:

- foreign national income,
- domestic and foreign prices,
- and the exchange rate.



### Shifts in the Net Export Function

#### Foreign Income

An increase in foreign income, ceteris paribus, will lead to an increase in the quantity of Canadian goods demanded by foreign countries. This increases **X** and shifts up the **NX** function.

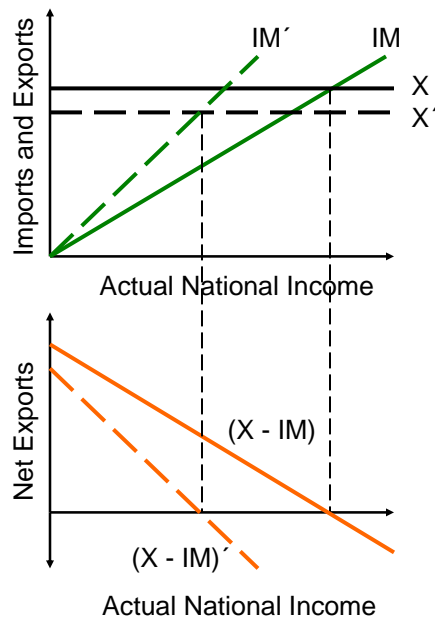
#### Relative International Prices

A rise in Canadian relative to foreign prices reduces Canadian exports, decreasing **X**. The **IM** function also rotates up since Canadians now spend a higher fraction of income on foreign goods. The **NX** function shifts down and also gets steeper.

This diagram illustrates the case of an increase in Canadian prices relative to foreign prices.

An important source of such relative prices changes is change in exchange rates.

An appreciation of the Canadian dollar will increase Canadian prices relative to foreign prices.



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## Equilibrium National Income

### Desired Consumption and National Income

When taxes are included, disposable income ( $Y_D$ ) is less than national income ( $Y$ ).

Suppose  $T = (0.1)Y$ . Then,  $Y_D = (0.9)Y$ .

How does this alter the simple consumption function?

$$C = 30 + (0.8)Y_D$$

$$C = 30 + (0.8)(0.9)Y$$

$$C = 30 + (0.72)Y$$

With income taxes, the MPC out of national income (0.72) is less than the MPC out of disposable income (0.8).

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### The AE Function

We can now expand the AE function to include net exports.

$$AE = C + I + G + NX$$

Recall that the slope of the **AE** function is the marginal propensity to spend out of national income — we call this **z**.

Suppose **Y** rises by \$1. Then an additional 72 cents is spent on consumption, but 10 cents of the extra consumption is on imports. Therefore, desired spending on domestic production rises by only 62 cents — **z** is 0.62.

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## Equilibrium National Income

As before, equilibrium occurs where desired aggregate expenditure equals actual national income.

What happens if  $AE > Y$ ? When households, firms, and governments try to spend their desired amounts, they will find that production is insufficient to meet their demand. This will deplete inventories and lead domestic firms to increase production.

If  $AE < Y$ , then desired aggregate spending is less than current production. Inventories will build up, and firms will reduce their production.

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## The Saving-Investment Approach

This approach is more complicated with government and international trade. We must think about desired national saving and desired national asset formation.

### National Saving

National saving is the sum of private saving and public saving (government's budget surplus):

$$\text{National Saving} = S + (T - G)$$

As national income rises:

- public saving rises (budget surplus), and
- private saving rises (saving function).

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### National Asset Formation

In a closed economy, the only way to accumulate assets is to devote some of national product toward investment.

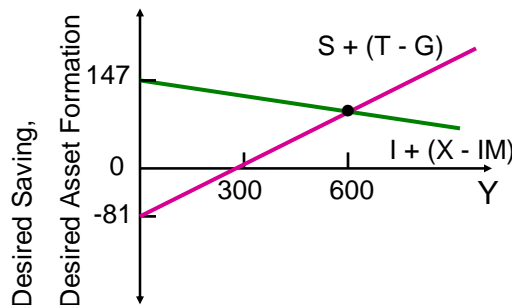
In an open economy, however, there is an additional way to accumulate assets: we can purchase income-earning assets from foreigners (stocks or bonds).

A country that exports more goods and services than it imports must use the “extra earnings” to buy income-earning assets such as stocks or bonds. So:

$$\text{National asset formation} = I + (X - IM)$$

National Income	Desired National Saving	Desired National Asset Formation	Saving Minus Asset Formation
Y	S + T - G	I + X - IM	(S+T-G) - (I+X-IM)
0	-81	147	-228
300	3	117	-114
600	87	87	0
900	171	57	114
1200	255	27	228

Equilibrium national income occurs where desired national saving is equal to desired national asset formation.





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The difference between desired aggregate expenditure and actual national income is always equal to the difference between desired national saving and desired national asset formation.

Suppose the difference between desired national saving and desired national asset formation is equal to  $W$ .

$$(S + T - G) - (I + X - IM) = W$$

Recall that disposable income,  $Y - T$ , is equal to consumption plus saving:

$$Y - T = C + S$$

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This implies:

$$S = T - Y - C$$

Substituting this equation into our first equation gives:

$$Y - (C + G + I + X - IM) = W$$

Now note that the expression in brackets is  $AE$ .

$$Y - AE = W$$

Thus, the difference between desired national saving and desired national asset formation is exactly the same as the difference between national income and desired aggregate expenditure.

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## 4 Changes in Equilibrium National Income

### The Multiplier with Taxes and Imports

With no government and no international trade,  $z$  is simply the marginal propensity to consume out of disposable income.

But imports and income taxes make  $z$  smaller, and thus the simple multiplier is also smaller.

The new value of  $z$  is given by:

$$z = MPC(1-t) - m$$

where  $t$  is the net tax rate and  $m$  is the marginal propensity to import.

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### A Realistic Value for the Multiplier

The lower value of the multiplier with taxes and imports reflects that changes in autonomous expenditure bring about smaller changes in national income than before.

Using realistic values of taxation and imports for Canada, the evidence shows that the value of the multiplier is closer to 1 than 2.

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## Net Exports

As with other elements of AE, if the net export function shifts upward, equilibrium national income will rise; if the net export function shifts downward, equilibrium national income will fall.

Generally, exports are autonomous with respect to domestic national income.

Foreigners' demand for Canadian exports depends on foreign income, on foreign and domestic prices, on the exchange rate, and on consumer tastes.

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## Fiscal Policy

Fiscal policy involves the use of government spending and tax policies to influence desired aggregate expenditure so as to change the equilibrium level of national income.

Any policy that attempts to stabilize national income at or near potential national income is called stabilization policy.

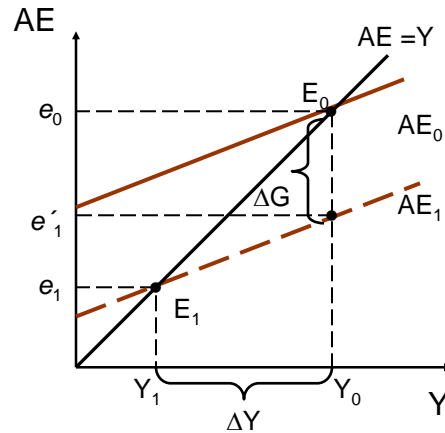
Suppose the government reduces its purchases of all consulting services, saving \$100 million annually. How much would equilibrium income change?

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A change in government purchases,  $\Delta G$ , will lead to a change in equilibrium national income,  $\Delta Y$ .

The change will equal the multiplier times the change in government purchases.



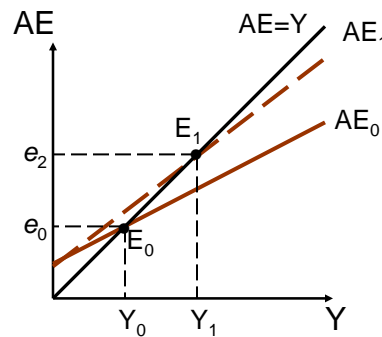
For example, suppose  $z = 0.62$ . The multiplier is then  $1/1.38 = 2.63$ . A \$100 million decrease of government purchases will therefore reduce equilibrium national income by \$263 million.

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Or, the government may decide to reduce taxes in an attempt to raise national income.

A lower net tax rate raises the marginal propensity to consume out of national income and thus increases  $z$  — the **AE** function gets steeper.



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## 5 Demand-Determined Output

The simple income-expenditure model is based on three central concepts:

- equilibrium national income,
- the multiplier, and
- demand-determined output.

The third concept — demand-determined output — is crucial. We (implicitly) assume that firms are able and willing to supply any amount of output at the given price level without requiring any changes in price. We therefore assume national income to be demand determined.

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There are two situations under which the assumption that output is demand determined is most reasonable.

The first is when there are unemployed resources in the economy, so that output is below potential and firms have excess capacity.

The second is when firms are *price setters*, which means that firms have some influence over price, either because of there are relatively few firms in the market, or because products are differentiated.

If the economy's resources are fully employed and firms are price takers, then the assumption of demand-determined output may not be reasonable.

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