The Digital Economist

Lecture 6 -- The Real Economy and Aggregate Demand

The concept of aggregate demand is used to understand and measure the ability, and willingness, of individuals and institutions to purchase goods and services.

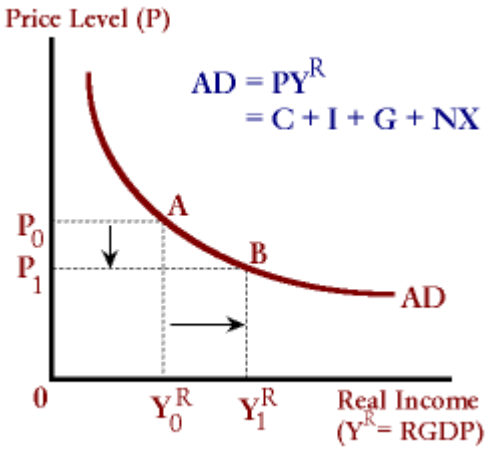
Say's law stated that "Supply creates its own Demand" in which the income earned producing a certain quantity of goods and services should be sufficient to purchase and identical quantity of those same products. However in a complex economy with sticky prices and wages, financial sectors in various stages of development, political institutions that fail to promote certainty and optimism, and strong international linkages and dependencies -- this law may not always hold. The ability to spend on the output of an economy may not be identical to the ability to produce that output.

AGGREGATE DEMAND

Aggregate demand represents the *ability to spend* in an aggregate economy or that level of expenditure necessary to command varying quantities of goods and services at different price levels. This concept measures the level of purchasing power such that when prices increase for a given level of nominal income, fewer goods or services can be purchased.

AD: Nominal Income = $P_t Y^R_t = (C_t + I_t + G_t + NX_t)$

Figure 1, Aggregate Demand



For a given level of nominal expenditure, an inverse relationship exists between the price level '**P**' and Real Income '$\mathbf{Y^R}$'. Aggregate demand represents this inverse relationship between the price level and a given level of purchasing power in an economy.

In the study of the behavior of aggregate demand we must take a close look at its individual components:

Any factor that affects consumption, investment, government, or export-import decisions will translate in to a change in nominal expenditure and, at an existing price level, a change in purchasing power. These factors may include changes in interest rates, exchange rates, wealth, taxes, public spending, expectations, or monetary policy targets.

Consumption Expenditure
Of the four components of aggregate demand, consumption expenditure C is the largest contributing to between 60% and 70% of total expenditure. For this reason, we often start our analysis with this particular component. This category of expenditure includes private spending on durable goods (automobiles, electronic goods, appliances), non-durable goods (food, clothing, books and magazines), and services (housing, health-care, education, entertainment).

Special attention must be given to the service component of consumption expenditure for several reasons. First, services represent the largest component representing at least 50 percent of this type of spending. Second, services include housing services measured directly by rents being paid from tenant to landlord, in the case of rental housing, or indirectly as imputed rent that an individual would pay to himself in the case of owner occupied housing. In the latter case the homeowner acts as both tenant and landlord with no actual payment changing hands but imputed expenditure being included in the services category to reflect the value of the housing services received from the owner-occupied home. Third, services, unlike durable and some non-durable goods, are difficult to accumulate as inventory. Thus any changes in the demand for services (due to changing preferences or the general level of economic activity) must be immediately matched with changes in production. This is not always an easy task in any economy.

Consumption expenditure decisions are strongly influenced by household disposable (after-tax) income, household wealth, savings needs and plans, confidence in the future direction of the economy, and interest rates (in the case of durable-goods purchases).

Investment Expenditure
Investment expenditure I represents a smaller share of the total but tends to be the most volatile component leading to the cyclical behavior of aggregate demand. This category of expenditure includes fixed nonresidential investment (factories, machines, transport equipment), fixed residential investment (new houses and apartments), and business inventories. Often the volatility in investment results from fluctuation in inventory levels due to changing expectation about business conditions.

Fixed residential and nonresidential investment refers to the creation of income-producing assets. Assets that will generate net-benefits (benefits-costs from housing services) in the case of owner-occupied housing or generate profits as part of the production process. These net-benefits and profits depend on the expected revenue or

gross benefits generated by the asset as well as the costs of acquiring, maintaining and replacing these assets.

Demand for the production of the asset will directly affect the revenue generated. Strong demand based on preferences, optimism, purchasing power, or demographics will lead to the desire for more investment expenditure.

Acquisition costs include both the purchase price of the asset and the borrowing costs involved both which are highly sensitive to changes in interest rates. Higher interest rates lead to higher borrowing costs and thus lower net-benefits or profits such that the level of aggregate investment expenditure may be reduced. Maintenance and replacement costs depend on the useful life of an asset and its rate of depreciation. Assets that wear out very quickly or become obsolete in a short period of time have higher costs with the same effect as rising interest rates. Because of the sensitivity of investment decisions to changing interest rates, this category of expenditure is easily affected by monetary policies and activity in the financial sector of an economy.

Government Expenditure
Government expenditure G is a reflection of the fiscal needs and policies of the public sector in a given economy. This type of expenditure might be in reaction to the demand for public goods and services by private households and businesses through voting or other types of political activity. In addition, government expenditure could be used as a deliberate policy tool to increase nominal incomes in the hope of stimulating aggregate demand.

Net Export Expenditure
Finally, Net export expenditure NX reflects the international linkages based directly on service and merchandise flows across borders in addition indirectly reflecting capital flows into and out of a particular country. Merchandise flows are sensitive to domestic income levels and preferences for foreign-made goods. In addition these flows are influenced by exchange rates which determine the domestic price of goods and services produced abroad. Capital flows depend on interest rate (yield) differentials among nations as well as exchange rates which affect the domestic price of a foreign asset both at the time of purchase of that asset and at the time of sale.

As we will see in the following sections, specific spending components may be defined by broad functional relationships:

C_t = f{income (Y_t), wealth (W), taxes (T) , interest rates (r) , and prices (P_t)}

I_t = f{interest rates (r), capital productivity and longevity, and income (Y_t)}

G_t = f{fiscal policies, budgetary needs and borrowing constraints}

NX_t = Exports - Imports = f{exchange rates(e.r.), interest rates (domestic& foreign), income (domestic & foreign)}

In addition interest rates and exchange rates are affected by activity in the financial sector of the economy. This activity may include changes in monetary policy as administered by central banking authorities and changes in expectations of future economic activity, inflation, and credit risk.

SAVING, INVESTMENT and INTEREST RATE DETERMINATION

A key variable missing from the above discussion is savings. **Savings** represents the source of funds within financial markets and, behind those funds, actual resources of the real economy. **Domestic Investment Expenditure** represents the use of those funds. It is important to keep in mind that these funds being transferred from lender to borrower represent scarce resources. These resources are made available via the saver foregoing current consumption allowing these resources to be used for the creation, accumulation, and replacement of capital -- capital that will allow labor to be more productive in the future (*see lecture 5*).

Measures of Savings begins with the **Income Identity** holding the level of income (output constant):

$$\mathbf{Y} \equiv C + I + G + NX$$

and rearranging terms:

$$\mathbf{Y} - C - G - NX = I_{[-]}(r)$$

where the left-hand-side of the equation represent the *source of funds* and the right-hand-side, the *use of those funds*. Additionally, we note that Investment decisions are (negatively) related to the real rate of interest '**r**'. Higher real interest rates will make certain investment project less profitable or not profitable at all. In this latter case planned investment projects will be abandoned leading to less demand for borrowed funds.

By subtracting and adding-in taxes '**T**' which represents the transfer of resources from the **private sector** to the **public sector** we have:

$$[\mathbf{Y} - T - C] + [T - G] + [-NX] = I_{[-]}(r)$$

Each term in the brackets now represents a separate type of savings defined as follows:

$S_{Private} = [\mathbf{Y} - T - C]$ ... **Private Savings**,

$S_{Public} = [T - G]$ ... **Public Savings** *and*,

$S_{foreign} = [-NX]$ ... **Foreign Savings.**

Note that NX represents the **Current Account Balance** within the balance of payments. Thus, its negative, [-NX] represents the **Capital Account Balance** (*see the Balance of*

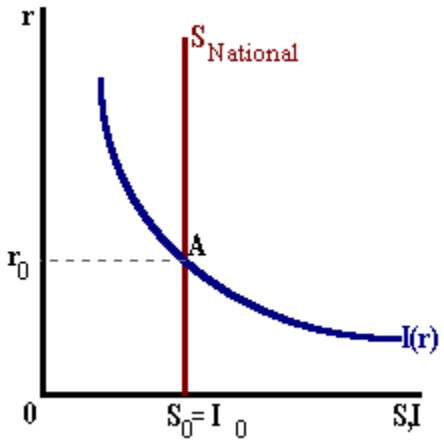
Payments in lecture 4) that, when positive in value, represents foreign lending to the domestic economy.

Adding these three terms together we have:

$$S_{National} = S_{pvt} + S_{pub} + S_{foreign}$$

This level of savings is modeled by the vertical line in the diagram below. The real rate of interest will adjust in competitive financial markets to bring **National Savings** into equality with **Domestic Investment** as derfined by $\mathbf{r_o}$.

Figure 2, Savings and Investment



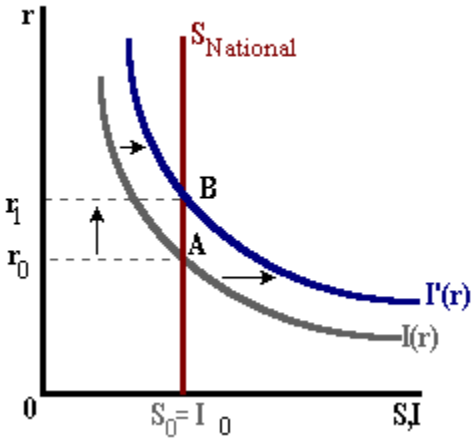
If real interest rates were to be *above* this equilibrium value, the resulting excess supply of funds would lead to competition among saver (lenders) in search for potential borrowers. This competition would lead to reduction in rates through financial market activity (*see 'Asset Prices and Asset Yields' in lecture 7*) inducing more borrowing.

If, on the other hand, real interest rates were to be *below* this equilibrium value, the resulting excess demand for funds (additional investment project would now be profitable) would lead to competition among potential borrowers bidding rates upward in financial markets.

External Shocks

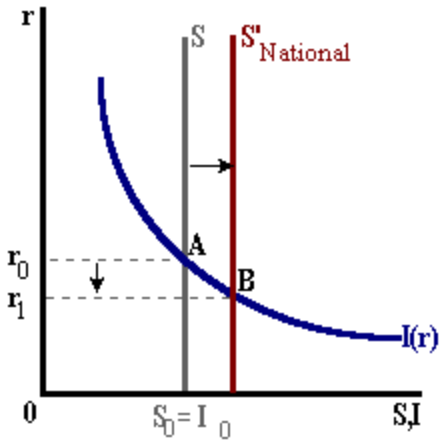
Various shocks can affect the flow of funds and thus the rate of interest. For example, an increase in investment expenditure perhaps due to an increase in the *productivity of capital* or due to *growth in the real economy* will shift the Investment schedule to the right. This shock will lead to an *excess demand for funds* causing the real interest rate to be bid upwards (point **A** to **B** in the diagram below):

Figure 3, An Investment Shock



Fiscal policy shocks can also affect the flow of funds and real interest rates. For example, suppose that Government Expenditure '**G**' decreases. Holding taxes constant, this will lead to an increase in Public Savings and National Savings. The savings function will shift to the right creating an *excess supply of funds* thus causing the real rate of interest to fall (points **A** to **B** in the diagram below):

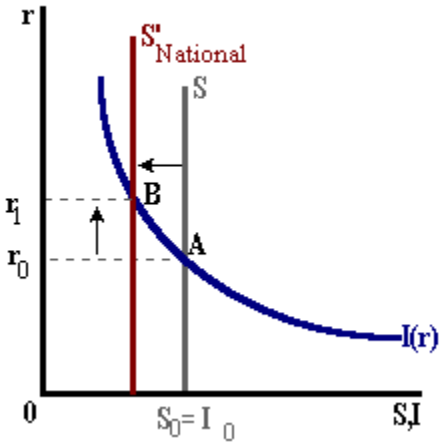
Figure 4a, A Fiscal Shock



If Government Spending were to increase (holding taxes constant), Public savings and thus National Savings would be reduced. This would shift the Savings line to the left leading to an *excess demand for funds*. This excess demand would lead to a bidding upward of real interest rates and result in a reduction of investment spending. Thus increased government spending has *crowded out* private investment spending in the economy – a situation known as the **Crowding Out Effect**.

Changes to the tax rate is a bit more complicated in this savings/investment model. Changes in taxes affect both Consumption Expenditure, and thus Private Savings, as well as Public Savings. However, working through the Marginal Propensity to Consume (*discussed in the next section*), a reduction in the tax rate increases Consumption Expenditure / Private Savings by less than the reduction in Public Savings. The net result is a decline in National Savings.

Figure 4b, A Fiscal Shocks



A Numerical Example
Suppose that we have the following equations:

C = 0.80(Y - T)	... consumption expenditure, MPC = 0.80
T = 0.20(Y)	... Tax Revenue, tax rate = 20%
G = 2,000	... Government Exp. (billions)
NX = -500	... Current Acct. Balance (deficit)
I = 2,600 - 100(r)	... Investment Exp.
Y = 10,000	... Real GDP (Output in billions) held constant.

Solving (given **Y** = 10,000), we find that:

T = 2,000
C = 0.80(10,000 - 2,000) = 6,400

and

S_{pvt} = Y - T - C = 1,600,
S_{pub} = T - G = 0 and,
$S_{foreign}$ = [-NX] = 500

thus,

$S_{National}$ = 1,600 + 0 + 500 = 2,100

setting

$S_{National} = I(r)$

we have:

$2{,}100 = 2{,}600 - 100(r)$

and

$r_0 = 5\%$ such that Investment expenditure = 2,100.

* * *

Now, if the tax rate were to be reduced to 10% (t' = 0.10):

T' = 1,000
C' = 0.80(10,000 - 1,000) = 7,200 and $\Delta C = +800$

$S'_{pvt} = Y - T - C = 1{,}800$ and $\Delta S_{pvt} = +200$

$S'_{pub} = T - G = -1{,}000$ and $\Delta S_{pub} = -1{,}000$

$S_{foreign} = [-NX] = 500$ as before.

Thus,

$S'_{National} = 1{,}800 - 1{,}000 + 500 = 1{,}300$ and $\Delta S_{National} = -800$

setting $S'_{National} = I(r)$ we have:

$1{,}300 = 2{,}600 - 100(r)$ or

$r_1 = 13\%$ such that Investment expenditure = 1,300.

Reducing the tax rate from 20% to 10% has led to an increase in the real interest rate from 5% to 13%. With this interest rate increase, private Investment Expenditure will be reduced by 800.

We can use this Savings/Investment model to look at other type of eternal shocks and their effect on the flow of funds and the real interest rate. Within these models and in the real economy, the real rate of interest acts as a barometer with respect to economic activity and resource availability. Events that lead to an excess demand for funds (resources) will cause this interest rate to increase – the change in this rate is less important than information provided about resource availability. An excess supply of funds will cause this real rate to decline signaling a surplus of available resources for the creation of capital or signal a lack of productive uses for these resources.

Note: The real rate of interest defined in these models is really a proxy for 'r*' – the desired real rate of return (*as described in lecture 4*). If inflation is perfectly anticipated such that: $E[\pi] = \pi$, then 'r' should equal 'r*'. This flow of funds model then provides a guide to changes to the 'r*' component of nominal interest rates:

$\mathbf{i} = r^* + E[\pi] + \rho + \lambda$ *as* $\mathbf{r^*}\uparrow$ *then* $\mathbf{i}\uparrow$.

THE TERM AND RISK STRUCTURE OF INTEREST RATES

Upon casual inspection of any business periodical, one will find that at any point in time there are many different nominal interest rates. The last section began to explain why all interest rates may change through time in reaction to changes in the supply or demand for loanable funds and due to changes in inflationary expectations. This section will examine differences in nominal rates at a point in time and how the spread between nominal rates may change in reaction to economic events.

The following table may be useful in organizing the many different nominal interest rates that exist on any given day:

Table 1, Nominal Interest Rates at a point in time

Term	**No Risk U.S. Treasury**	**Low Risk (AAA-AA)**	**Medium Risk (A-BB)**	**High Risk (B-CC)**
Short-term (1-year or less)	1.80%	3.36%	3.95%	5.00%
Medium-term (1 - 10 years)	4.24%	4.46%	5.12%	8.00%
Long-term (10+ years)	5.54%	6.21%	6.89%	10.00%

By taking credit risk and the length of the lending period into account, differences in nominal interest rates, at a point in time, can be explained with the following equation:

$$i_{market} = \{r^* + E[\pi_t)]\} + \rho + \lambda$$

The first two components in brackets are the familiar desired rate of return and expected inflation that make up the core of any interest rate at a point in time. The third component 'ρ' is known as the risk premium established by credit markets for different categories of risk. This value may be large or small depending on how risk averse lenders might be at any point in time.

The last component 'λ' is known as the liquidity premium which represents the amount of compensation required by a lender for lending to the long end of the market. For example in the above table the T-Note rate is 6.25% and the T-Bond rate is 7.40%. The 1.15% difference implies that lenders require an additional $11.5 per $1000 lent for 30 year loans relative to 5-10 year loans to the Federal government. Greater uncertainty about future rates of inflation or future political events will often widen the spread between the medium and long term. The differences that exist in nominal rates due to this liquidity premium are summarized in the frequently published yield curve constructed by using the different treasury rates (risk-premium = 0) that exist on a given date.

The (Credit) Risk Premium
Each column represents a different level of risk associated with a certain class of borrowers. This risk is also known as credit risk where different types of borrowers (or related projects) have different probabilities of being able to service their debt (make scheduled interest payments) and being able to repay the principal of the debt. These risk categories are commonly established by various credit agencies; the most popular being Standard & Poor's (listed above) and Moody's.

The No Risk category corresponds to Federal Government debt (T-bills, T-Notes, and T-Bonds). In this category, there is absolute certainty that the borrower (the Federal Government) will be able to properly service the debt and repay the principal at all times. This is possible because the Federal Government can always borrow new funds at what ever rate of interest necessary to pay existing interest obligations or to repay any existing debt. The government is not constrained by an income statement of annual profit and loss as are private companies. In addition, unlike state and local governments the Federal Government has the power to establish or perhaps create the currency necessary to meet its existing obligations.

The Low Risk category corresponds to a S&P classification of AAA-AA or investment grade lending. Borrowers in this category have a strong history of debt repayment and a solid stream or revenues to service any future debt. Lenders in this category are very risk averse seeking to protect their asset base (the principal) by avoiding those borrowers who might default on their debt repayment.

The classification of A-BB represents somewhat speculative grade lending or Medium Risk. Borrowers in this category often have a good credit history, however, there is some uncertainty about future revenues to service additional debt. Lenders involved in this type of debt are willing to speculate that all interest payments and principal repayment will take place in return for a slightly higher return on their investment.

Finally the High Risk category carries a S&P rating of B-CCC also known as "junk" or highly speculative lending. Lenders in this category are willing to put their assets at risk in return for a high return as measured by usually double-digit yields for a limited period of time. There is a strong probability of default on debt in this category.

The Liquidity Premium and Term Structure
In the above table, each row represents different lending/ borrowing periods. Short-term lending corresponds to anytime between one day and one year. The Medium-term corresponds to a lending period between one and ten years. Long-term lending is with respect to debt contracts for a time period greater than ten years.

Differing lengths in the lending period correspond to different degrees of uncertainty about future events. Very little change takes place in the political or economic structure of a nation or the world in any given year--the short-term. However, over a 30 year period of time typical for some types of government borrowing (T-Bonds) and private

borrowing (home mortgages), massive changes may take place in rates of inflation, political conflict, and the global balance of power.

In the long-term tremendous uncertainty exists and yet there are institutional lenders that actively seek the long term. For example, pension funds and life insurance companies that need to plan for exact financial obligations well into the future.

The actual derivation of liquidity and risk premiums take place in financial markets through the process of buying and selling financial instruments--concepts that will be discussed in later sections.

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Worksheet #5: Savings and Investment

1. Potential Output **'Y*'** for a given economy is $10,000 [i.e., $10 trillion]. Given the following equations:

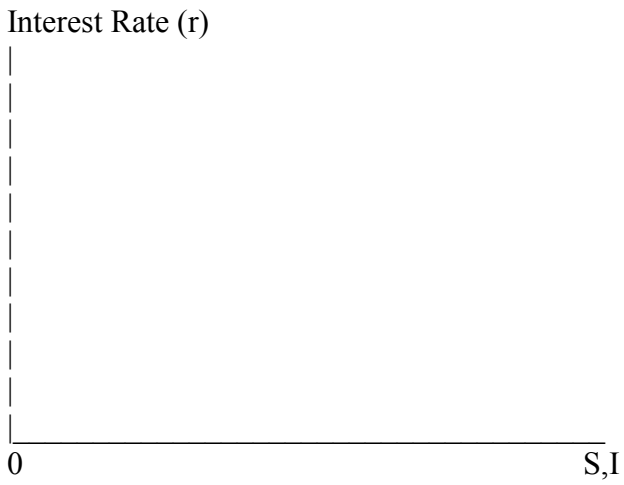
C = 0.80(**Y*** - T)	-- Consumption Expenditure
T = 0.10**Y***	-- Taxes [*tax rate* = 10%]
G = $2,000	-- Government Expenditure
I = $1,500 – 100(r)	-- Domestic Investment Expenditure [r = *market interest rate*]
NX = 0	-- Exports = Imports

a. Calculate the following:

- Private Savings,
- Public Savings, and
- National Savings.

b. At what market interest rate will Domestic Investment be equal to National Savings?

Graph the results of parts 'a-c' in the diagram below:



c. Describe how an increase in the tax rate from 10% to 15% will affect Private, Public and National Savings and the market rate of interest.

Worksheet #5, page 2

2. Given the following:

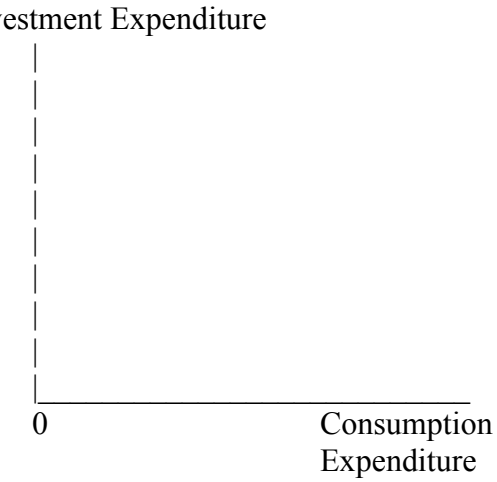
Y* = $10,000	--	Potential Output (held constant)
C = b(**Y*** - T)	--	Consumption Expenditure [b = Marginal Propensity to Consume]
T = 0.10**Y***	--	Tax Revenue [Tax rate = 10%]
$S_{public} = T - G = \$0$	--	Public Savings [G = T *always*!]
$S_{private} = Y^* - T - C$	--	Private Savings
$S_{national} = S_{public} + S_{private}$		
NX = $0	--	Net Export Expenditure [*always in balance for this problem*]
$I_{domestic} = 1000 - 100(r)$		Investment Expenditure [r = interest rate]
$I_{domestic} = S_{national}$	--	Assume that the interest rate adjusts such that Domestic Investment Expenditure is always equal to National Savings.

Complete the following table:

MPC	Potential Output	=	Consumption Expenditure	+	Government Expenditure	+	Investment Expenditure	National Savings	Interest Rate
0.50	$10,000		_____		_____		_____	_____	____
0.55	$10,000		_____		_____		_____	_____	____
0.60	$10,000		_____		_____		_____	_____	____
0.65	$10,000		_____		_____		_____	_____	____
0.70	$10,000		_____		_____		_____	_____	____
0.75	$10,000		_____		_____		_____	_____	____
0.80	$10,000		_____		_____		_____	_____	____
0.85	$10,000		_____		_____		_____	_____	____
0.90	$10,000		_____		_____		_____	_____	____
0.95	$10,000		_____		_____		_____	_____	____
1.00	$10,000		_____		_____		_____	_____	____

and Graph the relationship between *Consumption Expenditure* and *Investment Expenditure* in the diagram to the right:

What does this graphical relationship Represent?



AGGREGATE EXPENDITURE and INCOME DETERMINATION

In the last section, we derived measures of savings and the flow of funds by working with the Income identity holding the level of income '**Y**' *constant*. In this section we will relax this assumption and look at the factors that may lead to an increase in expenditure and thus income in an aggregate economy.

Given our understanding of National Income Accounting, one method of calculating nominal GDP (Y^N) was through the expenditure approach such that:

$$NGDP = \sum P_i Q_i = \mathbf{Y}^{Nominal}$$

or

$$\mathbf{Y}^{Nominal} = C + I + G + NX$$

where the variables on the right-hand side represent the four expenditure categories that make up **Nominal GDP** (Y). What is important is that certain expenditure decisions are proportional to the level of income such that as aggregate income increases, expenditure increases by some fraction of this income change.

$$AE = f_{[+]}(Y)$$

We will begin with consumption expenditure 'C' defined as being proportional to **disposable income** (*gross income less taxes paid*) with the proportional relationship being defined by the **marginal propensity to consume** '**b**' (*the fraction of each dollar of disposable income devoted to consumption expenditure*):

$$C = C_o + \mathbf{b}(Y-T), \qquad 0 < b < 1$$

Tax revenue 'T' is defined to be some fraction of income via the tax rate 't':

$$T = \mathbf{t}Y, \qquad 0 < t < 1$$

For algebraic simplicity we will define the other expenditure categories; investment 'I', government 'G', and net exports 'NX' as being **autonomous** with respect to income (i.e., *spending decisions remain independent of the level of national income*). We will combine these values with autonomous consumption 'C_o' and summarize this via a single variable 'A_o' known as **autonomous expenditure**:

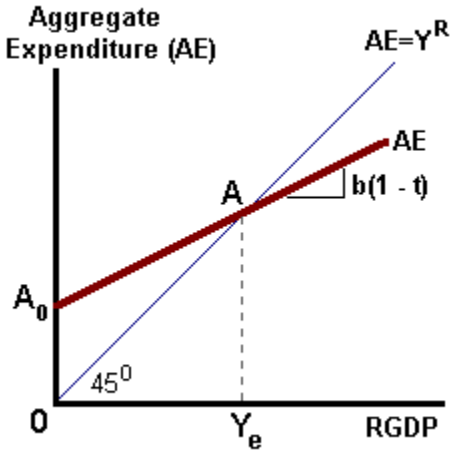
$$A_o = C_o + I_o + G_o + NX_o$$

Thus, the expenditure equation can be written as:

$$AE = A_o + b(1-t)Y$$

as shown in the diagram below:

Figure 5, Aggregate Expenditure



An equilibrium condition ($\mathbf{Y_e}$) is defined such that for one unique level of income, expenditure is exactly equal to that level of income:

Y_e : Aggregate Income = Aggregate Expenditure

Or substituting our expenditure equation:

$Y_e : Y = A_o + b(1-t)Y$

Solving for 'Y_e', the equilibrium value of income, we have

$Y_e = \alpha[A_o]$,

where $\alpha = [1-b(1-t)]^{-1}$ and represents, what is commonly known as, the **simple spending multiplier**.

The Multiplier Process

Any time new spending is introduced into the economy (or if spending is removed), it will cause GDP (and other measures of national income) to change by some multiple of that spending shock. This takes place through the multiplier process in aggregate spending largely via changes in consumption expenditure. For example, suppose that the marginal propensity to consume is equal to 0.75 and the tax rate is equal to 0.333. The marginal propensity to spend (changes in spending induced by changes in income) is then equal to 0.50

$$\textit{Expenditure} = A_o + 0.75(Y - 0.333Y)$$

$$= A_o + 0.50Y$$

Given our equilibrium condition: Y = AE (*Aggregate Expenditure*)

$$Y = A_o + 0.50Y$$

Since [1 - 0.75(1 – 0.333)] < 1, the spending multiplier α will be greater than one such that:

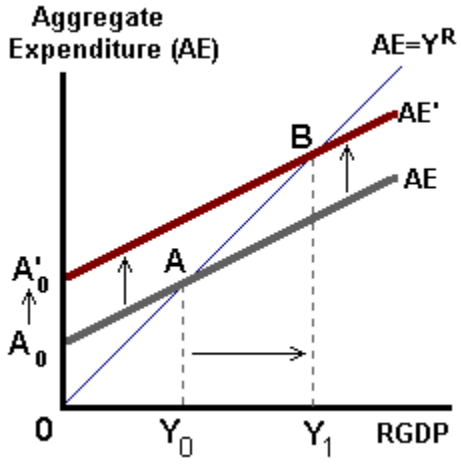
$$\alpha = 1 / [1 - 0.75(1 - 0.333)] = 2.0$$

$$Y_e = \alpha[A_o] \quad \Rightarrow \quad Y_e = 2.0[A_o]$$

and

$$\Delta Y_e = 2.0[\Delta A_o], \text{ (}with\ A_o' = A_o + \Delta A_o\ in\ the\ diagram\ below\text{)}:$$

Figure 6, An Autonomous Shock and the Multiplier



The Process: An initial change in autonomous spending (for example, a shock in the form of an increase in government spending) of $20 (billion) is received as income by some person or business in the aggregate economy. This spending translates into an increase in income for that person who, given the propensity to spend, will increase his expenditure by $10 . This $10 in additional spending is received by someone else as income who spends 50% of that amount.

iteration	**ΔIncome**	**ΔExpenditure**
0	Δ Ao= $20 (billion)	10
1	10	5
2	5	2.5
3	2.5	1.25
4	1.25	0.625
5	0.625	0.313
6	0.313	0.157
:	:	:
n	0.001	-
	Total Change in Income: $40 (billion)	

See: The Digital Economist: http://www.digitaleconomist.com/s_mult.html
to practice with the effects of changing parameter values on the spending multiplier.

The spending flows through the aggregate economy such that when we total up all of the increases in income we find that aggregate income has increased by $40 billion -- 2.0 times the initial spending shock. This is known as the multiplier process.

Be sure that you understand the following concepts and terms:

- Aggregate Demand
- Nominal Income (GDP)
- Real GDP
- Purchasing Power
- Consumption Expenditure
- Investment Expenditure
- Government Expenditure
- Net Export Expenditure
- Marginal Propensity to Consume
- Private Savings
- Public Savings
- Foreign Savings
- Current Account Balance
- Capital Account Balance
- National Savings
- Real Rate of Interest
- Flow of Funds
- Aggregate Expenditure
- Autonomous Expenditure
- Marginal Propensity to Spend
- The Multiplier

The Digital Economist

Worksheet #6: Demand-Side Equilibrium

1. Given the following equations:

$C_t = 0.75(Y_t - T)$	*Consumption Expenditure*
$I_t = 200$	*Investment Expenditure*
$G_t = 250$	*Government Expenditure*
$NX_t = 50$	*Net-Export Expenditure*
$T = 0.20Y_t$	*Tax Revenue*
$Y_t = C_t + I_t + G_t + NX_t$	*Equilibrium Condition*

a. Determine the following:

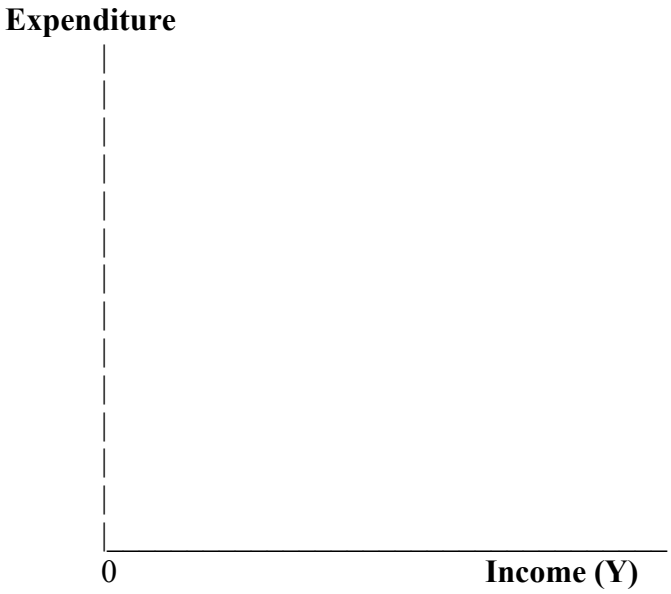
i. the Marginal Propensity to Consume:_____

ii. the (Income) tax rate:_____

iii. the level of Autonomous Expenditure A_o:_____

iv. the Spending multiplier: {1/[1-b(1-t)]}:_____

b. find the level of equilibrium income and graph this relationship in the diagram below:



c. Given this equilibrium level of income, calculate the level of tax revenue collected:_____ Is the government running a surplus or deficit:?_____

d. Calculate the level of savings:_____ and investment expenditure:_____ at the equilibrium level of income. Is there a funds (savings-investment) surplus or deficit?_____ How are these surplus or deficit funds being used?_____

Worksheet #6, page 2

2. Suppose that Income is fixed at **$1000**. Using the equations of page 2, substituting in the following investment equation:

$$I = 200 - 100(r),$$

calculate the corresponding value of the real interest rate, investment expenditure, savings, and the budget deficit.

How will a $50 ($\Delta G = 50$) increase in government spending impact the real interest rate?

How does this shock affect: savings, investment expenditure, and the budget surplus/deficit.