

Welcome to the power of macroeconomics. The purpose of this lesson is to illustrate the basic Keynesian model arguably one of the most important models in macroeconomic history.

In this lecture we will also introduce you to one of the most important tools in macroeconomics, that of fiscal policy.

>> In macroeconomics the basic Keynesian model goes by many names. Some economists refer to it as the multiplier model. While others call it the aggregate production aggregate expenditures model. Throughout this lecture, we will use these names interchangeably, as we show you how the development and application of the basic Keynesian model gave birth to fiscal policy.

Fiscal policy involves the use of Government expenditures or tax changes to stimulate or contract an economy.

The basic Keynesian Model provides a very straight-forward approach to using fiscal policy to close a recessionary gap.

At least in theory, this model may be used to calculate very precisely how much government expenditures must be increased. Or alternatively, how much taxes must be cut to stimulate an economy back to full employment.

Note however, that while we shall present this model in the very mechanical way that it was taught at universities in the 1960s, macroeconomics is hardly as simple as the Keynesian model would suggest.

Harsh reality, that economists learned in the 1970s with the emergence of a virulent stagflation.

We'll talk much more about stagflation and the complexities of macroeconomics later.

For now, let's try to master the simple Keynesian model and the use of fiscal policy.

If you were to sit down tonight and read John Maynard Keynes's famous little book, the General Theory of Employment, Interest and Money. You would find little in that book resembling today's basic textbook Keynesian model.

How Keynes's arcane prose was transformed into an easily-understood algebraic and graphical model is a story in and of itself.

Involving two key figures, professors Alvin Hansen and Paul Samuelson.

Alvin Hansen was a textbook writer and classical economist who, in the mid nineteen thirties left the University of Wisconsin to take a post at Harvard.

As the story goes, somewhere on the train between Madison and Cambridge, Hansen converted to the Keynesian faith.

At Harvard, Hansen led a seminar that became an important cauldron of ideas for the Keynesian doctrine.

And Hansen also took regular trips to Washington D.C. to spread the Keynesian gospel to the nations policymakers.

Perhaps most importantly, Hansen wrote A Guide to Keynes, which became the bible for economic students in the 1950s.

While Hansen's star pupil, Paul Samuelson began writing what would become the definitive macroeconomic textbook for more than three decades.

Out of these writings has emerged the basic Keynesian model.

The most important assumption underlying this model is that prices are fixed.

Keynes himself didn't believe this believe this, of course.

But Keynes did believe that when an economy is in the recessionary range, prices and wages were sufficiently inflexible.

So that income would adjust much faster than prices.

Therefore, for simplicity, price changes could be assumed away.

The beauty of this fixed price assumption is that it allowed Hansen and Samuelson to develop

a Keynesian aggregate production-aggregate expenditures model.  
 Readily distinguishable from the aggregate supply-aggregate demand model that we developed in the last lecture.  
 This figure illustrates the Keynesian model.  
 The vertical axis measures total spending or aggregate expenditures.  
 The horizontal axis measures real GDP or output.  
 And there is a 45 degree line that measures aggregate production.  
 In addition there is an aggregate expenditures curve that is calculated by totaling consumption plus investment plus government spending plus net exports.  
 Note that equilibrium in this model will occur where the aggregate expenditure and aggregate production curves cross.  
 Note also, that this equilibrium doesn't necessarily have to occur at the economy's full potential output,  $Q_{sub P}$ .  
 For example, if equilibrium occurs at, say,  $Q_{sub R}$ , actual output is below potential output  $Q_{sub P}$ .  
 And the economy is experiencing a recessionary gap.  
 If however the economy is at  $Q_{sub P}$  actual output exceeds potential output and there is an inflationary gap.  
 One useful way of thinking about these recessionary and inflationary gaps is through the concept of leakages versus injections.  
 Let's do this now within the context of our now familiar circular flow diagram.  
 Recall that in this diagram the flow of income moves from right to left at the top of the figure and represents aggregate supply.  
 Now a leakage, is income not directly spent on domestic output but rather is diverted from the circular flow.  
 And one important leakage we discussed within the context of Say's law occurs when consumers save a portion of their income.  
 But remember, that this savings leakage might be offset by an investment injection.  
 Where an injection is an addition of income to the circular flow.  
 This figure lists the various leakages and injections in the macro economy.  
 The broader point here is that any particular macroeconomic equilibrium will depend on the balance between these injections and leakages.  
 Of those listed in the figure, consumer savings and business investment are the primary sources of imbalances in a totally private and closed economy.  
 But in an economy with a government sector, taxes represent an important leakage while government spending is a crucial injection.  
 Same time, in an open economy where trading occurs, import leakages and export injections are likewise very important in determining actual output.  
 Here then is an updated version of our circular flow diagram that allows for both trade and a government sector.  
 Take a few minutes to study it.  
 As you do so remember that our next task is to understand how each of the components of the Keynesian model are constructed.  
 And then learn how fiscal policy can be used to close a recessionary or inflationary gap.

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[MUSIC]

Let's start our analysis of the Keynesian model by looking at the aggregate production.

Aggregate production is defined as the total amount of goods and services produced in the economy.

By definition such production creates an equal amount of income, so that the aggregate production curve can be represented by a 45 degree line.

This is illustrated

in this figure, where production in dollars is represented on the vertical axis.

Real income or GDP is represented on the horizontal axis, and the vertical line at  $Q^P$  represents the economy's potential full employment income or GDP.

The upward-sloping, 45 degree line, representing the aggregate production curve, means that at any point along this curve, production equals income.

For example, at point A where the 45 degree line crosses the full employment vertical line production and income both  $Q^P$ .

In contrast at point E.

Both production and income are at  $Q$ .

The economy's so-called recessionary gap is equal to the difference between  $Q^P$  and  $Q$ .

In the Keynesian model, total spending or aggregate expenditures may be represented algebraically by the equation that we first introduced in lesson one.

When we discussed the use of the flow of product or expenditures method, to calculate income or gross domestic product.

Specifically aggregate expenditures AE equals consumption plus investment plus government expenditures plus net exports.

And the aggregate expenditures curve is simply the vertical summation of these four components.

This figure

illustrates how these aggregate expenditures appear as a curve in the basic Keynesian multiplier model.

In the figure, expenditures are measured on the vertical axis.

And real income, or GDP, is measured on the horizontal axis.

Note that the aggregate expenditures curve slopes upward.

But, has a flatter slope than the 45 degree line that represents the aggregate production curve.

Note also that the aggregate expenditures curve, intersects the vertical axis at a level above zero.

Taken literally, this means that, even if income is zero, people will still spend a certain amount of money on consumption.

Such expenditures are called autonomous consumption, because they happen independently of the level of income.

To fully understand how the Keynesian multiplier model works, we not only have to understand the mystery of autonomous consumption.

We also have to understand why the aggregate expenditures curve is flatter than the aggregate production curve.

The best way to do this is to examine the major components of the Keynesian expenditure function discussed above.

Consumption, investment, government expenditures and net exports.

The largest component of aggregate expenditures is consumption.

It accounts for almost 70% of total aggregate expenditures in the US economy.

This table divides consumption into three categories.

Durable goods like autos and household equipment.

Non durable goods like food and clothing, and services like transportation and medical care.

Haynes sought to explain consumption expenditures in the following way.

First he posited that there is a level of consumption that will occur, even if a person's income falls to zero.

This zero income condition might happen, for example, if a person loses his or her job.

Nonetheless, despite being unemployed, this person will still be able to consume by dipping into his or her savings.

The level of consumption, that occurs regardless of changes in one's income, is called Autonomous Consumption.

Second, Keynes said that there is a level of induced consumption, that will depend on the individual's disposable income.

Where, disposable income is simply the amount of money you have left after paying taxes to the government.

Now, Keynes further described this consumption behavior in terms of a person's marginal propensity to consume.

Or, as it is also referred to as, the marginal propensity to expend.

This is simply the extra amount that people consume when they receive an extra dollar of disposable income.

By the same token, there is a marginal propensity to save, or marginal propensity to withdraw, and it measures the extra amount people save when they receive an extra dollar of disposable income.

Some people may only spend 75 cents of every dollar of their disposable income, and save 25 cents.

In this case, what will be the MPC, and what would be the MPS?

The MPC will be 0.75, while the MPS will be 0.25.

In another situation people may spend as much as 90 cents, and save only 10 cents of every dollar.

In this case, the MPC is 0.90 and the MPS is 0.10.

This figure illustrates that the marginal propensity to consume, or MPC, equals the slope of the consumption function and that the MPS is the slope of the savings function.

This is important to note because as we shall soon see the aggregate expenditures curve is flatter than the 45 degree line in the Keynesian model precisely because the MPC is less than one.

Now let's turn to a discussion of what the Keynesian consumption function actually looks like.

In fact it can be expressed in an equation, a table or a graph.

Algebraically we can represent the Keynesian consumption function simply as follows.

Total consumption  $C$  equals autonomous consumption  $C_a$  plus induced consumption.

Where induced consumption equals the marginal propensity to consume, MPC, times disposable income,  $y_d$ .

Typical example of such a consumption function is represented in this figure.

Note that this function intersects the vertical axis at the level of autonomous consumption at \$50 or point A.

While the slope of the consumption function is simply the MPC or 0.75.

You can see now how this consumption function relates back to the problem that Thomas Malthus originally identified with Say's Law and the Classical model.

Namely that people won't necessarily spend everything they earn, and aggregate expenditures therefore need not equal aggregate production.

[MUSIC]

Let's turn, now, to the second major component of the aggregate expenditures curve, namely investment. Investment expenditures include purchases of residential structures, investment in business plant and equipment, and additions to a company's inventory. Investment in plant and equipment is by far the biggest category, averaging a full 70% of total investment annually.

While total investment expenditures account for roughly 15% of total aggregate expenditures.

In the Keynesian model, investment expenditures are assumed to occur independently of the level of income.

Algebraically, this means that investment  $I$  is simply equal to autonomous investment  $I_{naught}$ .

The advantage of this assumption, is that it allows economists to draw the investment function as a horizontal line. This is illustrated in this figure.

The curve  $I_1$  shows annual business investment in 1929, just prior to the stock market crash, at \$16 billion.

The curve  $I_2$  shows investment after it has fallen to \$1 billion by 1933.

If investment is not determined by the level of income, it is useful to ask here, what are the determinants of investment?

To Keynes himself, there were at least two important factors.

First, he believed that investment was sensitive to changes to the interest rate.

When that rate falls, investment rises, when the interest rate rises, the investment falls.

Note however, that while Keynes believed the interest rate was important in determining investment he did not believe that falling interest rates.

And increased investment would necessarily lead to a full employment equilibrium like the classical economists did.

This is because Keynes believed that investment was in large part driven by a second important determinant, namely the expectations or business confidence that businesses had regarding potential sales and profits. Keynes referred to these expectations as Animal spirits.

And basically said that, if businesses believe the economy was about to go bad, it could become a self-fulfilling prophecy.

The reason?

Businesses would cut back on investment and production.

And thereby help trigger a recessionary spiral.

The third component of aggregate expenditures in the Keynesian model is government spending, this includes purchases of goods like tanks or road building equipment as well as the services of judges and public school teachers.

Unlike private consumption and investment, this component of aggregate demand is determined directly by the government's spending decisions.

When the Pentagon buys a new fighter aircraft this output immediately adds to the GDP.

Such government expenditures account for almost

20% of total aggregate expenditures in the U.S. and as with investment, the Keynesian model assumes government expenditures to be autonomous.

That is, determined outside the model.

This means algebraically that government expenditures  $G$  simply equal autonomous government expenditures  $G_{naught}$ .

And as with the investment function, the government expenditure function can be graphically portrayed as a horizontal line.

In general, government expenditures exhibit much

less volatility than investment, although episodic

events such as wars and natural disasters can lead to large fluctuations.

In the Keynesian model, increased or

decreased government expenditures, together with tax cuts or tax increases, serve as the primary tools of fiscal policy that are used to counterbalance changes in investment and consumption spending. Specifically, expansion fiscal policy involves increased government expenditures, tax cuts or some combination of the two to stimulate a recessionary economy and close a recessionary gap. In contrast, contractionary fiscal policy involves reduced government expenditures, tax hikes or some combination of the two to cool down and overheated economy. In addition to discretionary changes in government spending and taxes, there are also important non-discretionary government expenditures. That act as built-in macroeconomic stabilizers. These non-discretionary expenditures are called transfer payments, and they include such things as unemployment compensation to workers, welfare payments, and subsidies to farmers. These transfer payments, help stabilize the macro economy, because they automatically rise during recessions, and fall during expansion. This is because during recessions, as more and more people become unemployed, they become eligible for these programs. And as the economy expands, there is less need for these programs, and fewer payments. The fourth component of aggregate expenditures, is net exports. This component equals the value of exports, minus the value of imports. US exports include such things as the sale of airplanes to China, beef and oranges to Europe, an medical equipment to Canada, US imports include such things as Japanese made automobiles, Korean made running shoes, and oil from the Middle East. Because exports create domestic production, income, and employment for an economy, they must be added to aggregate expenditures. However, when we purchase imports from a foreign country, no such production, income, and employment is created, so that imports must be subtracted from aggregate expenditures. While net exports are a very important part of a global or open economy, they were not central to the development of the Keynesian multiplier model. So for the remainder of this lesson we shall do what economists often do, make a simplifying assumption. We'll assume a closed economy in which there is no international trade and drop net exports from the model. This allows us to focus solely on the role of government spending in fiscal policy. Don't worry, we'll deal with international trade and trade deficits in a subsequent lesson.



[MUSIC]

Let's pause briefly and assess where we are.

We get one curve, the consumption function, that slopes upward, and its slope is flatter than the aggregate production curve.

We've also got two other curves that by Keynesian assumptions are horizontal lines the investment and the government expenditure functions. If we vertically sum these curves we arrive

at the aggregate expenditures function and the important point to note is that.

Because the investment in government expenditure

functions are both horizontal lines the slope

of the aggregate expenditures function would be

the same slope as the consumption function.

Of course we already know what that slope is a marginal propensity to consume, this complete aggregate expenditures curve is illustrated in this figure, in the figure the full employment output is \$900 billion.

But the economy is stuck at a recessionary output of \$800 billion where the aggregate expenditures curve AE crosses the 45 degree line of the aggregate production curve AP.

Now in the Keynesian model expansionary fiscal policy can be used to close this \$100 billion recessionary gap.

But, before we can demonstrate this, we've got one more

concept we must master, the so called Keynesian expenditure multiplier.

The Keynesian expenditure multiplier, is the number by which a change in aggregate expenditures, must be multiplied in order to determine the resulting change in total output.

This multiplier is greater than 1 and the reason is that income is re-spent, not just once but many times after the initial increase.

This figure shows how the multiplier process can deepen a recession.

Here we see that in step one, there is an aggregate demand shock, which leads to \$100 billion in unsold goods from a reduction in aggregate demand.

In step two, this leads to a cutback in employment and wages.

While in step three, this leads to a reduction in income.

Now assuming a marginal propensity to consume of 0.75, we see a reduction in consumption of \$75 billion in step four.

This triggers a cutback in sales and further cutbacks in employment, and the process continues.

The ultimate impact of this demand shock on total spending can be determined by computing the change in income and consumption

at each cycle of the circular flow.

In the Keynesian model it can be easily shown mathematically that the multiplier is simple

the reciprocal of the marginal propensity to save.

That is the multiplier is one divided by the MPS, or put another way, one divided by one minus the marginal propensity to consume.

What then is the multiplier for the following use of the MPC?

0.5, 0.75, 0.8 and 0.9.

This exhibit provides the multiplier for MPC's of 0.5, 0.75, 0.8 and 0.9 while illustrating the first five steps of the multiplier.

Now that we know how to calculate the multiplier let's put it to work.

Suppose then that the U.S. permanently increases defense spending by \$100 billion in response to a threat to the oil fields in the Middle East.

What will be the effect of this increase in G on the GDP?

This figure provides us with an answer.

In the figure the increase in G shifts upward the C+I+G line by \$100 billion to C+I+G prime.

The new equilibrium level of GDP is thus read off the

forty-five degree line at E prime, rather than at E.

Because the MPC is two thirds, the multiplier is three, and the new level of output is \$300 billion higher.

From this example you can see now why the analogy of using government expenditures to prime the economic pump is particularly apt. Such expenditures trigger increased investment and consumption, and the total expansionary effect is far larger than the initial stimulus.

It should also be clear from this example how important the role of the multiplier is in the conduct of fiscal policy.

To reaffirm this point, let's go back to our earlier example, where we faced a recessionary gap of \$100 billion.

Assuming the marginal propensity to consume is 0.8, how much will we have to increase government expenditures to close this gap?

To answer this question, let's first calculate the multiplier.

It is simply  $1 \div 0.2$ , gives us a multiplier of 5.

Therefore, to close the \$100 billion recessionary gap, we must increase government spending by \$20 billion, because  $5 \times 20 = 100$ .

Now alternatively, we can use a tax cut, instead of increased government expenditures, to close this same \$100 billion recessionary gap.

Fiscal policy move, much like was done in the 1960s with the famous Kennedy Tax Cut. However, the calculation for the appropriate size for the tax cut is a little more complicated than it is for government expenditures.

This is because a dollar's worth of tax cuts has slightly less of an expansionary effect than a dollar's increase in government expenditures.

The reason is that consumers will not increase their expenditures by the full amount of the tax cut.

Instead they will save a portion of that tax cut based on their marginal propensity to save.

From this insight we can calculate the Keynesian tax multiplier as simply the expenditure multiplier times the MPC.

As illustrated in this figure.

Note that only part of a tax cut is used to increase consumption.

Now let's put this tax multiplier concept to work.

How much should taxes be cut to close a \$100 billion recessionary gap if we retain the assumption that the marginal propensity to consume is 0.8 and the multiplier is 5?

The answer is \$25 billion or \$5 billion more than we needed to increase government expenditures to achieve the same result.

We arrive at this total by first multiplying the expenditure multiplier of five times the MPC, yielding a tax multiplier of four.

Then, four times the \$25 billion tax cut yields the desired \$100 billion expansion.

Well we now know how to use expansionary fiscal policy to close a recessionary gap.

Suppose we face an inflationary gap instead.

A gap, such as the one in the late 1960's, caused by demand-pull inflation from the Vietnam War, and great society expenditures. Such a situation, is illustrated in this figure.

The economy is in equilibrium at point a where aggregate expenditures crossed the 45 degree line of aggregate production and income is at \$960 billion.

But this is \$60 billion above the full employment output of \$900 billion.

In such a case, we know that there will be strong upward pressures on prices.

Even though such pressures, are not visible in the Keynesian model.

Now in light of these inflationary pressures, how might fiscal policy be used, to close the inflationary gap?

In trying to answer this question, please

offer a specific a solution as possible.  
To close the inflationary gap, we must use contractionary fiscal policy.  
Where, contractionary fiscal policy involves reduced government expenditures  
Tax hikes, or some combination of the two, to cool inflationary pressures.  
More specifically, from the figure, we see that  
the slope of the aggregate expenditures curve is  
75, so that we know that the multiplier is four.  
Thus to close this inflation area gap we simply have to reduce government expenditures by \$15 billion or alternatively raise taxes by \$20 billion.  
At a multiplier of four either fiscal policy tool will lead to the desired economic contraction  
of \$60 billion.  
Now you might wonder at this point, whether it is more preferable to increase government spending, or cut taxes, to eliminate recessionary and inflationary gaps.  
The answer depends more on one's views of the appropriate size of the government, than pure economics.  
At one end of the ideological spectrum, liberals who think that there are many unmet social and infrastructure needs usually recommend increased government spending during recessions.  
And tax increases to fight demand-pull inflation.  
These actions either expand or preserve the absolute size of government.  
On the other hand, there are conservatives, who seek to shrink the size of government.  
What fiscal policies do you think they will advocate, to fight recessions or inflation?  
That's right, conservatives will generally favor tax cuts during recessions and cuts in government spending to fight demand pull inflation.

[MUSIC]

From our discussion of the Keynesian model and fiscal policy.

We can see now why this model was so useful in

explaining the economy's plunge into and recovery from the Great Depression.

In 1929, the economy was booming and at full employment.

But the stock market crash sent the business community into a panic.

In the language of Wall Street, the business communities animal spirits went from the full embodiment of a robust bull, to that of a bleak bear market.

Reacting to the crash, businesses cut back sharply on investment and production.

At the same time, frightened consumers cut back

dramatically on consumption while attempting to save more.

Effectively increasing their marginal propensity

to save as a response to the crisis.

Together, the reactions of business and consumers, lead to a

sharp and sudden downward shift, of the aggregate expenditures curve.

Business people in turn, responded by decreasing output further.

This depressed income and consumption, the economy

continued its downward spiral And eventually, unemployment reached

a staggering 25% of the workforce.

One of the ironies of this result, of course, was that in their attempt to save more.

Many individual households actually wound up saving less

because their incomes were plummeting as aggregate expenditures fell.

This result is known in macroeconomics as the

so-called paradox of thrift, and it can be an important contributor to recessionary events.

In this particular case, with the economy in a depressed

state, consumers not only tried unsuccessfully to boost their savings.

Businesses also became unwilling to invest no matter how low interest rates fell.

At this point the government stepped in with a massive dose of expansionary fiscal policies.

The public works projects of Franklin Eleanor Roosevelt's new deal followed

by the dramatic spurt of defense expenditures of world war 2.

Triggered both increased consumption and investment and

the economy roared back to full employment.

From these various examples, you can now see that

the textbook Keynesian Multiplier model provides a very mechanistic approach

to curing the economy of a recession.

Specifically, if you know what the actual Gross Domestic Product is and what the

full employment Gross Domestic Product is Then you know

the size of the recessionary or inflationary gap.

And if you know the marginal propensity to consume, and therefor the multiplier.

You also know how much you have to increase or decrease government

expenditures or

taxes, to close the gap.

Now if only life were this simple, none of us would have to worry about ever being

unemployed again.

In any of us, after mastering today's simple lesson would

be qualified to serve as the President's top economic advisor.

But, such is not the case even if many economists at the height of the 1960's

Keynesian Era naively thought it was.

Indeed there are many problems with this mechanistic Keynesian view and one

specific one has to do with an important issue known as crowding out.

Crowding out refers to the reduction in private sector

investment that can be caused by increased government spending.

And it can happen when the government borrows money to finance these

expenditures.

Such borrowing or deficit spending can drive up interest rates.

As we have discussed earlier in this lecture, higher interest rates can in turn reduce private sector investment.

Why should this concern us?

Because it means that any fiscal policy stimulus may be partly, or fully offset, by a reduction in private sector demand.

This, in turn means, that the net expansionary effect of Keynesian fiscal policies might wind up being smaller, and indeed in some cases, much smaller Than was intended.

Beyond this specific problem of crowding out, much broader problem, with a mechanistic Keynesian approach.

Is that it relies on a model that is not a complete model of the economy.

Particularly with respect to the monetary and financial sector.

Despite its limitations the Keynesian model is a powerful tool for illustrating two particular situations.

The first is when the economy is in the Keynesian recessionary or depressionary range.

In this range with fixed price assumption mirrors reality because increased output brought about by increased aggregate demand does not put upward pressure on prices.

The second situation were the Keynesian model is useful analytically is for illustrating how a small imbalance between leakages and injections can multiply into a much larger unemployment or inflation problem.

Having said that it is clear that the Keynesian model does assume away one of the most important problems in economics.

Namely, inflation In doing so, it neglects the crucial influence of monetary factors on interest rates, and interest-sensitive components of output, such as investment.

That's one good reason, why in macro-economics, we also like to use the Aggregate Supply, Aggregate Demand model.

It illustrates both price levels and real output.

But what is the relationship between the Keynesian aggregate expenditures-aggregate production model.

And the Classical aggregate supply-aggregate demand model?

Why don't you take a minute to try and draw the two models and illustrate the relationship?

This figure illustrates the relationship between the Keynesian and AS-AD models.

The top panel shows the output expenditure equilibrium in the Keynesian model.

At point e, the spending line just cuts the 45 degree line.

This leads to an equilibrium output of  $q$  and a recessionary gap of  $q^p$  minus  $q$ .

This same equilibrium can also be seen in the bottom panel, where the AD curve cuts the AS curve at point E.

So both approaches lead to the same equilibrium output  $q$ .

But note that in this case the economy is assumed to be operating in the intermediate range.

So that if fiscal policy were to be used to close the recessionary gap, some inflation would likely result.

Moreover if fiscal policy were to try to push the economy beyond  $Q^p$  into the classical range, the primary result would be inflation.

In this case, the Keynesian model is not helpful, while a deeper understanding of the monetary sector of the economy is crucial.

It will be to the monetary sector we will turn to in the next lecture.

In the mean time, please remember that economics is not something to be memorized, but rather something to be conceptualized.

Don't just study it.

Think about it too.

Your job and your business might just depend on it.

[MUSIC]