

**MACROECONOMICS 201**  
**Spring 2020**  
**NOTES 9**

**The Multiplier and its Application to Stabilization Policy**

Readings:

See notes 8

Our primary topic in this set of notes is the “multiplier.” This is an important Keynesian principle that states that some expenditures that stimulate the economy can lead to a growth in spending that is a multiple of the initial expenditures. Of course, the opposite is also true, a reduction in the same types of expenditures can lead to multiple reduction in expenditures. This is covered briefly in the text assignment.

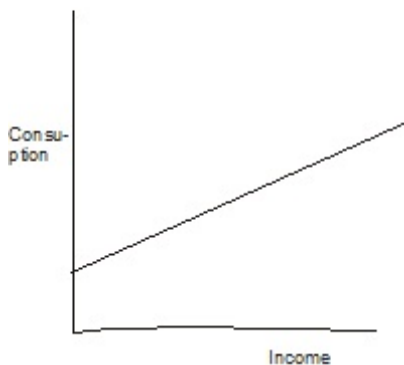
**1. . What is the Marginal Propensity to Consume (MPC) and why is it important?**

Once again, the economist’s concept of the margin becomes critically important.

The MPC for an individual refers to the **percentage increase in the** amount that is expected to be spent by a person on consumption as **additional** disposable income is received. Imagine that you suddenly received a \$1,000 tax rebate from the government. If you decided to spend \$900 and save \$100, your marginal propensity to consume would be .9, (or 90%) i.e., \$900/\$1000. \$900 is the **additional** amount you will actually spend out of your **increased** disposable income. Three points.

- We would expect the MPC for each individual to decline as incomes rise, i.e., the higher your income, the greater the percentage that you save out of increased income. For example, most of you save very little as college students (many of you have negative saving - think of student loans), but when your earnings rise, you will increase the amount you save (probably).
- Obviously, the MPC for different people varies widely, *even among those with identical disposable incomes*.
- How much you save may also depend upon how much you earned in the past. For example, even if your income suddenly declined, you probably expect to have high earnings again in the future, and will resist lowering consumption expenditures. In fact, in some instances you will be unable to. House and car payments do not decline just because your income did. And it may be hard to change eating and clothing habits. This is the **permanent income hypothesis**, developed by Milton Friedman.

Figure 8-2  
Individual Consumption  
Function

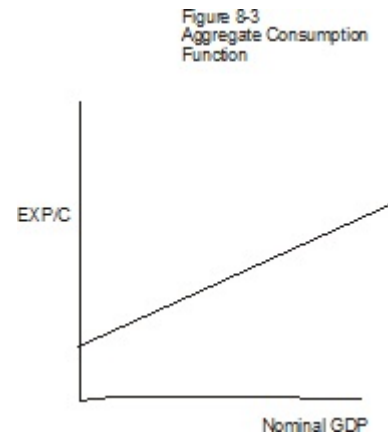


But to further explain. We can reasonably assume that there is some minimum level of consumption that people cannot do without, i.e., even if they have no income, they will necessarily consume something, if nothing else, daily food. This makes sense. Imagine, if your income goes to zero, will you not still try to pay for (from savings or by borrowing if nothing else), rent and utilities, food, bus rides to the welfare office. etc. Some of you have negative savings as you take out loans to pay for college. Now imagine that your income starts to rise. As it rises, will you not feed yourself a little better. Perhaps you will keep your abode a little warmer. Maybe even buy more gas if you happen to own a car. And as your income continues to rise, you will continue expanding your consumption. You may save some of the increased income, but you will also spend part of the increased income raising your level of consumption. If you thought about it, you could probably generate a crude consumption function for yourself, i.e., a schedule that

shows the increase in consumption spending as your disposable income rises. It should look something like figure 8.2.. The upward sloping line is your “*consumption function.*” It shows the total amount that you will spend on consumption as your income increases.

Now imagine that we can calculate a consumption function for everyone in the country. Obviously, as noted above, these functions will differ among people even when they have the same income. There are numerous reasons for this. Some people simply value consumption more than others. Some will have spending patterns based on a higher past income, such as a more expensive home, so that even if their income level falls, their spending cannot fall to the level of other people with similar incomes and a smaller mortgage. Actually, this is an example of the fact that peoples consumption patterns are based not only on current income but also past income, or what economists describe as *permanent income* (as mentioned above). *Repetitious*

In principle, we can draw a national marginal propensity to consume function that shows how total spending on consumption goods and services rises as **nominal** GDP rises (figure 8-3). It is almost identical to figure 8-2 except that we add /C after EXP to indicate that the line represents *only* the aggregate change in consumption as GDP rises and we measure **nominal** GDP on the horizontal axis rather than personal disposable income (rises in disposable income are closely correlated with rises in nominal GDP). Note that the rate of increase of consumption will partly depend upon which people have an increase in income. Among the very rich, it may not rise much at all.



It is important to emphasize that the MPC is measured by the slope of the consumption function over **very small distances**. For example, if aggregate personal disposable income rose from \$900 billion to \$1000 billion, and consumption rose from \$800 billion to \$880 billion, then the MPC would be measured by \$100 billion (the growth of personal disposable income) divided into \$80 billion (the rate of growth of consumption and would be calculated as .80. But suppose the economy grew by another \$100 billion to \$1100 billion and consumption grew by \$70 billion to a total of \$950 billion. Then the MPC would be \$70 billion divided by \$100 billion, i.e., .70.

We could simply have an expenditures function by showing the change to total spending (i.e., changes in investment, government, and net exports) as GDP rises, but lets keep it simple for the time being - this is the way it was originally developed.

## 2. What is the marginal propensity to save (MPS)?

Economists also define a **marginal propensity to save** function which is simply the percentage saved out of a unit of additional disposable income (the obverse of the MPC). Using our previous example, if you decided to spend \$900 and save \$100, your marginal propensity to save would be .1 i.e., 100/1000.

The MPS is also equal to 1-MPC, an equation which we will shortly use. In order to simplify our discussion, this very simple calculation *assumes* a balanced budget and balanced trade. The principles which we will describe would be a considerably more complex, if the federal budget and national trade are unbalanced. But the basic principles of the multiplier would be unchanged.

## 3. What is the average propensity to consume and the average propensity to save?

Economists also define an **Average Propensity to Consume** and an **Average Propensity to Save** function which is simply total consumption divided by nominal GDP, and total savings divided by nominal GDP. These terms will not be of major concern to us, but when you take a more advanced course, you may be expected to know them..

#### 4. What is the multiplier?

Magic, pure magic. This is one of the best known, and famous, concepts in economics. It is best illustrated by a simple example.

Assume you receive a \$1000 tax rebate (**with no change in the taxes you pay and no increases in foreign purchases**). As a typical young college student, perhaps you choose to spend 80 percent of the \$1000 on a wild graduation party. And to make it simple, let us assume for the moment that 80 percent is the MPC for all Americans. This is just a simplification to make the multiplier easier to grasp, but it is not essential to the concept. Note that \$800 is the **initial stimulus** (i.e., initial increase in spending), **not** the \$1,000.

The immediate consequence of your graduation party is that national expenditures on consumption and nominal GDP *rise* by \$800 since you had to rent space, hire a band, purchase food and liquids, and perhaps you even purchased some new clothes. The AD curve shifts a little to the right - remember, increasing aggregate expenditures causes the AD curve to shift to the right. But then, the people who received the \$800, *in turn*, spent \$640 on items that they desired, food, clothes, etc. (remember, we are assuming (for the sake of simplicity) that all people have a MPC of .8). Clearly additional people had to be employed to produce these items. If their MPC was also .8, these individuals would spend \$512 on items they desired (80% of \$640). In principle, the process would continue on ***ad infinitum*** (to infinity). The spending stream is as follows:

\$800, 640, 512, 410, 328, 262, 210, 168 .....

The sum of this infinite series represents the total increase in AE (note that this is the actual total increase in dollars spent (aggregate expenditures) set in motion by your initial \$1000 tax rebate and the subsequent spending that it set in motion. AD The **sum** of this infinite series, can be calculated by a very simple formula. The initial *autonomous* expenditure (\$800) is multiplied by  $1/1-MPC$  or its equivalent,  $1/MPS$ , which is termed the multiplier. If the MPC is .8, the multiplier is 5. If the MPC is .75, the multiplier is 4. Incidentally, this widely used simple formula assumes that imports and exports are equal and ignores the fact that people will have to pay some amount of tax on the money they receive (and receive public services in exchange). We could construct a formula that would include the effects of taxes and differences between imports and exports into the formula, but it would just complicate the formula and would not change the basic principle which is that any injection of money will lead to a multiplier effect.

Another way to look at this is that the multiplier effect will continue until the total amount of savings grows to equal the initial expenditure/injection of \$800 (caused by the \$1000 tax rebate and a MPC of .8). At that point, the leakages (savings) will equal the injection, in this case, \$800 of new spending. Consider, if the MPC is .8, then the multiplier is 5, and AE will increase by \$4,000. 20 percent of \$4,000 is \$800, the initial expenditure/injection.

Think of it this way:

New spending stream: \$800, 640, 512, 410, 328, 262, 210, 168 , etc..	= \$4,000
New savings stream \$200, 160, 128, 102, 81, etc	= \$800

If firms try to produce more than an additional \$4,000 in goods, say \$5,000, then only \$800 of the additional \$1,000 in output would be purchased by consumers (since they receive an additional \$1,000 in income, but save \$200). In that case, inventories would increase and output would eventually fall back to the equilibrium level predicted by the formula. Remember, increased leakages, \$800 must equal increased injections, the original \$800 expenditure.

#### 5. How can the effects of the multiplier be made permanent?

The example given above was based on the often overlooked assumption that there was a **one-time** infusion of \$800 in increased consumption in the economy. But what happens after the effects of the initial expenditure dwindle down to zero. GDP will go back to its original level. It has to if you can no longer keep spending an

additional \$800. To have a permanent effect, the increase in expenditures would have to be made *each succeeding year*. You might do this by a permanent reduction of taxes as seems to be always advocated by some politicians. Of course, other factors can also change, such as optimism about the economy, new technology, war spending, etc., which will also cause a longer-term change in aggregate demand.

### 7. Why is it important to stress that the expenditure must be autonomous to cause the multiplier to function?

We must discuss a crucial condition for the multiplier to operate. *The change in spending must be autonomous*, i.e., the *initial* increase in aggregate expenditures must *not* result from an increase in *earned* factor income or be balanced by an increase in taxes, or any other change. In other words, it must be initiated by changes in variables in the *top half* of *our* circular flow of resources, not the bottom half. It must initially cause an increase in spending on consumption, or investment, or government spending and not result from payments for an increase in output. Some examples will help explain this.

- In our example, the \$1,000 tax rebate, and the subsequent multiplier, was based on the assumption that taxes *do not rise* to pay for the tax rebate. If taxes rose to finance that rebate, then the increase in spending started by your wild party would be offset by decreased spending by people who pay the taxes.
- If investment is increased, say in response to a lower interest rate, this must be in addition to what was previously planned investment, and must not be offset by an increase in planned saving (which is unlikely if interest rates decline), as this would have an offsetting effect by reducing consumption.
- If G is increased, say to build more roads, this must not be offset by a rise in taxes, since this would reduce consumption by taxpayers. This usually means that there must be an increased deficit in Federal spending for the multiplier to increase aggregate spending, a matter which is always controversial.
- Another possibility for an autonomous increase in spending would be an increase in sudden consumer spending (i.e., consumers save less), perhaps because consumers became more optimistic about the future of the economy.
- And obviously, if exports are increased, this will have a favorable effect on employment and the multiplier, but only if imports are not also increased.
- Of course, the government could also just print up some money and scatter it around.

You should be able to think of other strategies or events which could lead to a multiplier effect, but those above are the main ones in current use for stabilization purposes. Any autonomous expenditure will cause the AD curve to shift right, while the AS curve is unchanged.

Now, here is an example of what is *not* a multiplier effect. Back in the 1970's, the Department of Labor, in its annual reports, used to tout the manpower programs it managed by arguing that as workers were trained and found jobs, the money they spent from their increased income would then be received and spent by others resulting in a multiplier effect that would create jobs throughout the economy.

The Department of Labor (and many others) was *wrong*. Although people were trained and put back to work, their earnings were not autonomous. Their increased earnings were *matched, and in fact made possible*, by an initial equal increase in the value of production. Hopefully, AE would increase by the amount of their earnings, but these higher expenditures will be matched by an increase in the value of production (AS). The most that could be expected was that this would lead to a new, and higher, equilibrium level of GDP by the amount of the increased earnings of the newly productive worker, and enable welcome improvements in their standard of living. Note that the initial impact of training workers would be reflected in increased incomes as shown on the *bottom half* of the circular

flow of resources.

### **7. How do we know how much to shift aggregate expenditures in order to achieve a given increase in employment or reduction in inflation.**

We don't. We know how to initiate a multiplier effect, e.g., lower tax rates, lower interest rates, increase government spending. But we do not know how large the resulting multiplier would be for the following reasons:

- the way we illustrated the multiplier above was very simple. Actually, the multiplier is dependent upon all of the factors which reduce consumption spending out of increased income, savings, taxes, imported goods, and many other factors. We called these leakages in the previous set of notes. Our example of a multiplier of 5 is probably unrealistically optimistic. We could, as noted above, easily adjust our formula to take account of these other factors.
- We do not know what the consumption function in the U.S. is at any point in time. We assume that it varies given the state of the economy and peoples' *expectations* about the future. But note, peoples willingness to spend **decreased** at the beginning of the recent great recession, which shifted the AD curve leftwards and reduced the size of the multiplier. In fact, the reduced willingness to spends apparently swamped the effects of additional stimulus spending (injections) . Nor are we clear on how much time must elapse *before people spend* any increase in disposable income so we do not know how long it will take for the full effects of the multiplier to be completed.
- Certainly, the multiplier varies according to the type of stimulus. For example, cutting taxes for the very rich will almost certainly result in a smaller initial increase in spending than an extension of unemployment compensation or a reduction in taxes on the poor (but it may increase economic growth). As another example, direct government spending, in theory, should have a bigger impact than a tax rebate since some of the tax rebate will be saved, but hold this thought until we discuss the balanced budget multiplier (below).
- Policies that lead to a multiplier will clearly cause aggregate spending to increase. But we do not know how much of the increased spending will be reflected in increased output and how much will be reflected in increased prices. Presumably, when we are in a deep recession, the bulk of the increased spending will be used to increase output and employment. In boom times, a much larger part of increased spending, if we are so foolish as to initiate a stimulus in boom times (*as we have done* with some large tax decreases), will be reflected in higher prices.
- Given the above, all we can say about the multiplier is that a stimulus will almost certainly increase spending, but how much it will increase total spending, and how much of the increased total spending will be reflected in increased output and employment and how much in increased prices is uncertain and very controversial. You can see this controversy being played out in current political debates.

### **8. Important points about stimulus spending**

1. **Negative stimulus, can the multiplier work in reverse?** When there is a negative stimulus, the multiplier works in reverse. It takes the form of successive leftward movements of the Aggregate Demand curve. In the recent great recession, for example, the financial crisis initiated an enormous lack of confidence in the U.S. economy and a dramatic reduction of lending by the banking system. In turn, this caused a sharp reduction in aggregate spending *and* in employment. This in turn, because of reduced disposable income, led to a further leftward movement of the AD curve and the process continued until unemployment reached 10% despite a substantial increase in federal spending and a dramatic reduction in interest rates.

**2. Why do we usually need a federally funded stimulus in a recession?** Obviously, once you are in a recession, you need something to change to cause spending to increase and start the economy moving upward again. It would be nice if this would occur naturally as implied by our discussion of the boom and bust cycle and as some may believe. However, the shock of the great depression of the 1930s shows that once a major recession begins in an industrialized economy, it may take a very long time before the economy begins a significant recovery without some form of substantial public intervention.<sup>1</sup> And it is unreasonable to expect that large numbers of unemployed people would be willing to peaceably wait a long time for a job, especially when we have no idea how long it might require. Ask yourselves, how long would you be willing to wait for a job if you were unemployed? How long would you wait before you accepted drastically reduced pay in order to be able to make a meager living? As Keynes said, “In the long run, we are all dead.” The big issue, being extensively debated, is on how to determine the most effective type of stimulus and who should be the biggest winners of changes in public programs. For example, should we reduce taxes on the rich because they pay the most taxes, or on the poor because they are likely to spend a larger percentage of any tax reduction.

As we have discussed, one way to initiate a stimulus is to increase aggregate public spending. It might also be possible to stimulate spending by lowering interest rates (to be discussed in notes 10), but as we have seen, and will discuss further, this may not always be enough to bring the economy back to a high level of employment.<sup>2</sup> Reducing interest rates almost always requires that money be created, and only the Federal Reserve (a quasi public organization) can do that.

If reducing interest rates is not sufficient (notes 10), you usually have to borrow money from domestic or foreign savers. Normally, only the federal government, which currently has a sterling credit rating, has the ability to borrow the substantial sums of money needed to significantly impact the economy. This borrowed money, of course, can be spent or somehow transferred to citizens who will spend it. As we have repeatedly noted, this transfer of funds can be done in many ways, e.g., tax reduction, unemployment insurance extension, building of infrastructure, etc., but this always requires borrowing the funds to do so (as we did in the recent greatly publicized cut in taxes)

Usually, if a multiplier effect is desired, this means that the Federal government will operate at a deficit when attempting to increase employment through a public stimulus. This, of course, is very *controversial*. Unfortunately, the national debt in the United States is currently very high and growing, largely because of irresponsible federal budget policy beginning with the Reagan presidency. This might make the use of a public stimulus more difficult in the future if more borrowing is required.

**3. How long should stimulus spending (i.e., should federal deficit spending) last?** People will argue about this, but a case can be made that it should last as long as cyclical/demand unemployment is at unacceptable levels (whatever that is). Hopefully, as employment rises, or at least as unemployment does not get worse, people will become more confident in the economy causing consumer and investment spending to rise and bringing the recession gradually to an end. As employment rises, the stimulus, i.e., federal deficit should decline and at some point we should have a balanced budget or something close to it (in theory, not in practice). This is certainly not true at present.

We have focused on solutions to unemployment. But if you have too much inflation, you wish to have a negative multiplier. It works exactly in the same way as a positive multiplier, but with opposite policies. You run a government surplus, you cut government spending without lowering taxes, or you might, *horrors*, even raise taxes.

---

<sup>1</sup>One should note that the finding of large oil reserves in the U.S. and new ways of exploiting old oil reserves, are giving the U.S. economy a significant boost.

<sup>2</sup>If you read the financial pages, you should be aware that the Federal Reserve kept interest rates at historic lows during the recent great recession, but unfortunately, by itself, this was inadequate to quickly return the economy to full prosperity, or at least, it took a long time .

### 9.. What is the balanced budget multiplier?

We have emphasized that for the multiplier to work, the increase in spending must be autonomous. However, there is one limited exception that was developed after World War II (to the great delight of many economists). **It is called the *balanced budget multiplier*.**

Suppose the government taxes people \$1000 to build a road. Public expenditures begin with \$1,000 (the government spends the entire amount to hire workers and buy materials) and these payments cause consumption expenditures to proceed as predicted by the multiplier.

1000, 800, 640, 512, 410, 328, 262, 210, 168 .....

But people have had their disposable income reduced by \$1,000 in taxes. How does this affect spending. Assume a MPC of .8. Then, normally people would have spent only \$800 of the \$1000 that is used for taxes. Since this money is no longer spent, we can envision a negative multiplier effect as follows:

-800,- 640,- 512,- 410,- 328,- 262,- 210, -168 .....

Note, the two streams are identical *except* for the initial expenditure of 1000. The reason is that it is assumed that the marginal propensity to spend of the government is 100%. In consequence, any balanced tax and spending policy by the government would increase the total level of aggregate expenditures (AE) by the initial amount of the tax and increased government spending. This might sound appealing if you favor government projects, but many economists would prefer other methods for expanding aggregate expenditures.

### 10. What are automatic stabilizers?

These are important components of stabilization policy and in particular, of maintaining AD and AE in times of rising unemployment. By now, it should be clear that the amount people will consume and add to AD and/or AE is primarily dependent upon the amount of disposable income they have available. **Automatic stabilizers** operate by modifying changes in disposable income as unemployment rises and falls.

- The most common example of an automatic stabilizer is unemployment insurance which pays benefits for 26 weeks if an individual becomes unemployed, and is sometimes extended by congressional action if the country is in a deep recession. These benefits reduce income loss among people who become unemployed and prevent their expenditures from falling as much as they might if they had no replacement income at all. This prevents as great a fall in AD/AE as might otherwise occur, moderating the ups and downs of the business cycle. Conversely, when they obtain jobs, their unemployment benefits are terminated so that the rise in their disposable income is reduced by that amount.
- There are other, mostly state and local, programs which provide assistance to the needy, often who become needy because of job loss, that could be described as automatic stabilizers.
- Personal income taxes (including social security taxes), which exist at the federal and sometimes state and local levels is also counted as an automatic stabilizer in the sense that taxes increase as income goes up, dampening the growth of disposable income and decrease as income goes down, dampening the loss of disposable income, so that changes in disposable income are not as great as changes in income earned. This reduces the amount of consumption that occurs as income rises from what might have occurred if there were no personal income tax, and vice versa.

### 11. Do recessions ever benefit the economy?

There are economists who believe that an occasional small recession is good for the country. I am one of them. When times are good, businesses become complacent and do not always behave in a fiercely competitive manner. A recession forces managers to look for ways to cut costs, or improve products. Some economists have called this the "pencil sharpening effect." This almost certainly will eventually lead to higher per person productivity and ultimately higher earnings. And perhaps to some job losses. This certainly happened in the recent great recession.

## 12. Keynes Revisited

Keynes was focused on the problem of massive, worldwide unemployment caused by the great depression. During the great depression of the 30's, the basic goal of Keynes was to describe how to increase the level of employment by increasing aggregate expenditures (AE) to increase the demand for goods and services (AD) and the level of employment. Although Keynes was well aware that increasing AE would eventually, if the stimulus was high enough, lead to higher prices, this was clearly not an important issue during the great depression. Neither Keynes or hardly anyone else was greatly troubled about the possibility of rising prices, given the massive unemployment that existed. In fact, a rise in prices would probably have been welcomed as indicating the Keynesian policies were working. This primary focus on increasing AE to increase employment lasted at least to the early 1950's and formed the core concern of macroeconomics for most economists during that time period.

### Review Questions

1. Would reducing taxes help reduce unemployment if most unemployment was caused by a mismatch between job requirements and available job skills?
2. Will reducing taxes increase aggregate expenditures? Explain.
3. What are the three broad fiscal macroeconomic tools? Provide examples.
4. How can spending on public works increase the level of employment?
5. Would a lump sum tax reduction in taxes be more effective in increasing aggregate expenditures than an across the board cut in tax rates?
6. If you find a job next summer, and increase your personal expenditures, will this lead to a multiplier effect on GDP?
7. What is meant by autonomous investment? Why is being autonomous important when calculating the spending multiplier?
8. What is the spending multiplier? Describe how it operates? Suppose the MPC was .75. What would the multiplier be if we ignore leakages due to imports and taxes?
9. What does it mean to have an autonomous growth in government expenditures and why is this important in terms of the total effect on aggregate expenditures?
10. Under what circumstances is the increase in GDP caused by the spending multiplier permanent and under what circumstances is it transitory?
11. What is a consumption function? What is the Marginal Propensity to consume? What are the determinates of consumption?
12. Is the consumption function likely to be higher or lower for poor people as compared to rich people.
13. If the MPC is .90, what is the multiplier (ignore foreign trade)? If Investment suddenly increases by \$100,000,000, what will be the rise in aggregate expenditures given this MPC?
14. If the country is experiencing significant unemployment, should the government try to increase or decrease aggregate expenditures?
16. Why did Keynesian economists not rely on lowering interest rates during the great depression?
17. Why did Keynesian economists not worry about price level changes during the great depression?:
18. Suppose the government built a large dam and increased taxes by \$20 billion to pay for the dam, what would be the effect on aggregate expenditures if the MPC was .9?
19. What would be the effect on aggregate expenditures if the government reduced income taxes by 10%, if the MPC was .90?
20. Should we have a balanced budget when unemployment is high?



21. If the marginal propensity to save is 10%, and the government reduces spending on roads by \$10 billion: a). What is the immediate effect on aggregate expenditures? b) What is the long-term effect on aggregate expenditures? c) What is the spending multiplier?
22. In what way was the Keynesian approach to showing how an economy could reach equilibrium a major advance over the classical approach? What were the three major modifications to classical economics that Keynes used?
23. What are automatic stabilizers? Identify the most obvious automatic stabilizer.
24. What justification is made for decreasing taxes on rich people.
25. What is the balanced budget multiplier?
26. Do you think that we will ever settle down at an equilibrium GDP?
27. What is meant by monetary policy as compared to fiscal policy?

*Added thought optional: In the real world, salaries and wages are almost certainly very sticky for persons who maintain their job. But one could argue that they are much more flexible for persons seeking jobs. It is likely that the higher the level of unemployment, the more flexible people become in terms of the wages that they will accept to become employed.*