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## Macroeconomics Notes, Set 2

**Introduction:** In macro notes set #1, we developed the terminology of macroeconomics, and developed a model that can explain the causes and consequences of *short term* fluctuations in real GDP. Here in macro notes set #2, we will develop a model that explains the causes of GDP growth over many, many years—i.e. *long term* economic growth. We will then link our short term model with our long term model, discussing a tradeoff between the welfare of the present generation and the welfare of future generations. Finally, we shall look at the implications of trade deficits on future generations.

**A Long Term Economic Growth Model**Intuition:

The level of GDP depends upon four things:

- (1) the amount of labor in the economy
- (2) the skill level of the labor in the economy (a.k.a. *human capital*)
- (3) the amount of capital in the economy
- (4) the level of production technology in the economy.

Hence, GDP will increase over time if (1)-(4) increase over time.

*Strategies to increase GDP over time:*

To increase (1)

- encourage population growth
- liberal immigration policies

Important note: Merely increasing the amount of labor does not, by itself, do anything to increase standards of living, since GDP *per capita* does not increase.

To increase (2)

- increase/improve education and training of the workforce

How does one do this? I dunno.

Here are some suggestions of others:

- tax credits for community college (now available)
- more college grants/loans
- replace current K-12 public school funding with vouchers
- apprentice programs (similar to Germany's)

To increase (3) one must increase investment:

- reduce cost of investment to firms (e.g. investment tax credit)
- increase savings of government and households. This would provide more funds for purchases of new capital. (It would also reduce interest rates, making the new capital less costly to acquire.) How?
- raise taxes or cut government spending, increasing the budget surplus.
- make savings tax exempt (perhaps by replacing income tax with national sales tax?)
- reduce capital gains taxes

Note that if one makes savings tax exempt or reduces capital gains taxes, then government should really replace the lost revenue by raising some other tax, so that government savings (the budget surplus) does not fall.

- government “investment” in public infrastructure—roads, bridges, and the like.

Note that capital depreciates over time. In order for the economy to grow, there must be enough investment to not only replace the depreciated capital but also to increase the total capital stock.

To increase (4)

- research and development tax credit
- modify antitrust law to allow firms to cooperate on basic research
- more government funding of basic research
- industrial policy? Some believe that government should subsidize industries where it sees high growth potential. But this is the same government that screws so many other things up—how can it possibly know what to subsidize? (Recent stupid subsidy: HDTV)

Note also the potential tradeoff between: government savings; and increasing (2) and/or (4). Increasing (2) and/or (4) may require more government spending or less tax revenues. This reduces the budget surplus—a reduction in government savings—no help to the level of investment, that's for sure.

### **The mathematics of production:**

Economists usually model long term production using a production function:

General form:  $Y = f(K,L,H,T)$

where : “K” is amount of capital, “L” is amount of labor, “H” is amount of human capital, and “T” is level of technology.

Specific form: A popular specific form is the Cobb-Douglas production function:

$$Y = AK^bL^cH^dT^e$$

where: A,b,c,d and e are constants

### **Inflation and Economic Growth**

Many economists believe that low inflation is another key to long term economic growth. They argue that low inflation reduces uncertainty about future conditions; this is because low inflation tends to be stable and predictable, whereas high inflation tends to be unstable and unpredictable. Reduced uncertainty, the argument continues, fosters more investment and hence faster economic growth.

### **GDP, economic growth, and Material Living Standards**

Now let's discuss the level of *GDP per worker*. This is a better measure of material standards of living than the total level of GDP.

The level of *GDP per worker* depends upon 3 things:

- (a) the skill level of the “average” worker
- (b) the amount of capital *per worker*
- (c) the level of production technology

Hence, standards of living will increase over time if: workers become more skilled over time; if the capital stock grows *faster than the labor force* over time, or if production technology advances over time.

### **Present vs. Future Generations: Combining the Results of the Business Cycle Model and the Economic Growth Model**

**Proposition A:** Fiscal policy that reduces the budget deficit (or increases the budget surplus) reduces the welfare of the present generation, and increases the welfare of future generations.

(Note: Fiscal policy that reduces the budget deficit or increases the budget surplus includes: raising taxes, cutting transfer payments, or cutting government purchases)

*“Proof” of Proposition A:* We just saw, using our long term economic growth model, that an increase in government savings frees up more money for investment, causing the economy to grow faster over the long term—future generations better off.

On the other hand, in the notes mana-macro1, using our business cycle model we saw the short run effects of this policy—lower aggregate demand, higher unemployment, i.e. a recession—not good for the present generation. In addition, any increase in taxes or reduction in transfer payments would reduce the income that the present generation has to spend, further making them worse off.

**Corollary to Proposition A:** Fiscal policy that increases the budget deficit (or reduces the budget surplus) enhances the welfare of the present generation, and reduces the welfare of future generations.

(Note: Fiscal policy that increases the budget deficit or reduces the budget surplus includes: cutting taxes, increasing transfer payments, or increasing government purchases)

*“Proof” of Corollary to Proposition A:* Earlier in these notes we used our long term economic growth model to show that a reduction in government savings reduces the money available for investment, causing the economy to grow slower over the long term—future generations worse off.

On the other hand, in the notes file mana-macro1, using our business cycle model we saw the short run effects of this policy—higher aggregate demand, lower unemployment, i.e. an expansion—good for the present generation. In addition, any reduction in taxes or increase in transfer payments would increase the income that the present generation has to spend, further making them better off.

**Proposition B:** Monetary policy that reduces inflation causes short term harm but long term benefit.

(Recall that the Central bank reduces inflation by raising interest rates. This slows down demand for goods and services, reducing the incentive of sellers to raise prices.)

*“Proof” of proposition B:* We discussed above the long term benefits of low inflation on long term growth on the previous page—low inflation reduces uncertainty and increases investment, allowing the economy to grow faster over time; this is good for future generations.

Our business cycle model from mana-macro1 forecast the short run costs of contracting the money supply—lower aggregate demand, lower GDP in the short run, and higher unemployment; this ain’t no picnic in the short run.

**Corollary to Proposition B:** Monetary policy that reduces unemployment causes short term benefit but long term harm.

(Recall that the Central bank reduces unemployment by cutting interest rates. This increases demand for goods and services, causing producers to increase production and hire more workers.)

*“Proof” of corollary to proposition B:* Clearly lower unemployment has short term benefits. However, the monetary policy that reduces unemployment has a negative side effect—higher inflation. We discussed above the long term costs of high inflation on long term growth on the previous page—high inflation increases uncertainty and reduces investment, causing the economy to grow more slowly over time; this is bad for future generations.

### **International Trade and the Welfare of Present and Future Generations**

*What's a trade deficit?* It's when imports of goods and services into a country exceed exports of goods and services out of the country. The United States has had trade deficits for many many years.

*This Sounds Like a Good Deal for U.S. Consumers:* It is!! They are consuming lots of foreign goods, while not having to ship a comparable value of goods and services overseas.

*What's the Catch?* Let's do a phony example to illustrate the catch:

U.S. Imports of goods and services:	\$1000 billion
U.S. Exports of goods and services:	<u>\$800 billion</u>
	a trade deficit of \$200 billion!!

Look at it in these simplified terms: Americans have given \$1000 billion to foreigners for their goods and services; foreigners have taken \$800 billion of this and used it to buy American goods and services. Foreigners still have \$200 billion left!

*So What Do they Do With the \$200 billion? Throw it away? Line their bird cages? NO! They:*

- use some of it to buy U.S. assets (stocks, real estate, whole companies)
- loan us back the rest of it (earning interest for them)

*I See. So in effect, U.S. wealth is reduced when we run a trade deficit.* That's right. We consume a lot today by selling off our assets and by going into debt to foreigners. This leaves a smaller net asset base for future generations of Americans.

*It's All the Fault of those Evil Foreigners and their trade barriers against U.S. products!! I'm voting for Pat Buchanan.* Not so fast. Don't you see that it's our own desire for lots of foreign goods that's largely to blame for this deal? We current Americans are better off. Vote for Pat Buchanan and the nice imports may be out of reach.

(By the way, the average Japanese person buys almost the same value of U.S. products as the average American buys of Japanese products. Our population is twice as large; that's why our aggregate Japanese purchases are higher than Japan's aggregate U.S. purchases.)

*I'm Still A bit skeptical. Can you explain this another way?* Yes. See the next section of the notes.

**Link: Low savings→high interest rates→strong dollar→trade deficit**

Suppose Americans want to buy a lot of stuff now. This would mean that they would save a very small amount of their income. They would also want low taxes. What's this mean to the amount of money available for loans?

--American households aren't saving much, so they aren't putting much money in the bank—not much there for banks to lend.

--With low taxes, government collects low tax revenue. Hence there may be little or no government savings, as all tax revenue is spent. So government isn't providing any funds for loans.

Conclusion: national savings is low. What's this mean for interest rates?

They'll be high. There's little money to loan, so if you want a loan, you'll have to pay a high interest rate for it.

Conclusion: U.S. interest rates are high. How does this cause a strong dollar on foreign exchange markets?

Foreigners would like to earn high interest in the U.S. But they need U.S. dollars to buy dollar-denominated interest-bearing U.S. securities. Demand for dollars rises on foreign exchange markets. This makes the dollar appreciate—get stronger—on foreign exchange markets.

Conclusion: The dollar is strong relative to foreign currency. How does this cause a trade deficit?

A strong dollar makes foreign goods cheaper to Americans (Don't believe me? When would you rather go to Mexico—when the dollar is strong or when it's weak?); imports rise. Simultaneously, a strong dollar makes U.S. exports more expensive to foreigners (Don't believe me? When would a Frenchman rather come to Disneyworld? When the dollar is weak (say, 4 francs per dollar) or when the dollar is strong (say, 7 francs per dollar?); exports fall.