

Answers to Problem Set #4

1) a) The price of this bond will be the present value of the payments. The bond payment is in dollars (it is a nominal bond), so the nominal interest rate in the appropriate discount rate. Therefore, the bond price is:

$$P_b = \frac{\$2}{1:05} + \frac{\$2}{(1:05)^2} + \frac{\$2}{(1:05)^3} = \$5:45$$

b) IBM generates \$50 billion in profits per year. Each of the 25 billion outstanding shares of stock is a claim to an equal share of the profits. Therefore, the dividend per share is \$2. IBM is expected to go out of business in three years. Therefore, the income stream from the stock is exactly the same as the bond in (a). Hence, the stock price is \$5:45:

c) With an inflation rate of 10%, the nominal interest rate is $5\% + 10\% = 15\%$: Therefore, the bond price is:

$$P_b = \frac{\$2}{1:15} + \frac{\$2}{(1:15)^2} + \frac{\$2}{(1:15)^3} = \$4:57$$

d) The key here is that if all prices rise by 10% per year, so will dividends. Therefore, the stock price will be

$$P_s = \frac{\$2(1:1)}{1:15} + \frac{\$2(1:1)^2}{(1:15)^2} + \frac{\$2(1:1)^3}{(1:15)^3} = \$5:49$$

e) This tells us that stock prices are insulated from changes in inflation where bond prices are not.

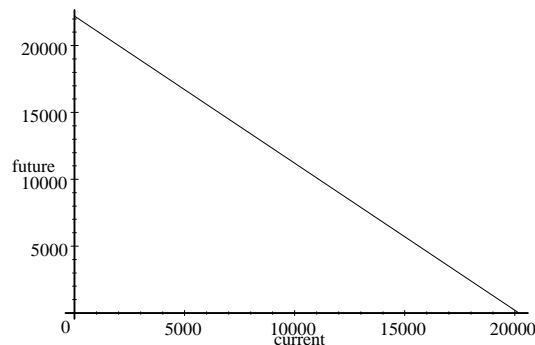
2) a) If you spent all of your income this year, you could spend up to

$$\$2;000 + \frac{\$20;000}{1:1} = \$20;182:$$

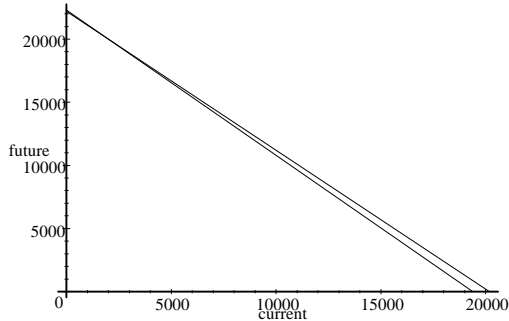
If you saved all your income this year, next year you would have

$$\$2;000 (1:1) + \$20;000 = \$22;200$$

Therefore, your budget set is as follows:



b) If the interest rate rose to 15%, your budget set would rotate clockwise as follows:



With a higher interest rate, current spending has become relatively more expensive. Therefore, the substitution effect would cause you to spend less today, more next year. With low current income, you would most likely be a borrower. Therefore, the income effect would cause you spend less both today and next year. The net effect is that today's spending falls, but next year's is ambiguous. If today's spending falls, then savings must go up.

c) Its reasonable to think that given a sudden increase in income (and knowing that this increase is only temporary - you won't be getting \$3,000 from your aunt every year!), you would want to spend some and perhaps save some for a rainy day. Therefore, your current expenditures increase, but by something less that \$3000. Therefore, savings increases. However, suppose you know about the inheritance, but do't expect to receive it until next year. In this case, it is reasonable to think that you might like to start spending that inheritance now (presuming you have decent credit!). In which case, your savings falls as you borrow o® you future windfall.

3)

# of Sewing Machines	# of Shirts	MPK	VMPK = P*MPK
1	100	100	200
2	190	90	180
3	270	80	160
4	340	70	140
5	400	60	120
6	450	50	100
7	490	40	80
8	520	30	60
9	540	20	40
10	550	10	20

a) User cost = $(r+d)*Pk = (.05 + .05)*1000 = 100$

b) Presuming that the firm currently has no machines, it should purchase 6.

c) User Cost = $(.1+.05)*1000=150$. The firm should purchase the third machine, but not the fourth. Therefore, demand is equal to 3.

4)

a) A temporary increase in capital productivity should have no effect on new investment decisions. Therefore, the investment demand curve doesn't move. However, with the increase in productivity, output (and, hence, income) temporarily rises. This should cause consumers to save a little more (savings shifts right) and possibly work a little less (labor supply shifts left). The end result would be lower interest rates and higher real wages.

b) With a permanent reduction in regulation, the productivity of capital equipment permanently increases. This should increase the desired capital stock and, hence, investment demand should shift right. Note that the regulation doesn't go into effect until next year. Therefore, output today is unaffected. However, consumers recognize that their future income next year should be higher and therefore start spending it today. Savings shifts left. Lower savings and higher investment both act to raise interest rates. The only possible effect in the labor market is that consumers could possibly reduce labor supply (in light of their higher lifetime wealth), causing real wages to rise.

5) Let's start first in the labor market. The drop in the population represented a massive decline in labor supply (labor supply shifts left). Labor demand is unchanged, hence the real wage rises. What happens to income? Income per capita goes up (wages have risen), but aggregate income must fall (with less labor, total production drops). Moving on to capital markets, recall that labor and capital are complements in production. With less labor, the productivity of capital is diminished (with no one to work the fields, less food can be harvested per acre!). This causes a drop in investment demand lowering real interest rates.