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(i) *A 10% increase in the wage rate due to technological progress in the non-household sector combined with a 10% increase in household productivity across all household commodities would increase real household income by 10%.* **False.** There are many reasons why this is false:

- ▷ If labor is not supplied inelastically, then consumers could, depending on the relative size of the substitution effect (work more because leisure is more expensive) and the income effect (work less because leisure is a normal good and for every fixed level of labor supply, wealth is higher.). If, for instance, the substitution effect outweighs the income effect, then households may give up some leisure and work more in the labor market so that their aggregate income will increase by more than 10% if the household does not change the labor in the household.
- ▷ It might be interesting to ask why the wage increases in the first place. If labor and goods markets are competitive, the wage is the marginal value product of labor. Not suppose that the central bank announced that it would (with some monetary instrument) increase the price level by 10% uniformly over all goods. If this monetary shock is anticipated and consumers do not suffer from money illusion, then the wages will also increase by 10% - but without actually changing the real wage.
- ▷ The household could also derive income from assets. Even if the real wage on the labor market increases by 10% and the household productivity increases by 10% and the household does not change the time devoted to work on the market and at home, real income will not rise by 10% because the asset income will not rise by 10% . (Jonas)

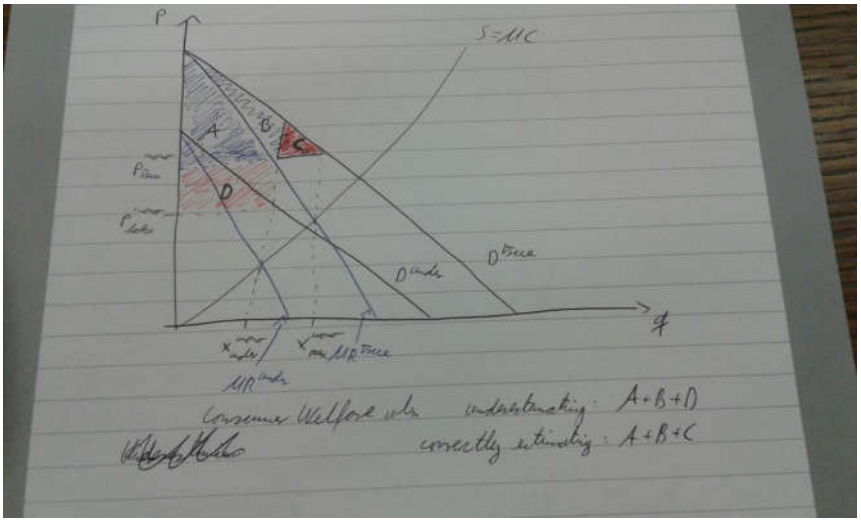
(ii) *Suppose a marriage market where there is transferable utility between men and women in a marriage. Consider a marriage market competitive equilibrium where there are benefits to any couple of being married (i.e. the utility of two individuals when married exceeds that of being single), there is positive assortative mating and there are more women than men. The introduction of a tax benefit to married couples of $M per couple financed by a uniform per-person tax would raise the utilities of all men and lower the utilities of all women.* Becker stuff, we didn't cover this.

(iii) *Consider a good X subject to social influences. Assume that there are two groups of consumers, leaders (L) and followers (F). Assume that the demand for X by F is increasing in the consumption of X by L but the demand for X by L is decreasing in the consumption of X by F and that each group's demand for X is decreasing in the price of X holding the other group's consumption of X fixed. Aggregate demand for this good could be backward bending (i.e. a fall in price could lead to less aggregate consumption) but there would not be multiple equilibria at the same price.* Becker stuff, we didn't cover this.

(iv) *Suppose that some consumers underestimate the value received from a good and as a result purchase less of that good than they would otherwise. If a small number of consumers underestimate the value of the good then those consumers will be worse off but if many consumers do so they may all be better off.*

Uncertain. It is true that if there are few consumers who underestimate the value, these consumers are worse off then they otherwise would have been. This is because the prices do not change compared to the optimal world in which they perceive the utility correctly and would buy more because the group is so small that it does not affect aggregate demand in a significant way. Because these consumers then buy too less of this product, they are worse off than they would be if they would perceive the good's value correctly and would optimize their consumption bundle accordingly.

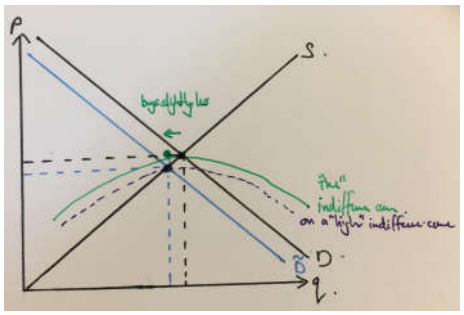
But if many consumers underestimate their utility, they will affect the price which will fall. But if the goods market is monopolistic, this might increase consumer welfare even for those



consumers which underestimate the price, see picture. (Jonas)

True. Consider the following figure where S denotes supply and D denote the demand based on consumer's true preferences. If only a small number of consumers buy less than the optimal amount, q^*, and in fact buys $\tilde{q}$ at price p^*. Then, such consumers must be worse off.

Now, suppose that enough consumers underestimate the value and buys too little so that the market demand shifts to $\tilde{D}$. The new equilibrium quantity is now $\tilde{q}$. The difference here is that, market price is now $\tilde{p}$ so that consumers may consume $(\tilde{q}, \tilde{p})$. But notice that this point is on a "higher" indifference curve than one that goes through the point (q^*, p^*); i.e. the consumers must be better off making the mistake in this case. (Tak)



(v) *Many low income areas suffer from a lack of policing. A law which mandates that the government provide greater levels of policing would make residents of those communities better off if the increased police activity is financed by taxes on third parties (i.e. individuals that do not live in the community).*

False. They may have selected into the areas with high crime and enjoy the lower rents which result from the fact that scared rich kids don't dare to rent apartments there. As soon as the policing is increased, the rich kids will come and rent the apartments so that the rental rates will rise. If the people in these areas don't own the houses but have rented them themselves, they might be worse off than they would have been without the policing. In contrast, if people in this neighborhood own the houses, they will either stay there and enjoy the decrease in crime or they will rent the apartments to some rich kids and be better of because their choice set is strictly bigger .(Jonas)

Uncertain. Suppose that those that live in the area rent their housing. Better policing is likely to lead to a safer neighbourhood so that rental prices are likely to increase. But better

policing is unlikely to alter the income of those that live in the area so that, in fact, housing becomes less affordable for the residents. Of course there is the benefit from being in a safer neighbourhood, however, which effect is more prominent is uncertain. Therefore, although the increased policy activity was financed by third parties, it is not necessarily the case that the residents are better off.

However, if the residents are homeowners, then they can benefit from the increase in house prices and so they may indeed be better off with better policing. (Tak)

(vi) *A new invention which makes capital goods more durable that applies to both new capital goods produced as well as the existing capital stock would reduce rental prices for the capital good in the long run but would have an uncertain effect on long-run capital good prices.*

True. Capital goods becoming more durable is equivalent to a fall in the depreciation rate. In (K, P) space, we can think of this as a shift out of the supply curve. We can see this from the equation for the supply curve

$$R = \frac{1}{\delta} I\left(\frac{R(1-\delta}{r+\delta}\right)$$

Hence, we know that, in the long run, the rental rate of capital must decrease. However, recall that the long-run price of investment is given by

$$\bar{P} = \frac{\bar{R}(1+r)}{r+\delta}$$

Since $\bar{R}$ falls and δ falls, the net effect on $\bar{P}$ is ambiguous. Note that if demand for capital is elastic, then the change in $\bar{R}$ would be relatively small so that $\bar{P}$ is more likely increase.

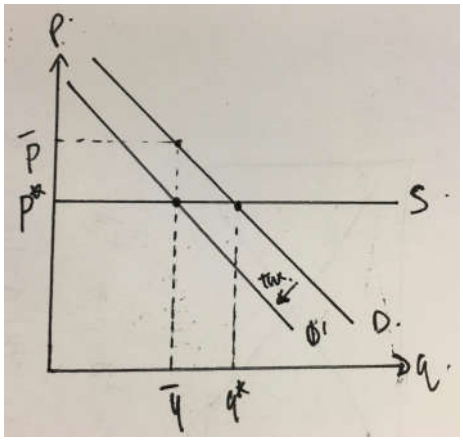
Although not asked, we can also think about the dynamics. In the very run, when capital is fixed (so that rental rate is also fixed), a decrease in the depreciation would lead to a jump in P and also a jump in I. This leads to an increase in capital in the next period, and a fall in the rental rate. Since δ is constant at the new lower value, a fall in the rental rate would reduce price, and leads to lower investment. Hence, we will find that both prices and investment would initially jump, and fall to the new steady-state levels. Capital, on the other hand, would increase gradually to the new, higher steady state level. (Tak)

(vii) *A law that limits the annual catch of fish by stopping fishing once a set limit has been reached for the year would lower the price of fish relative to a system that yields the same annual catch by taxing fish.*

False. Let us compare the limits on the annual catch, which can be thought of as a quota, and per-unit tax on fish caught. It would be natural to think of the supply of fish as being elastic (let's assume we're fishing at the sea so that the reproduction rate does not depend on the price of fish!). As the figure below shows, without any intervention, q^* amount of fish would be caught. Let's suppose that we introduce an annual limit $\bar{q} < q^*$. Then, the price raises to $\bar{p}$ as indicated.

To replicate the same quantity of catches, we can also tax per fish caught, which, in effect, shifts down the demand curve. Since the supply of fish is perfectly elastic, this results in no change in the price of fish. Thus, we found a counterexample to what the statement claims. (Tak)

(viii) *If advertising by a monopolist increases a good's value to all consumers by the same percentage but does not change the monopolist's profit-maximizing price then it would be socially efficient to increase advertising above the level chosen by a profit-maximizing monopolist.*



(ix) *With two factors and CRS, capital augmenting technological progress will benefit workers in both the short-run (capital fixed) and the long-run (a constant real return to capital) and the benefit to workers will be greater in the long-run than in the short-run.*

True. We can write down the production with capital-augmenting technological progress as

$$Y = F(AK, L)$$

Totally differentiating above and manipulating yields that

$$\frac{dY}{Y} = \frac{F_1 AK}{Y}\frac{dK}{K} + \frac{F_1 AK}{Y}\frac{dA}{A} + \frac{F_2 L}{Y}\frac{dL}{L}$$

Using that $w = F_2$ and $r = F_1 A$, we can write this as

$$\Delta Y = s_K(\Delta K + \Delta A) + s_L \Delta L,$$

where s_K and s_L are capital and labour share respectively. Then, TFP is given by

$$\Delta TFP = \Delta Y - s_K \Delta K - s_L \Delta L = s_K \Delta A$$

Because production function is CRS, there is no technological bias; i.e. $\Delta B = 0$. Then, in the short run (i.e. $\Delta L = \Delta K = 0$) we must have

$$\Delta W = \Delta TFP + s_K \Delta B = s_K \Delta A$$

and in the long run (i.e. $\Delta R = 0$), we would have

$$\Delta W = \frac{s_K \Delta A}{s_L}$$

We can therefore see that a positive change in A leads to higher wages, benefiting the workers, and that the effect is greater the higher the share of capital. Since $s_L \in [0, 1]$, we can also see that the long-run change in wages is greater than the short run changes in wages. Since $s_K + s_L = 1$ with CRS, the long-run effect is greater than the short-run effect when capital share is higher. (Tak)

Uncertain. An increase in capital augmenting technological progress means that capital is more productive. It now depends on whether capital and labor are complements or substitutes which can be seen from the cross derivative F_{KL}. If $F_{KL} < 0$, the inputs are substitutes and

workers will loose because wages will drop on impact. In contrast, if if $F_{KL} > 0$, then the inputs are complements and workers' productivity will increase, leading to higher wages. (does not adequately cover the time dimension of the problem) (Jonas)