Some review for the first UGBA 101A exam

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Elasticities

Own price (demand)	ϵ_{xx}^D	$=$	$\frac{dx^D}{dp_x}\frac{p_x}{x^D}$
Own price (supply)	ϵ_{xx}^S	$=$	$\frac{dx^S}{dp_x}\frac{p_x}{x^S}$
Cross price	ϵ_{xy}	$=$	$\frac{dx}{dp_y}\frac{p_y}{x}$
Income	η_x	$=$	$\frac{dx}{dI}\frac{I}{x}$
Substitution	σ	$=$	$\frac{d\left(\frac{K}{L}\right)}{d\text{MRTS}_{L,K}}\frac{\text{MRTS}_{L,K}}{\left(\frac{K}{L}\right)}$

Equilibrium conditions

Interior solution	$x, y > 0$	$\text{MRS}_{x,y}$	$=$	$\frac{p_x}{p_y}$
Corner solution	$x > 0,\ y = 0$	$\text{MRS}_{x,y}$	$>$	$\frac{p_x}{p_y}$
	$x = 0,\ y > 0$	$\text{MRS}_{x,y}$	$<$	$\frac{p_x}{p_y}$

Directions of income and substitution effects of price changes on x

	Substitution effect	Income effect		Total effect	
		Normal good	Inferior good	Normal good	Inferior good
If $p_x \uparrow$	$x \downarrow$	$x \downarrow$	$x \uparrow$	$x \downarrow$	?
If $p_x \downarrow$	$x \uparrow$	$x \uparrow$	$x \downarrow$	$x \uparrow$	?

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Consumer and producer analogues

Consumers		Producers	
Utility function	$U(x,y) = U$	Production function	$F(L,K) = Q$
Marginal utility	MU_x, MU_y	Marginal product	MP_L, MP_K
Indifference curves	$\{(x,y) : U(x,y) = \bar{U}\}$	Isoquants	$\{(L,K) : F(L,K) = \bar{Q}\}$
Marginal rate of substitution	$\text{MRS}_{x,y} = \frac{\text{MU}_x}{\text{MU}_y}$	Marginal rate of technical substitution	$\text{MRTS}_{L,K} = \frac{\text{MP}_L}{\text{MP}_K}$

Solving for an equilibrium

1. Set $Q^S = Q^D$ and solve for the equilibrium price.

2. Plug the equilibrium price into either Q^S or Q^D and solve for the equilibrium quantity.

Finding a demand curve for x

1. Solve $\text{MRS}_{x,y} = \frac{p_x}{p_y}$ for y in terms of x.

2. Substitute the expression for y into the budget constraint and solve for x in terms of p_x.

3. See if there are any values of p_x such that the demand for x is 0 or negative. In these instances, only y will be consumed (important step for quasi-linear utility).

This procedure works if there is an interior solution to the problem. If utility is linear, this will not be the case. Instead, use the corner solution equilibrium conditions listed above to determine whether only x or only y will be consumed. For quasi-linear utility, there will be an interior solution for some values of p_x, p_y, and I and this procedure will permit you to identify these values.

Finding an optimal consumption bundle

1. Follow the instructions above to find the demand curve for x.

2. Plug in the appropriate values of the exogenous parameters to solve for x.

3. Plug this value of x into the equilibrium condition for the problem to find y.

Algebraically identifying income and substitution effects on x

1. Find the optimal bundle under the original prices and income, (x_0, y_0). Also, calculate the utility of this bundle, $U(x_0, y_0) = U_0$.

2. Find the optimal bundle under the new prices and income, (x_1, y_1). Also, note the equilibrium condition expressed as y in terms of x.

3. Substitute the new equilibrium condition for y into the utility function and set the utility level equal to U_0. Solve to find x_D. Substitute this value of x into the new equilibrium condition and calculate y_D. These values comprise the *decomposition bundle.*

4. The substitution effect is $x_D - x_0$.

5. The income effect is $x_1 - x_D$.

6. The total effect is $x_1 - x_0$, which is also IE + SE.