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ECONOMIC THEORY 3A

GIFFEN GOODS

1. We have always assumed that demand curves have negative slopes and that supply curves have positive slopes. In a course like Econ 208 where we are interested in economic theory it is natural for us to ask: can we prove that demand curves must necessarily be negatively sloped and supply curves positively sloped? The answer to the latter question is that the short run supply curve of a competitive firm will always be strictly positively sloped (no horizontal or negatively sloped sections) because of diminishing returns. However, the answer to the first question is disconcerting, because not only is it not possible to prove that demand curves are always negatively sloped, but we can actually prove that there are circumstances in which the demand curve will be positively sloped, even though this can only be true for "sufficiently low' prices.

2. While we cannot give a mathematical proof here we can at least explain the logic of the argument. First we should stress that we assume throughout our discussion that ceteris paribus always hold, and so other prices, income, tastes, technology, etc. are all held constant in this analysis.

3. If the demand curve is strictly negatively sloped, i.e. it is negatively sloped for all prices, then a fall in price must be accompanied by an increase in the quantity demanded and

vice versa. This means that the change in the price of X and the change in the quantity demanded must always be in opposite directions. Therefore ΔP_X and ΔQ_X^D must be of opposite sign, i.e. if one is positive the other must be negative, and vice versa. Therefore $\Delta P_X/\Delta Q_X^D$, which is the slope of the Marshallian demand curve, must be negative.

4. Let us now consider what happens when we reduce the price of X (**you** should do the case where the price of X increases). There are two effects that we must take into account. First, the reduction in the price of X makes X relatively cheaper than all of those other goods whose prices have remained constant because of our ceteris paribus assumption. But, if the consumer was initially in equilibrium then she would have allocated her fixed money income in such a way as to buy the bundle of goods and services that maximizes her level of satisfaction (utility). Such an allocation must satisfy *the optimal allocation rule of economics* that says that resources are optimally allocated if, at the margin, **the return from each good** (in this case its marginal utility) **per dollar spent must be the same for each good**. Now tastes have not changed and so the marginal utilities of the goods have not changed, and so the consumer is now getting more satisfaction from the last unit of X purchased, per dollar, than from any other good. This means that a rational consumer will always wish to buy more of X and less of the other goods and services. This is what economists call the **substitution effect**, SE. The SE means that when the price of X falls (increases), ceteris paribus, consumers will buy more (less) of X. So the SE leads to an inverse relationship between P_X and Q_X^D and also between ΔP_X and ΔQ_X^D. This means that *if there were only the SE to*

take account of then all demand curves would be negatively sloped.

5. But, say that P_X was originally \$2 per unit of X and that the consumer was originally buying ten units of X at a total cost of \$20, the rest of her money income being spent on other goods and services. Now let us reduce the price of X to \$1 per unit of X. If the consumer continues to buy ten units of X at the new price then her total expenditure on X will drop to \$10, and if she continues to purchase the same amount of the other goods and services at their unaltered prices than she will end up with \$10 of her income unspent. This \$10 windfall is called the **income effect**, IE, because it is equivalent to increasing the consumer's purchasing power (income) by \$10.

6. Therefore, when we lower the price of X there will be two effects, the substitution effect, SE, and the income effect, IE. We have seen that the SE causes the consumer to want to purchase more of the relatively less expensive X good and so $\Delta Q_X^D > 0$ if $\Delta P_X < 0$. We now need to determine the impact of the IE on the desired amount of X to purchase.

7. How consumers react to the IE associated with the fall in the price of X depends on the nature of good X. If X is a **normal good** then the consumer will buy more of X when the consumer has more money to spend. Therefore *normal goods and services* -- and most commodities are normal -- will *always have negatively sloped demand curves*, because in this case the IE reinforces the SE. For normal goods the fall in the price of X will lead to a SE that will cause the consumer to wish to buy more X, and an IE that will also cause the consumer to wish to buy more X, since at least part of the spare \$10 will be used to purchase X.

8. The case of **inferior goods and services** is more complicated. When the price of an inferior good falls, it becomes relatively cheaper and consumers will substitute expenditure towards it and away from other goods and services. It is now relatively cheaper to purchase increases in satisfaction by buying X than by buying other goods and services. In other words *inferior goods have standard SEs* and if their prices fall then consumers will wish to buy more of them because of the SE. So, if X is an inferior good and if the only effect of a change in price was the SE, then inferior goods would also have negatively sloped demand curves. But inferior goods also exhibit IEs and these IEs will cause consumers to wish to buy less of the inferior good X when its price falls.

   This result follows from the fact that when income increases we buy less of inferior goods and services, using our increased incomes to purchase the more expensive, but preferred substitutes to the inferior good or service.

9. Therefore *the SE and the IE work against one another in the case of inferior goods*. The fall in the price of the inferior good X leads consumers to want to buy more of it because of the SE, but consumers want to buy less of X because of the IE. The outcome of the price fall is the sum of the SE and the IE, but **the SE is positive** because the price fall leads to an increase in the desire to purchase of X, and **the IE is negative** because the price fall leads to a decrease in the desire to purchase X. Therefore, what happens when the price of an inferior good falls depends on the *relative magnitudes of the SE and the IE*.

10. There are **three cases** that we need to discuss. In the **first case** *the SE swamps the IE*. For example the SE might lead

consumers to wish to increase their consumption of X by four units, whereas the IE might lead the consumers to wish to cut back their consumption of X by two units: SE + IE = 4 + (-2) = 2 > 0. In *this case the demand curve will always be downward sloping* although more steeply than if we had only the SE to contend with.

11. It is possible that **the SE and the IE simply cancel one another out**. For example the SE is 4 and the IE is -4. In this case the consumer would wish to buy the same amount of X at the new, lower, price and the demand curve would be vertical over the relevant price range. (See Figure 2.) But note that *the demand curve can only be vertical at "low" prices*. This is because the consumer's expenditure on X is the product of the price of X, P_X, and the quantity of X purchased, Q_X, and therefore there will exist some price, P_X^*, such that $P^*_X.Q_X = I_0$ the consumer's given money income. Hence, for any price above P_X^* the consumer would not be able to purchase the same amount of X and the demand curve would begin to bend backwards towards the vertical axis and the demand curve would be negatively sloped for all prices above P_X^*.

12. Finally we come to **the case where the IE is larger (in absolute magnitude) than the SE**. Say, for example that the SE is 4 and the IE is -6 then the consumer will reduce her purchases of X by two units when the price falls (SE + IE = 4 + (-6) = -2). So in this case the fall in price is accompanied by a fall in the quantity demanded and *the demand curve is negatively sloped over the relevant price range*. (See Figure 3.)

    But, if the demand curve is positively sloped, then total expenditure on X must increase as P_X increases. Therefore,

the demand curve for X can only be positively sloped for sufficiently "low" prices, where total expenditure on X is less than or equal to I_0. Once the price rises to a level at which $P_X.Q_X > I_0$ then the consumer can no longer afford to buy more X as its price rises and the demand curve takes on a negative slope.

This final case -- where the good or service is inferior and the $|IE| > SE$ -- is called the **Giffen good** (GG) case, after the reference by Alfred Marshall to Sir Robert Giffen Governor General of Ireland who, according to Marshall, wrote that the consumption of potatoes increased as their price increased during the great Irish potato famine of the 1840s.

Notice that from an economic point of view the Giffen phenomenon is strange because it requires X to be *inferior* -- which means that consumers do not prefer it to its more expensive substitutes -- and for X to have a *large IE*. The two properties if the GG seem to be contradictory. Marshall's example is interesting because it tells a plausible story -- but one that, alas, appears to be untrue. His example suggests that we should look for the GG phenomenon where the good is a crucial component in the consumer's budget perhaps because the consumer needs to purchase the GG in order to stay alive. However, despite much research the GG has remained elusive and no economist has ever come up with an example that withstood careful scrutiny. Purported GGs have always turned out to involve subtle violations of the ceteris paribus assumption.

Finally, note that *you should not confuse the GG with an inferior good*. All GGs are inferior, but only some inferior goods and services could be GGs (and at present the set of

GGs appears to be empty). An inferior good is one where a fall in *income* leads to a fall in demand (*a shift of the demand curve*). Whereas a GG refers to a good where, when its *price* changes -- ceteris paribus -- there is *a movement along the positively sloped (section) of its demand curve*.

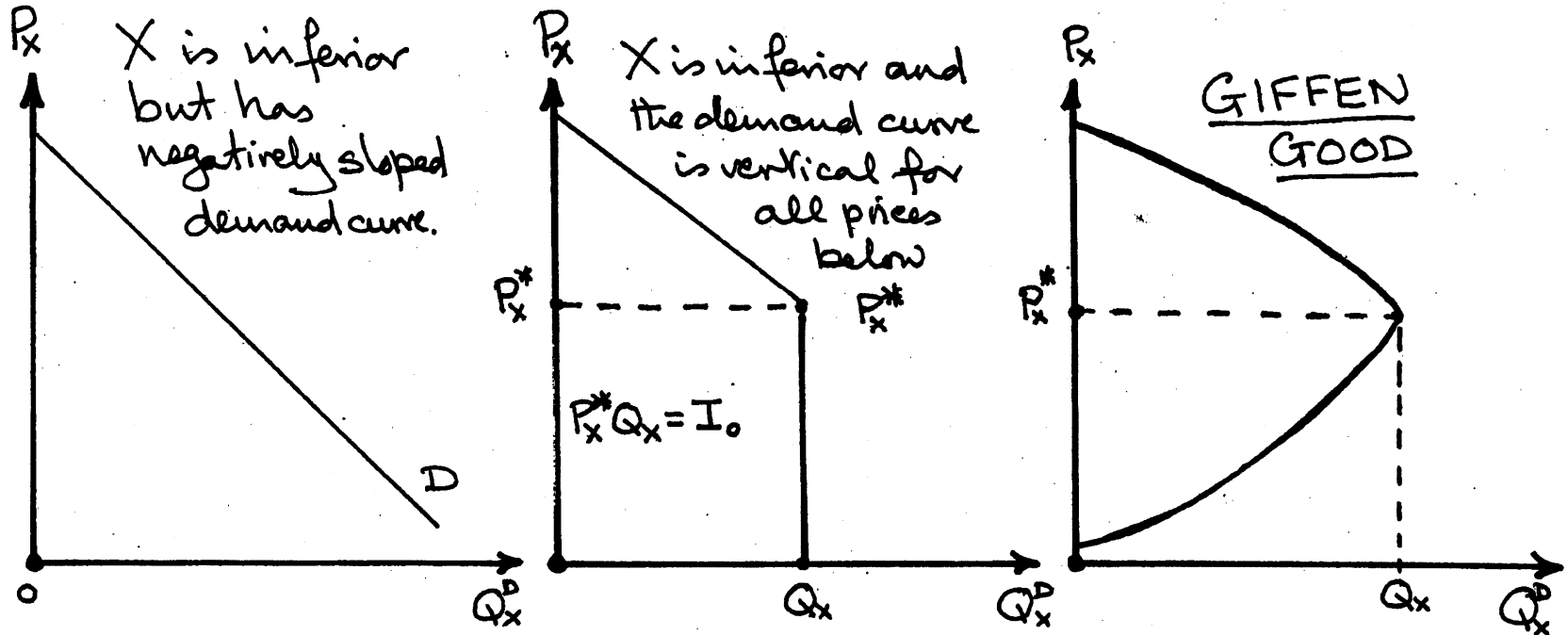

Figure 1

SE > |IE|

Figure 2

SE = |IE|

Figure 3

SE < |IE|

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ECONOMIC THEORY 3B

STATIC STABILITY ANALYSIS

1. Qualitative comparative static (QCS) is a powerful analytical tool but you must understand its limitations if you are to use it safely. We usually assume that demand curves have negative slopes and that supply curves have positive slopes. However, as we have seen in ET 3A and in class, we may wish to investigate unusual configurations of supply and demand curves. The Giffen good (GG) is a case in point. At least for "low" prices the demand curve may be positively sloped, and we also saw that inferior goods may have vertical demand curves at "low" prices. And while the short run supply curve will be positively sloped as soon as diminishing returns to the variable input sets in, in the long run it is perfectly reasonable to assume that the supply curve will be horizontal in the case of constant returns to scale and positively sloped in the face of increasing returns to scale -- a favorite topic of economists during the last fifteen years or so. Further, in asset markets -- for example the stock market or the foreign exchange market -- "expectational" effects may lead to perversely sloped demand and supply curves as transactors anticipate further price falls or increases, and markets exhibit herding or momentum effects. And, of course, in Econ 206 you considered vertical and horizontal demand and supply curves when studying elasticity of demand and supply. By now you are aware that demand and supply curves are unlikely to exhibit perverse behavior for all