REGULATORY BUNDLING*

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Goods may be sold individually or in bundles of two or more. Many examples of bundling are presumably explicable in terms of cost economies: the convenience of selling - and, for most consumers, of buying - shoes in pairs outweighs the inconvenience and cost imposed on persons with one leg or odd-sized feet; it may cost less to fit heaters to all examples of an automobile model than to produce and sell some without heaters.

Bundling can also serve as a monopolistic selling strategy for extracting consumers' surplus. Its modus operandum is described most succinctly by Stigler in his analysis of block booking of motion pictures (1963). A recent detailed analysis of monopolistic bundling is by Adams and Yellen (1976). For bundling to serve as a form of price discrimination does not require there to be complementarities in either production or consumption of the tied goods: indeed, disjointness in tastes for the tied goods is needed for the strategy to be successful.

Commodity bundling can also arise as the unintended consequences of government regulation. Tying the sale of a good the price of which is controlled to the sale of an uncontrolled good is a well-known means of evading the price control, and many price-control ordinances outlaw the practice. Bundling may also be used to minimize the effect of quantitative restrictions. Thus Australian car importers appear to have sought to make best use of their import licences (which limit the number of units imported) by bringing in top-of-the-line models loaded with optional equipment.

However, an increasing number of tied sales are being made, not necessarily to reduce costs, exploit consumers, or evade controls, but simply in order to comply with the law. In recent years there has been a rapid growth in industrial censorship, and socialization of risk, so that the

freedom to contract has been abridged and many transactions have been subjected to detailed regulation. The thrust of recent regulatory and legal innovation has been overwhelmingly in the direction of tying, rather than separating, goods and services for the purpose of sale. Design rules that require the incorporation in products of certain "features" or components, mandatory warranties, and the shift in the law toward strict seller liability, all compel sellers to offer as composite packages goods that otherwise would be sold separately.

This paper is concerned with the effects of bundling on quantities sold and consumers' surplus, on the assumption that each good is produced and sold at constant cost, and the price of the composite is equal to the sum of the costs of its components. Since no consideration is given to production or marketing complementarities, monopoly, or cost changes, the analysis is of limited applicability to voluntary bundling. It is intended as part of an analysis of enforced bundling.

Goods which are bundled may be technically unrelated in consumption, but more commonly are in some way complementary. I shall consider both unrelated goods, and goods that are complementary in the manner that a product and an accessory are complementary: the product is useful without the accessory, but the accessory is useful only in conjunction with the product. I also assume that each good is such that no consumer would wish to own more than one unit of it (or purchase more than one unit per time period). This assumption is reasonably realistic with respect to numerous consumer durables, some services, etc., and is analytically convenient in that it gives the demand curve a very simple interpretation: it is an array, in descending order, of different consumers' willingness to pay for a unit of the good. The quantity demanded at any price is equal to the number of consumers at that price.

Non-complementary Goods

The effect of bundling on quantities sold and consumer welfare can be analysed conveniently with the aid of a diagram used by Adams and Yellen (Figure 1). On each axis is measured the price of a good (A or B), either the market price or the maximum price that each individual is willing to pay (demand price). Thus each consumer's demand prices for A and B can be represented by a point in the figure, and the market prices of A and B represented by a horizontal and a vertical line respectively. The figure is thus divided into four quadrants, corresponding to the four possible consumer responses: I, buy neither A nor B; II, buy A only; III, buy both; and IV, buy B only.

If the goods are now bundled, and sold at a price for the composite (P_C) equal to the sum of the former prices of each component, the bundle's price is shown by a line of slope minus one passing through the intersection of the two initial price lines: the sum of the coordinates of any point on this line equals P_A+P_B. The figure is now divided into two areas: that enclosed by the composite commodity's price line and the axes, containing those consumers who do not consume the composite good; and the open area above the price line, containing those who do buy it.

It is clear that bundling, with $P_C = P_A + P_B$, affects only consumers in quadrants II and IV, i.e. former consumers of A or B only. When the goods are priced separately, these consumers enjoy a surplus (S) on one and would experience a "deficit" (D) on the other. Their response to bundling depends on the relative sizes of their surpluses and deficits. Those for whom the deficit on the unwanted good exceeds the surplus on the wanted good are excluded from consuming the wanted good. Those for whom the reverse is true are induced to buy the composite good, with the deficit on the unwanted component partially offsetting the surplus on the

wanted good. There are thus four groups, as follows:

1. Sector II(1), A-consumers excluded, $S_A < D_B$
2. Sector II(2), New B-consumers, $S_A > D_B$
3. Sector IV(1), B-consumers excluded, $S_B < D_A$
4. Sector IV(2), New A-consumers, $S_B > D_A$

The effects of bundling on quantities depends on the relative sizes of these four groups. Any combination of quantity changes is possible: consumption of both goods may increase, or decrease, or consumption of one may increase and of the other decrease.

It is worth noting that net changes in quantities consumed are no guide to the welfare effects of bundling. Thus it would be possible to have no aggregate change in quantities (group 1 = group 4, group 2 = group 3) yet a substantial loss of surplus.

It can also be concluded that the effects of bundling are likely to be greater, the more negatively correlated are individual's valuations of the two goods; for, with negative correlation, a higher proportion of the demand-price pairs are likely to fall in quadrants II and IV; or, more fundamentally, the more likely are surpluses to be reduced or wiped out by deficits.

Complementary Goods

The type of complementarity to be discussed is that exemplified by a product and an accessory, whereby the product provides services with or without the accessory, but the accessory is useful only in conjunction with the product. This specification fits the mandatory design rules case exactly; however, "accessory" should not be interpreted only in a literal fashion: it could be, for example, a manufacturer's warranty of his good against defect, or some element of service offered by a seller.

I assume that an individual's willingness to pay for the accessory is unaffected by the price of the product, and vice versa (i.e. income effects are ignored). However, he will not buy the accessory unless he simultaneously buys the product. He has the choice of buying neither, of buying the product alone, or of buying the product plus accessory. He will choose the second or third option only if it yields him a positive surplus (however small) and of the two will choose the one that yields the greater surplus. Thus he will not purchase the accessory if it yields him a deficit - since he would do better with the product alone - but he will purchase the product, as part of a product-accessory combination, even if it yielded a deficit, provided the surplus yielded by the combination was positive.

From the foregoing it is obvious that product-accessory complementarity has some of the same effects as does the bundling of unrelated goods. Specifically, surpluses associated with the accessory (B) are set against deficits associated with the product (A), thus boosting sales of the latter and restricting sales of the former. But unlike bundling, there is no offsetting of surpluses and deficits in the opposite direction. Hence it can be anticipated that the distortions and losses of surplus brought about by bundling will be less in the product-accessory case than with unrelated products: the former are, so to speak, already partly bundled.

The following tabulation lists the same four groups affected by bundling that were distinguished above. It shows the good(s) each consumes if the two goods are unrelated, are product and accessory, or are bundled.

	Group	Unrelated	Product-Accessory	Bundled
1.	$S_A<D_B$	A	A	Neither
2.	$S_A>D_B$	A	A	A+B
3.	$S_B<D_A$	B	Neither	Neither
4.	$S_B>D_A$	B	A+B	A+B

If A and B are unrelated, group 3 consists of B-only consumers who are excluded as a result of bundling. But if B is an accessory it is not consumed alone, so this group consumes neither good, whether or not they are bundled. Similarly group 4 is unaffected by bundling, if A and B are product and accessory, since they are "bundled" already. Hence the effects of bundling of a product and accessory are limited to groups 1 and 3, (quadrant II), and are unambiguous: consumption of the product decreases (cannot increase) and of the accessory increases (cannot decrease).

Some Special Cases

In this section the effects of bundling are analysed using ordinary supply-and-demand tools and consumers' surplus. Only certain special cases are amenable to this method of analysis. This is because the adding together of each individual's valuations of A and B (which is necessary in order to derive the demand curve for the composite good (A+B) from the demand curves for its components) can be done only if there is a known relationship between the ordering of individuals along the two component demand curves. Two obvious, if extreme, cases that are analytically simple are those of perfect rank correlation, positive or negative, between individuals' willingness to pay for A and willingness to pay for B. A third case, amenable to a probabilistic analysis, is that of zero rank correlation between the valuations.

1. Positive Rank Correlation of Willingness to Pay for A and B

In Figure 2, AC is the demand curve for A, and BD the demand curve for B. The price of A is OG, and of B, OH. If the goods are sold independently, the quantities demanded are OJ and OK respectively, and the consumers' surplus is shown by the two hatched areas.

If there is perfect rank correlation between individuals' valuations of A and of B (and if the highest-ranking demander of B is also the highest-ranking demander of A), each point on the abscissa represents a particular individual, and the corresponding ordinates on BD and AC represent the maximum amounts he is willing to pay for B and A respectively. The demand for (A+B) can now be found simply by vertical addition of BD and AC. By assumption, the price of the composite is the sum of the prices of its components, i.e. OH+OG. The resulting equilibrium is shown in Figure 3, where the price of (A+B) is OM, and the quantity is OL.

The effect of tying is to reduce the quantity consumed of the major good (i.e. the good of which a greater quantity would be sold if both goods were sold separately) and increase consumption of the minor good. The consumer surplus is reduced by an amount equal to the two small triangles labelled a- and b+: the first represents the surplus given up through the reduced consumption of A; the second, the excess of price paid over consumers' valuation of the additional consumption of B.

Note that the loss of surplus is smaller, the flatter are the demand curves. The bundling of the goods requires that any initial discrepancy in their quantities demanded be eliminated, in this case by an increase in one and a decrease in the other, so apportioned that the marginal valuations of each change by equal but opposite amounts. Thus the triangles a- and b+ have a common height, and their bases sum to KJ. For any given KJ, the flatter the demand curves the smaller the change in marginal valuations required, and hence the smaller the area of the triangles.

The effect of bundling on quantities in this case (major good decreases, minor good increases) is similar to the product-accessory case discussed earlier (product decreases, accessory increases). The reason is similar, viz. the lack of change in, or emptiness of, one of the quadrants,

II or IV. Perfectly positive rank correlation of valuations of A and B implies that no valuation-pair lies north-west or south-east of any other pair in Figure 1. This in turn implies that either quadrant II or quadrant IV is empty.[1] If IV is empty, A is the major good, and if II is empty, B is the major good. The first case is illustrated by Figure 3, the second by Figure 4.

If consumers' valuations of A and B are perfectly and positively correlated by rank, and B is an accessory of A, the outcome depends upon which quadrant is empty. If IV is empty, the initial equilibrium, and the effects of bundling, are the same as for unrelated goods. But if II is empty, the initial equilibrium is the same as the bundling equilibrium for unrelated goods, so that bundling has no effect. The two cases are illustrated by Figures 3 and 4 respectively, with, in Figure 4, OL being the pre- and post-bundling equilibrium quantity of each good. If the marginal B-consumer enjoys a positive surplus on A, quadrant IV is empty, since, by the positive correlation assumption, all intra-marginal consumers of B must also obtain positive surpluses from A. On the other hand if the marginal B-consumer values A at less than its price, he is in quadrant IV and hence II must be empty.

2. Negative Rank Correlation of Willingness to Pay for A and B

If the valuations of A and B shown in Figure 2 were prefectly negatively correlated, the array of individuals from left to right whose valuations form BD would correspond, person to person, to the array from right to left whose valuations form the lower part of AC. It would then be legitimate to add BD vertically to AC, provided BD were first reversed and displaced to the right so that its origin corresponded to point C. This is done in Figure 5.

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1 Conceivably, both could be empty.

The losses of surplus resulting from bundling are the areas delineated b- (B-consumers excluded), a- (A-consumers excluded) and b+ (new B-consumers). With different initial price configurations, different outcomes are possible. For example, Figure 6 incorporates lower prices for A and B, and bundling results in an increase in consumption of both components, in contrast to the reduced consumption of A illustrated in Figure 5.

As mentioned earlier, negatively correlated valuations enhance the opportunities for bundling to affect consumer behaviour, and any combination of quantity changes are possible. As illustrated in Figures 5 and 6, the vertical addition of the component demand curves with the origin of one reversed can produce a highly elastic demand curve for the composite good. Or, in terms of Figure 1, the composite good's price line is a knife's edge, which, with small displacements inwards or outwards, can cause many consumers to switch from not consuming to consuming the composite good, or vice versa.

3. Willingness to Pay for A and B Uncorrelated

If consumers' valuations of A and B are uncorrelated, the demand curve for (A+B) is obtained by pairing the valuations of A and B at random, and arraying the resulting sums in descending order. The expected, or average, outcome when two linear demand curves are summed by random pairing, and where one (that of the minor good) has a substantially smaller price range than the other, is as shown in Figure 7. The demand curve for the major good, A, is raised, over the greater part of its length, by the average valuation of the minor good (reckoned inclusive of zero valuations): at its upper and lower extremities, the curve is raised by greater and lesser amounts, respectively. (This is because there is a small probability that the two highest and the two lowest valuations will be paired.) Pro-

vided, then, that the equilibrium quantity of (A+B) does not fall near the extremities of the demand curve, the quantity consumed of A will rise or fall, as a result of bundling, according as the price of B (which is added to the price of A to give the price of (A+B)) is less than or greater than the average valuation of B.

It can also be verified, by a little experimentation with different initial price and quantity combination, that bundling can result in any combination of direction of quantity change of A and B.

The welfare effects of bundling in this case can be analysed more clearly with the aid of a separate diagram (Figure 8), in which the top panel shows the demand for A and the consumers' surplus (area hatched with plusses) when A is sold separately at price OG, and the middle panel shows the demand for B and the consumers' surplus when B is sold separately at price OH. (The bottom panel will be explained presently.)

If the two goods are sold only as a composite at price OG + OH, the loss of surplus can be analysed as follows:

Consider first the surplus associated with the consumption of B. If individuals' valuations of A and B are uncorrelated, consumers along the segment oc will be distributed at random along OC. It is therefore to be expected that, on average, oj/oc of the total B-surplus would accrue to individuals lying on the OJ segment of OC, where oj/oc = OJ/OC. Similarly js/oc of the B-surplus would belong to individuals on the JS segment, and sc/oc to those on the SC segment of OC. Thus the total B-surplus can be subdivided into the three triangular portions as shown in the diagram, each portion being associated with a particular range of valuation of A. On OJ, the valuation of A exceeds OG; on JS - since GL = BH - it lies between OG and (OG - BH); on SC, it lies between (OG - BH) and zero.

The portion represented by the triangle with base oj accrues to individuals who also enjoy a positive surplus from the consumption of A. When A and B are sold only as a bundle, they will purchase the bundle, and enjoy the same surplus as when the goods were sold separately. Hence the triangle with base oj, which is redrawn in the bottom panel of the diagram, is hatched with plusses to indicate that this part of the B-surplus remains intact with bundling.

The triangle with base sc represents B-surplus accruing to individuals for whom the price of A exceeds their valuation of A by as much or more than the maximum surplus that any of them derive from B. Hence none would consume the composite good, and the surplus which, in the absence of bundling, they would gain from consuming B, would be lost.

B-surplus enjoyed by individuals who would not consume A if it were sold separately but who might conceivably purchase the composite good is represented by the triangle with base js. Consider a person enjoying the maximum surplus on B (i.e. BH), and whose valuation of A fell within the JS segment. His surplus on B would outweigh his deficit on A and he would purchase the composite good. His B-surplus would be reduced by the amount of his A deficit, which could range from zero to BH: on average, half of his B-surplus would be expected to be lost. The same reasoning applies to a person enjoying half of the maximum B-surplus, whose A-valuation lies on the JR segment (JR = ½JS); i.e. on average, half of the B-surplus would be lost. But if his A-valuation lay on the RS segment, the A-deficit would exceed the B-surplus, the composite would be rejected, and all his B-surplus would be lost. Hence, over the whole JS segment, three fourths of the surplus of individuals having B-surpluses equal to 1/2 (BH) would be expected to be lost. For persons with smaller B-surpluses, greater proportions would be lost. Hence substantially less than half of the B-

surplus represented by the triangle with base js would remain intact after bundling: this is the area hatched with a plus in the bottom panel of the diagram.

Now consider the area c'DCo'. This is the deficit that non-consumers of B would suffer if they were forced to consume B. The bundling of A and B will induce some consumers to suffer deficits on B provided they are offset by surpluses on A.

The total deficit can be apportioned among different ranges of A-valuation in the same manner as the B-surplus was apportioned. The three delineated portions are redrawn in the lower panel. The part of the deficit associated with the segment OK will become operative, since all individuals on this segment enjoy an A-surplus equal to or greater than the maximum B-deficit (MG being equal to OH), and hence will purchase (A+B). The portion associated with the JC segment will not become operative, since no individual on that segment enjoys any A-surplus. Finally, more than half of the deficit associated with the KJ segment will become operative: the reasoning is analogous to that relating to the loss of surplus over the JS segment. The "operative deficits" are shown as areas hatched with minuses in the bottom penal: they represent the amount of A-surplus that is lost through being offset by B-deficit as a result of bundling.

The total consumer surplus with bundling is the plus-hatched areas in the top and bottom panels, less the minus-hatched areas in the bottom panel.

If B were an accessory of A, a smaller quantity would be consumed than if it were an independent good. The total pre-bundling surplus would consist of the plus-hatched areas in the top and bottom panels, and the surplus lost through bundling would be the minus-hatched area in the bottom panel.

An Inappropriate Comparison

Enforced bundling has been analysed with the aid of a construct similar to Figure 7 (Hirsch, 1981; Parish, 1980). The mandatory addition of certain "features" to a "product" (in both the cases cited, tenant-protection clauses to landlord-tenant agreements) raises both the supply and demand curves for the product. With parallel shifts of the curves, the welfare effect of the change (as measured by the change in total surplus) is positive or negative according as the change in quantity is positive or negative, i.e. according as the demand curve rises more or less than the supply curve. Several comments on this mode of argument are in order.

1. The parallel shift in the demand curve may be rationalized (exactly) by the implausible assumption that all consumers and potential consumers of the product value the mandatorily-included features uniformly. Alternatively it may be justified (approximately) by the assumption of zero correlation between consumers' valuation of the bare product and their valuation of the added features.

2. In the second case, the uniform upward shift in demand may mask substantial distributional effects, since the ordering of consumers along the uplifted curve may be very different from along the original curve, and intra- and extra-marginal, as well as marginal consumers of the product, may be excluded or included.

3. To make a comparison between the economic surplus associated with two goods in a bundle, and that associated with <u>one</u> of them sold separately is an inappropriate way of analysing the welfare effects of enforced bundling, since it ignores the surplus associated with the other good if and when sold separately. The comparison conflates the effects of (i) the

availability of the minor good/accessory and (ii) its bundling with the major good/product. Such a comparison might be appropriate in an historical sense if the minor component had not been available prior to its mandatory addition to the major component, but is not appropriate analytically unless, in addition, it were not feasible to untie the bundle and sell both components separately.

Equivalent Fiscal Measures

Bundling may be compared with normal fiscal means of encouraging or discouraging the consumption of particular goods. With non-complementary goods the effects of bundling generally do not, but in some special cases do, correspond to those obtainable by means of a simple tax-subsidy scheme. Bundling can rather be likened to the imposition of a whole set of discriminatory taxes and subsidies, individually tailored to the tastes of different individuals. Thus those located in sectors II(2) and IV(2) of Figure 1 can be thought of as receiving a subsidy just sufficient to offset each individual's deficit on one good, and paying a tax on the other good equal to the subsidy received on the first. Those in sectors II(1) and IV(1) behave as if a tax had been imposed on A or B high enough to deter them from consuming the good.

One special case for which a simple tax-subsidy scheme would duplicate the effects of bundling is when consumers' valuations of A and B are perfectly and positively correlated by rank. As is evident from Figure 3, the scheme would need to comprise a subsidy on B and a tax on A equal to amounts shown by the braces labelled s and t, respectively. Since s and t are equal, and equilibrium consumption of A and B would also be equal, the scheme would be self-financing: like bundling, it would involve the exchequer in no cost. This case is also illustrated in demand-price space

in Figure 9, where the distribution of consumers' valuation-pairs is shown by the line of x's. It is this highly special distribution that causes bundling and the tax-subsidy scheme to have equivalent effects. They would obviously not be equivalent if, for example, some of the valuation-pairs fell in the eastern or southern arms, or in the centre, of the cross formed by the two sets of parallel price lines.

Bundling of a product (A) and accessory (B) is also equivalent to a self-financing tax-subsidy scheme, viz. the full subsidization of the cost of the accessory, and the taxation of the product at the same rate as the accessory is subsidized. This result can be explained with the aid of Figure 10, in which the demand-price space is divided (by unbroken lines) into areas corresponding to the three possible consumer responses: buy A, buy A and B, buy neither. It will be recalled that product-accessory complementarity has the same effect on consumers in quadrant IV as does bundling in the case of non-complementary goods: it forces them to choose either A+B or neither. In reducing the price of the accessory to zero and increasing the price of the product to (P_A+P_B), the tax-subsidy scheme eliminates quadrants I and II from the diagram. Consumers thus find themselves in either quadrants III and IV, and, because of the complementarity, behave in the same way as if the goods had been bundled.

One caveat regarding this result is in order. It assumes that consumers who value the product at its tax-enhanced price or higher, but value the accessory at naught, will nevertheless acquire the accessory if its price is zero. But their behaviour is in fact indeterminate. Bundling eliminates any indeterminacy, and hence the two policies are not completely equivalent. It is also possible that some consumers might regard the accessory as a bad. With bundling some at least would acquire the com-

posite - viz. those whose surplus on A outweighed their negative valuation of B; however, they presumably would subsequently discard the accessory, if it were detachable. (Several mandatory accessories of automobiles are examples.) With the tax-subsidy scheme, these consumers would not acquire the accessory.

Summary

The effects of the bundling of goods produced and sold at constant cost and consumed in unit quantity have been analysed. The principal findings with respect to non-complementary goods are as follows:

1. In general, bundling can produce any combination of quantity changes for the two goods.

2. If all consumers of the minor good are also consumers of the major good, bundling causes the quantity of the minor good to increase and of the major good to decrease.

3. Large and strange combinations of quantity changes - such as an increase or a decrease in both goods - are more likely to occur if consumers' demand prices for the two goods are negatively correlated.

4. Negatively-correlated demand prices are also capable of producing a highly elastic demand for the composite good.

5. Given the postulated conditions of supply, bundling affects only those who would consume one good but not the other, by forcing them to give up the wanted good or buy the unwanted good. They thus experience a loss equal to the smaller of their surplus on the wanted good and their deficit on the unwanted good.

6. The welfare losses are thus likely to be greater the more dis-

joint are the sets of consumers of each good, i.e. the more negatively correlated are consumers' valuations of the two goods.

7. Except for very special distributions of consumers in demand-price space, bundling of non-complementary goods is not equivalent to any simple tax-subsidy scheme.

If the bundled goods are a product and an accessory, the above findings are modified as follows:

1. The quantity and welfare effects of bundling tend to be smaller for a product and accessory than for unrelated goods, since the constraints on consumer choice imposed by this type of complementarity amount to a pre-existing partial bundling of the two goods.

2. Bundling causes the quantity of the accessory to increase and of the product to decrease.

3. Bundling of a product and an accessory is the equivalent of subsidizing the full cost of the accessory and taxing the product at the same rate as the accessory is subsidized.

To infer the welfare effect of tying a minor good/accessory to a major good/product from the relative shifts in the latter's supply and demand curves resulting from the incorporation of the former is to conflate the effects of (i) the availability of the minor good/accessory, and (ii) tying it to the major good/product. On standard assumptions, the welfare effects of (ii) can only be negative (but see Concluding Disclaimer).

Concluding Disclaimer

In conclusion I wish to point out two major limitations of my analysis. First, by assuming that consumers are well-informed and rational, and that their preferences should be respected, and by disregarding possible externalities in consumption, I have ignored the major arguments in favour of regulatory bundling and hence any benefits it may have. For some of these arguments a benefit analysis could simply be tacked on to my analysis of costs, but for others, especially those based on a presumption of consumer ignorance or irrationality, or a rejection of consumer sovereignty, my analysis would require more extensive modification, or it might be deemed irrelevant. Furthermore, assuming that a case for intervention is made out on grounds of market failure or non-economic considerations, the question arises as to whether bundling is the most appropriate form of intervention.

Second, by assuming constant costs and pricing at cost, I have deliberately simplified the supply side of the analysis so as better to concentrate on demand effects. But if regulatory bundling is viewed as a manifestation of interest-group politics, my analysis is also seriously incomplete in assuming away producer rents and thus depriving the predominant private interests of their motivation for persuading the state to enforce the tying of their good to another good.

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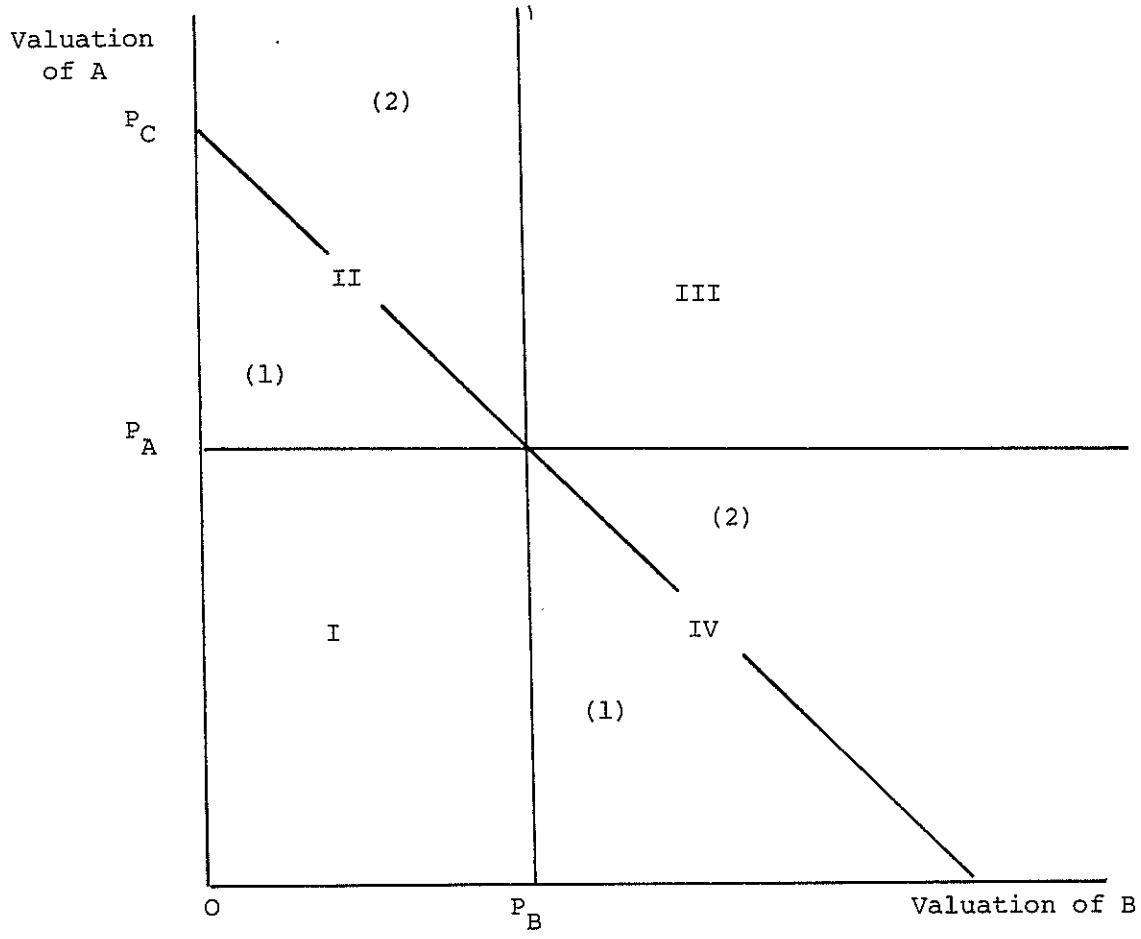


FIGURE 1

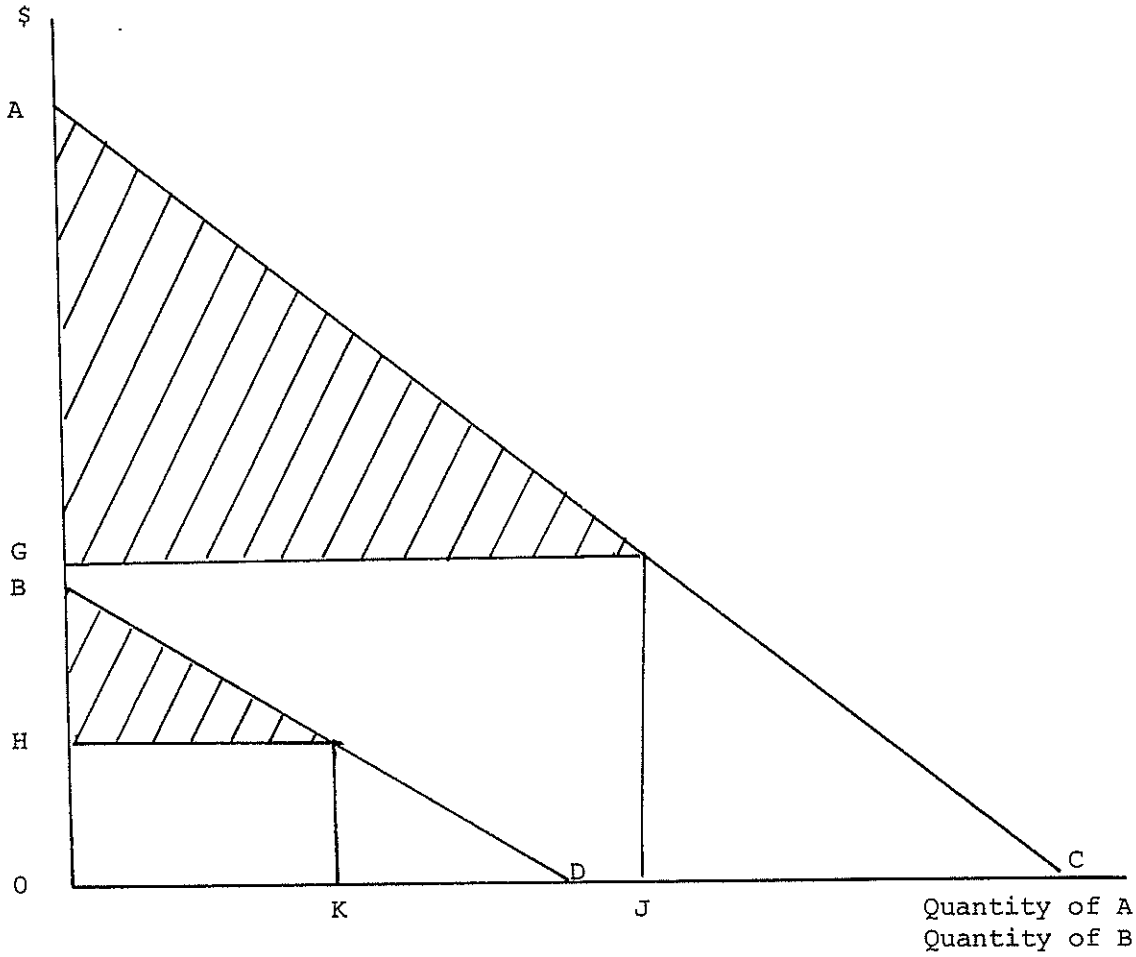


FIGURE 2

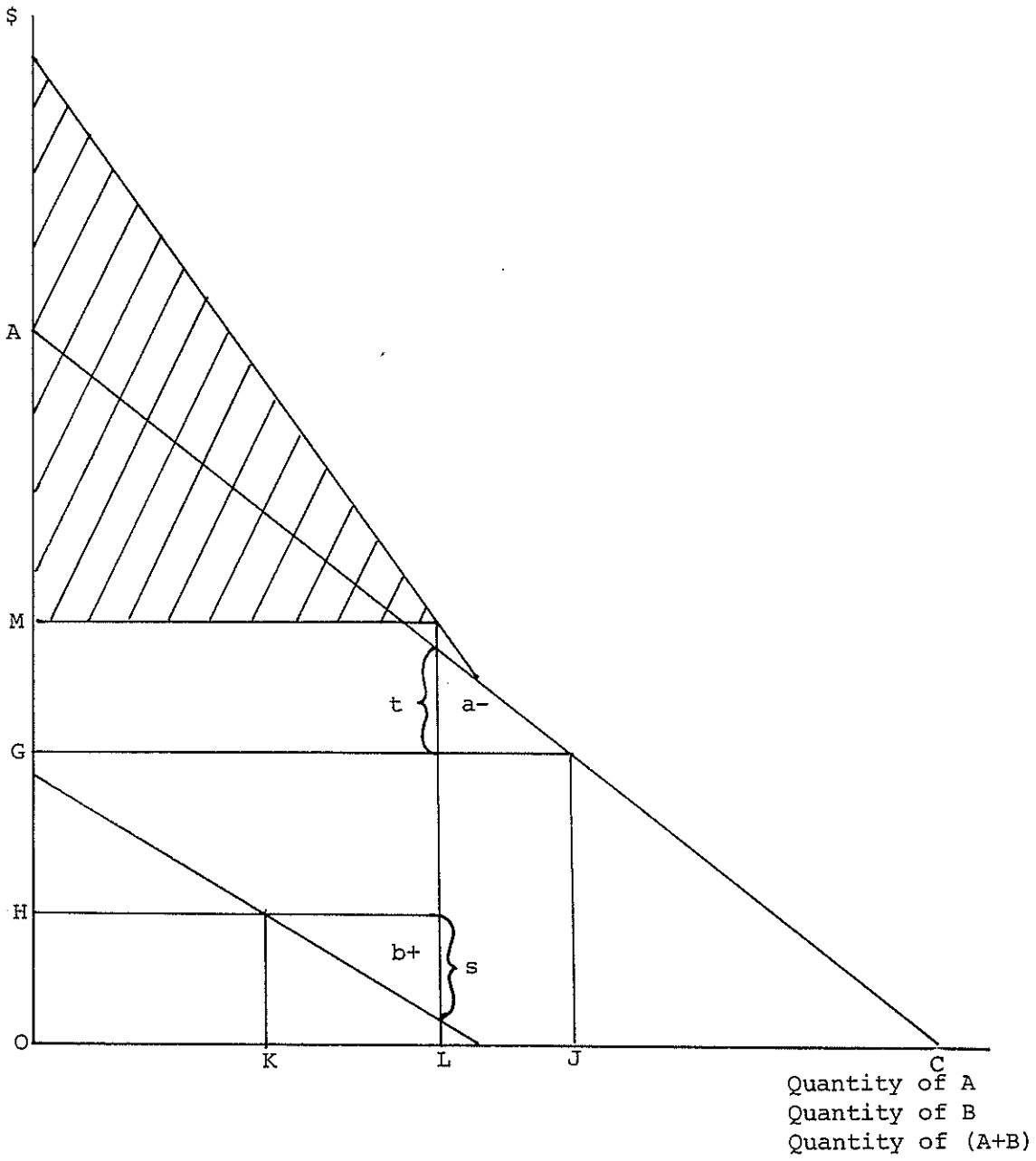


FIGURE 3

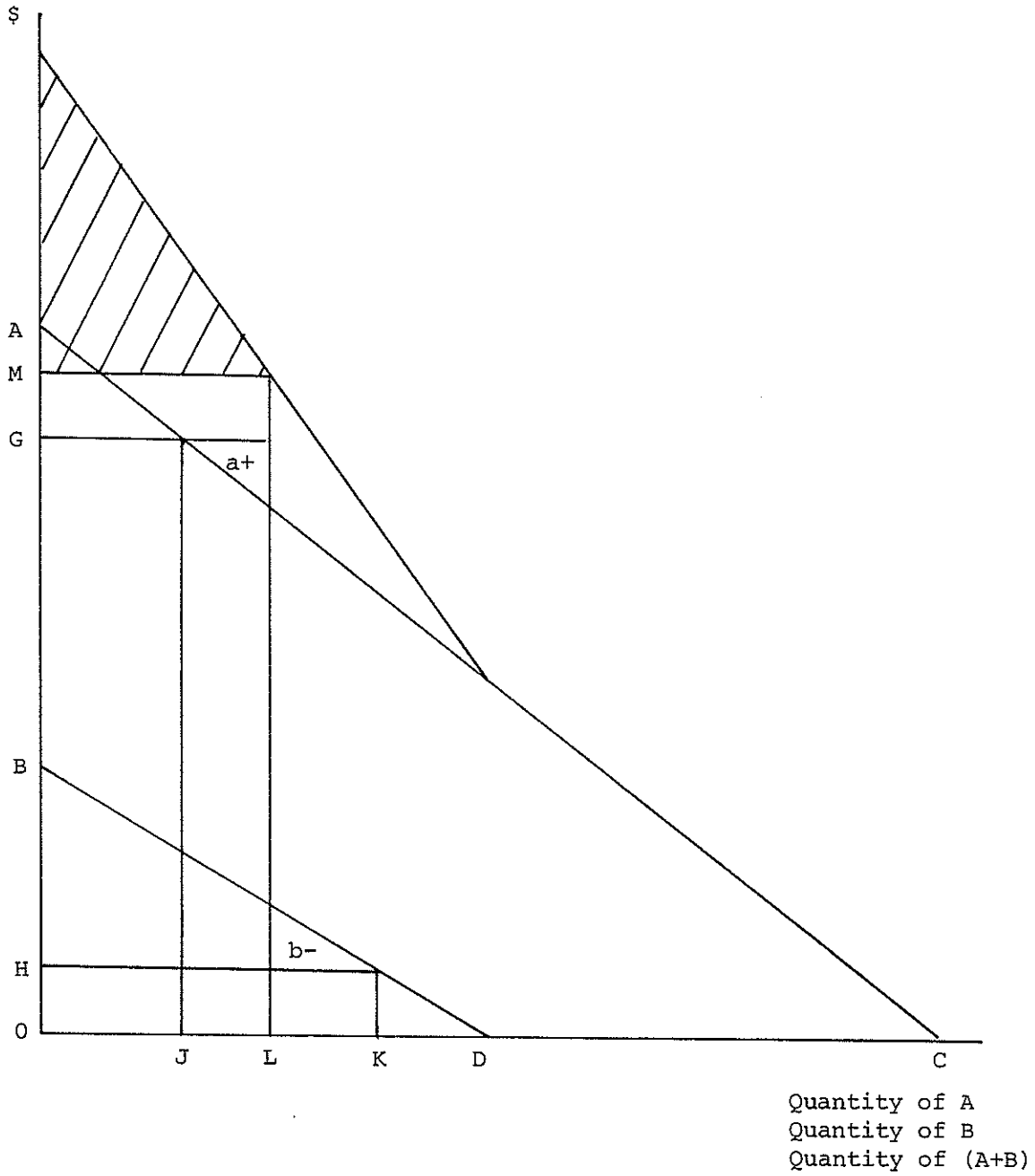


FIGURE 4

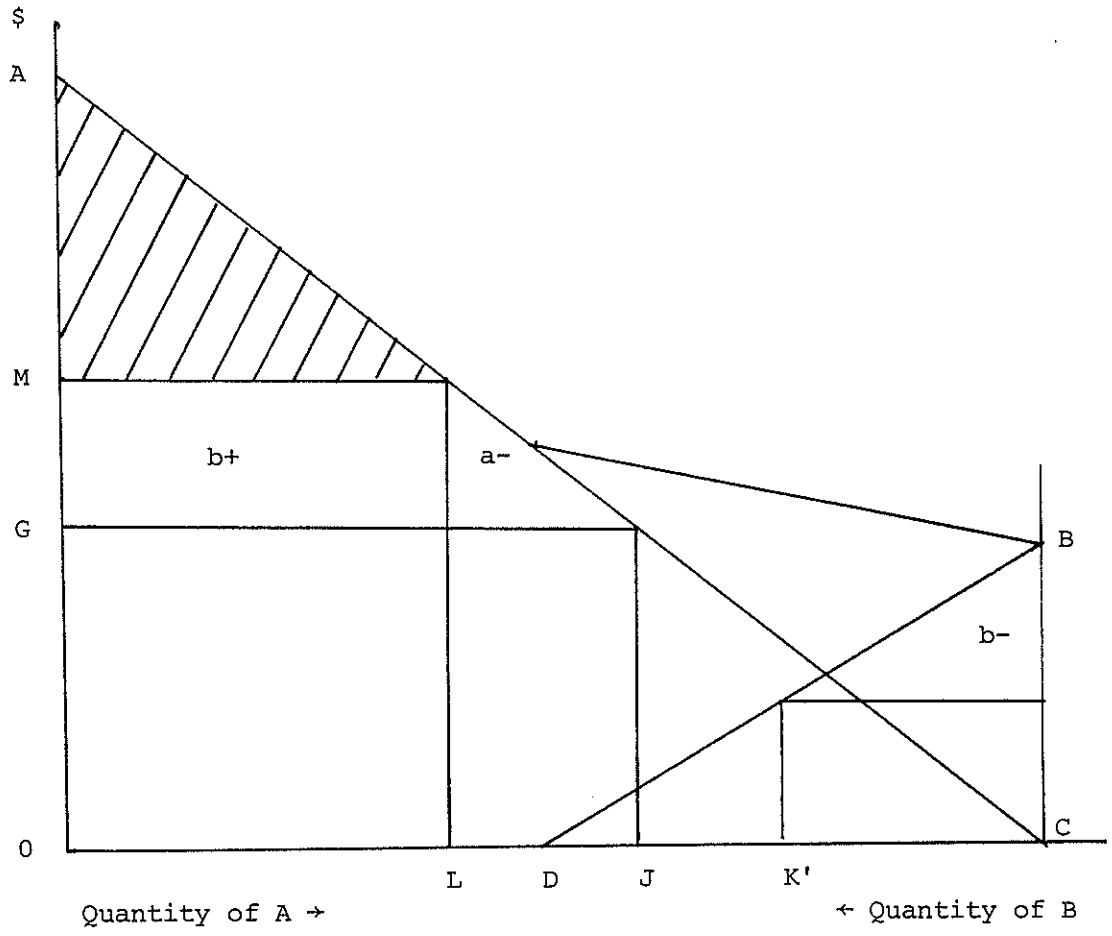


FIGURE 5

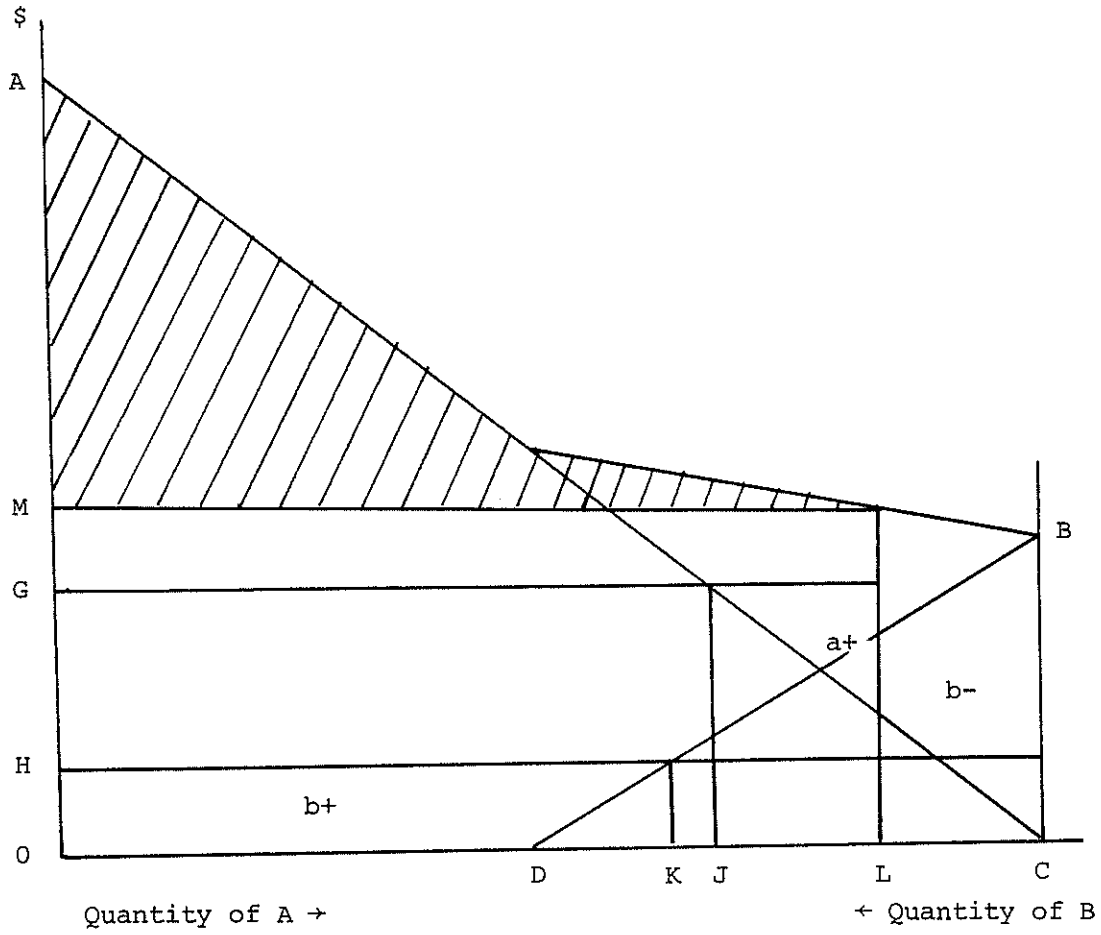


FIGURE 6

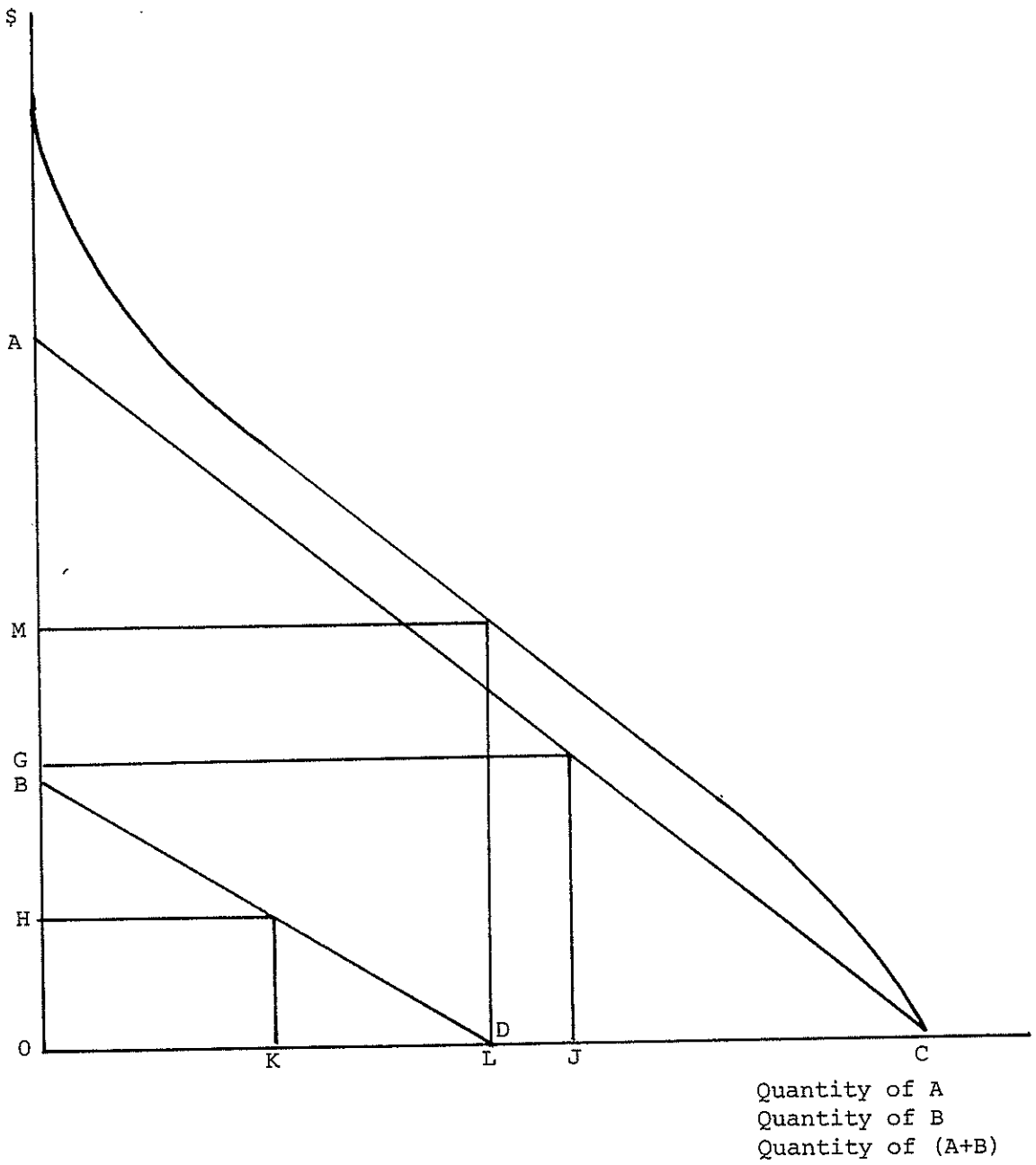
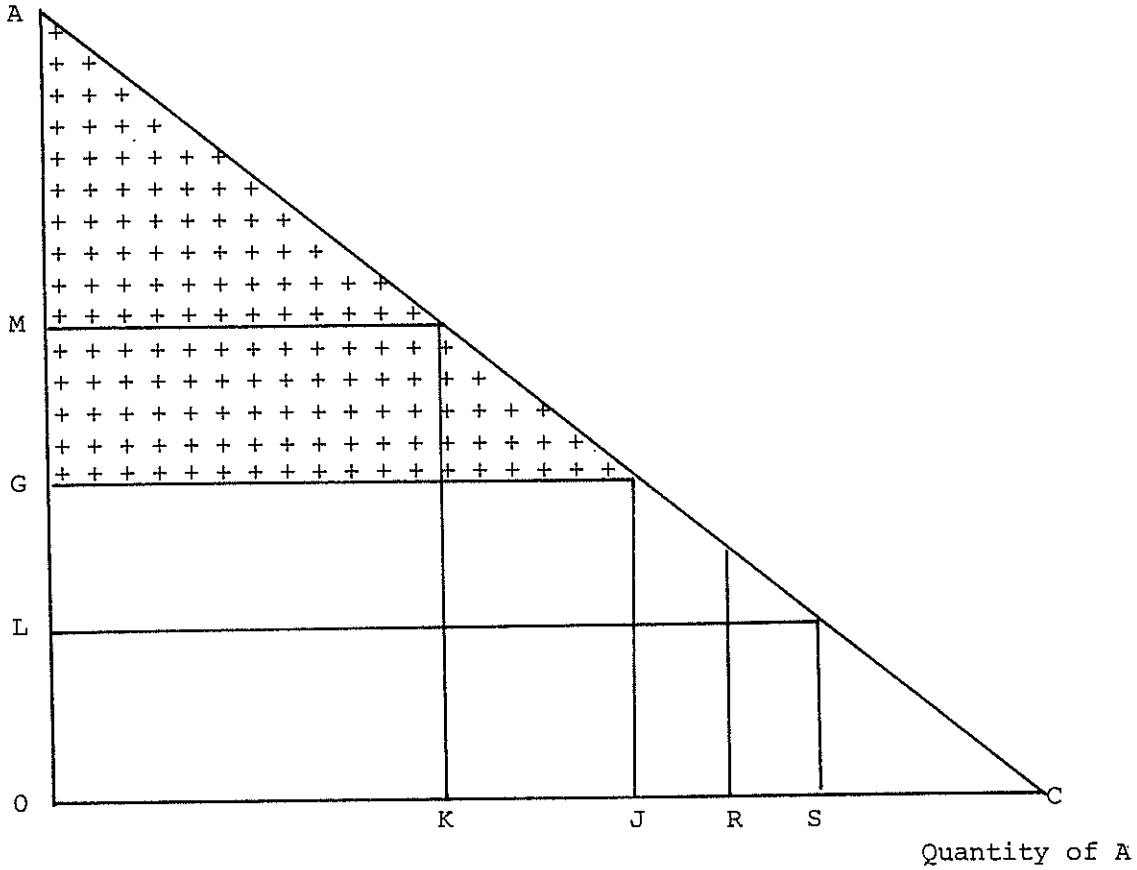
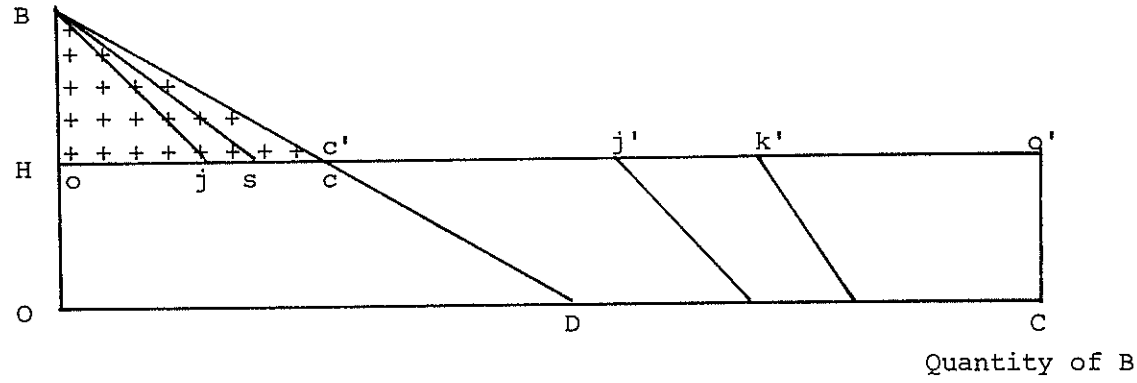


FIGURE 7


A
M
G
L
O
K
J
R
S
C
Quantity of A


B
H
O
o
j
s
c
c'
j'
k'
o'
D
C
Quantity of B

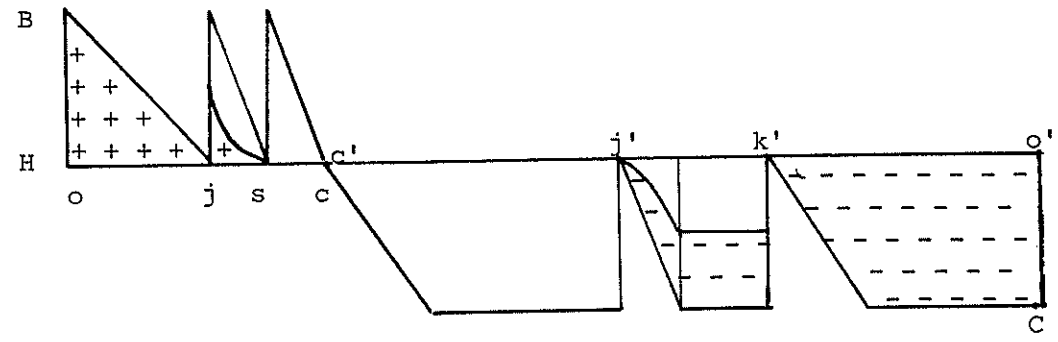

B
H
o
j
s
c
c'
j'
k'
o'
C

FIGURE 8

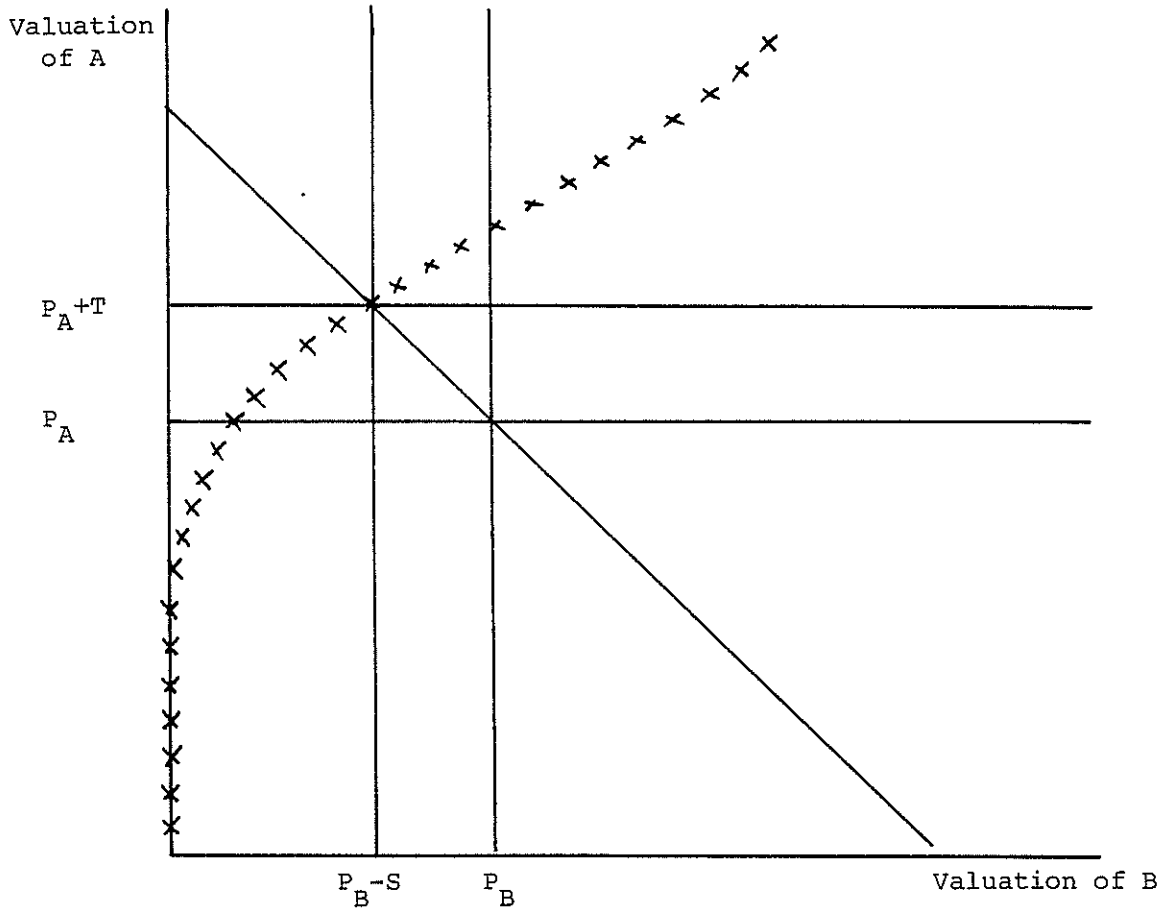


FIGURE 9

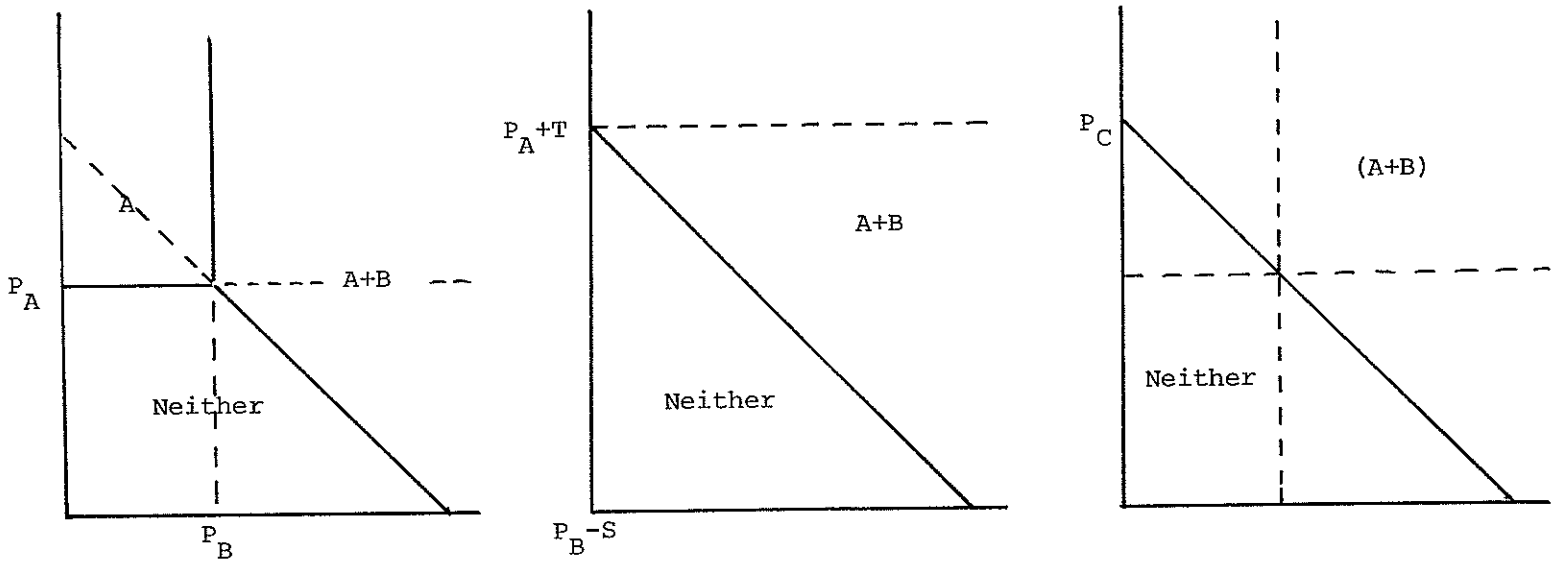

A
A+B
P_A
Neither
P_B
Unbundled
P_A+T
A+B
Neither
P_B-S
Tax and Subsidy
P_C
(A+B)
Neither
Bundled

FIGURE 10