THE DOCTRINE OF THE
CONSUMERS' SURPLUS

by

MISS ROHINI V. DESAI

B. A. Gujarat University, 1959
M. A. Sardar Vallabhbhai Vidyapeeth, 1963

––––––––––––––

A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF ARTS

Department of Economics and Sociology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1964

Approved by:

*Edgar S. Bagley*

Major Professor

TABLE OF CONTENTS

| Chapter | Page |
|---|---|

# CHAPTER I

## ORIGIN OF THE CONCEPT

1. Origin of the Concept of Consumers'
   Surplus

2. Marshall's General and Partial
   Analysis of Consumers' Surplus

3. Marshall's Analysis of Partial
   Consumers' Surplus

CHAPTER I

ORIGIN OF THE CONCEPT

## Origin of the Concept of Consumers' Surplus

The concept of consumers' surplus, which has rendered an invaluable service to economic theoraticians as well as to practical analysts, was originally stated by the French engineer economist Jules Dupuit, in a crude form in 1844. He was led to the marginal utility theory by his attempt to construct a theory of prices that maximizes utility.[1] He distinguished total and marginal utiltiy with great clarity and discovered "une espéce de benéfice" that we now call Consumers' Surplus. It was defined as the excess of total utility over marginal utility times the number of units of the commodity, but it was actually taken to be the area under the demand curve minus the expenditures on the commodity. (i.e. - Marshall's measure without his restrictions).[2]

Armed with this concept he investigated the optimum

_____

[1]His chief essays (published in 1844 and 1849) are reprinted in De l'uhlite' er de sa mesure. (Torino: La Riforura Sociale, 1934).*

*Dupuit - "Principles of Economics," pp. 124-37; his paper on "The Measurement of Utility of Public Works" has been translated into English and published in International Economic Papers No. 2.

[2]Ibid., p. 50, also p. 180.

toll on bridges. His analysis was as follows:
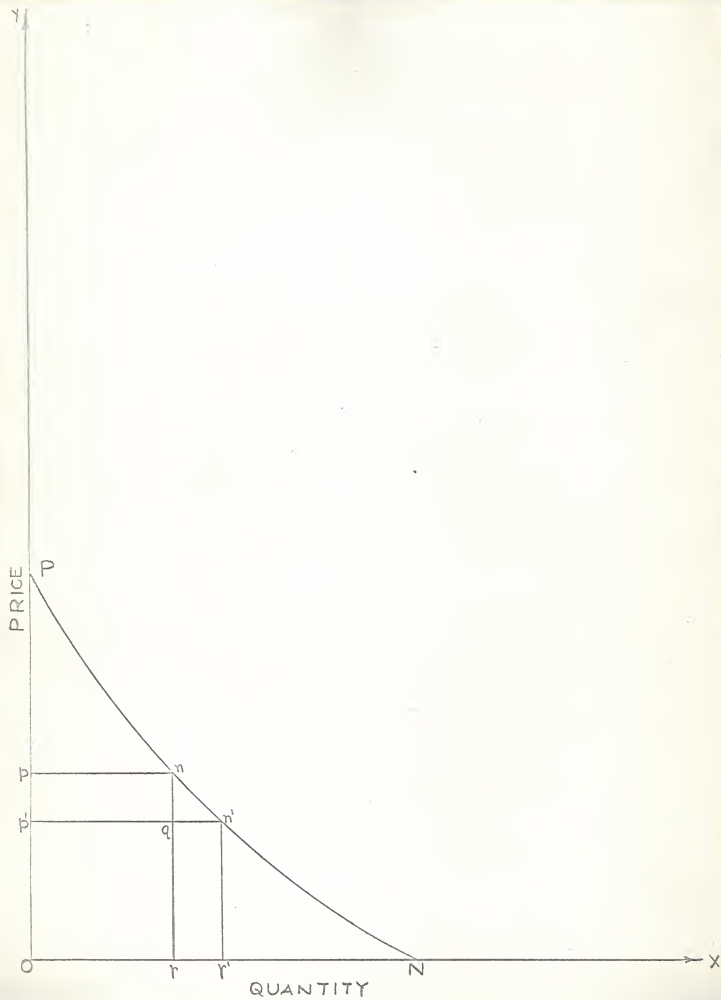
Let NP be the demand (and marginal utility) curve, Op the
price. Then OrnP is the absolute utility consumers obtain from
the use of the bridge, and pnP is the relative utility. If the
toll is reduced by pp' there is a net gain of consumer utility
of qnn' (equal to the area under the demand curve between r and
r' minus the expenditure rr'n'q).

Dupuit's general conclusion is:

> The utility of a means of communication, and in
> general of any product, is at a maximum when the toll
> or the price is zero.[1]

### Marshall's General and Partial Analysis of Consumers' Surplus

Marshall refined this concept in his Pure Theory of
Domestic Values 1879 and styled it as "Consumers' Rent." In
his Principles of Economics, he further elaborated the concept
in logical detail and described it as "Consumers' Surplus."
Marshall's doctrine in its original form has two aspects. The
first consists in his broader views on the nature of economic
activity and its relation to the surpluses in general.[2] The
second consists in his practical applications of the surplus
analysis in its partial form.[3]

Marshall set down his general view of the nature of
economic activity and its relation to different types of
surpluses. Here we find a mixture of the relative and the

---

[1]Ibid., p. 161.

[2]A. Marshall, Principles of Economics, 9th edition,
London, Macmillan and Co. Ltd., 1961, Appendix K$^a$, pp. 830-2.

[3]Ibid., pp. 830-2.

absolute conception of surpluses. There is a passage which
describes consumers' surplus in the relative sense, as:

> ....a true net benefit which he, as consumer,
> derives from the facilities offered to him by his
> surroundings or conjuncture. He would lose this
> surplus, if his surroundings were so altered as to
> prevent him from obtaining any supplies of that
> commodity, and to compel him to divert the means which
> he spends on that to other commodities (one of which
> might be increased leisure) of which at present he
> does not care to have further supplies at their
> respective prices.[1]

It is the major theme of the Appendix K[a] to show the
essential unity of man's net gain from his efforts in spite of
the fact that in an economy with division of labor and exchange,
money transactions intervene between the acts of production
and consumption.

> While the national income or dividend is
> completely absorbed in remunerating the owner of
> each agent of production at its marginal rate, it yet
> generally yields him a surplus which has two
> distinct, though not independent sides.[2]

As a consumer, he obtains consumers' surplus, since
for all parts of his purchase except the "marginal unit" he
would have been willing to pay a higher price than that at
which he obtains them.

> Another side of the surplus which a man derives
> from his surroundings is better seen when he is
> regarded as producer....[3]

As a worker, he derives a "worker's surplus" and as
"owner of accumulated wealth in any form" he derives a

---

[1]Ibid., p. 830.

[2]Ibid., p. 830.

[3]Ibid., p. 830.

"saver's surplus," since for all parts of his services except
the "marginal unit" he would have been content with a lesser
rate of remuneration than that which he actually gets for
them.[1]

### Marshall's Analysis of Partial Consumers' Surplus

Let us turn to a closer examination of Marshall's
concept of the consumers' surplus on a given commodity and
find out what refinements have been added to it in its recent
rehabilitation. In Book III, Chapter VI, Marshall started
from the surplus of an individual consumer and defined it as:

> The excess of the price which he would be willing
> to pay rather than go without the thing, over that which
> he actually does pay, is the economic measure of this
> surplus satisfaction.[2]

His meaning will become clearer if we compare this with
the alternative definition in Appendix K[a], where consumers'
surplus is regarded as the benefit he would lose:

> If his surroundings were so altered as to prevent
> him from obtaining any supplies of that commodity, and
> to compel him to divert the means which he spends on
> that to other commodities, one of which at present he
> does not care to have further supplies at their respec-
> tive prices.[3]

The second definition makes it clear that when we are
estimating the consumers' surplus on a given commodity, we
should assume that he is in an equilibrium position with regard
to other commodities -- i.e. their marginal utilities to him

---

[1]Ibid., p. 830.

[2]Ibid., p. 125.

[3]Ibid., p. 830.

are proportional to their prices. The definition given by
Marshall is quite concrete; it involves nothing more intro-
spective or subjective than the demand curve itself. The
demand curve purports to show how far the price of the
commodity would have to be raised in order to reduce the
purchases to any given extent. A precise answer to this
question can only be given by assuming "other things being
equal"; thus, in strictness only one point on a demand curve
can ever be observed, the remainder being hypothetical--though
possibly being capable of estimation by suitable statistical
methods. The consumers' surplus is just the same sort of
hypothetical magnitude; it involves the question:

> What is the maximum amount which the consumer
> would be willing to pay for the particular quantity
> of the particular commodity if he were given the
> choice between having this quantity on such terms or
> not at all?
> The consumers' surplus is the difference between
> the amount so defined and the amount of money actually
> paid. The critical question is just the same sort of
> question as that implied in the demand curve. It is
> limited by the same ceteris paribus clause as the
> demand curve is limited.[1]

The above idea, Marshall translated into a diagram,
taking the example of tea.[2]

The aim of the concept of consumers' surplus according
to Marshall was to serve as an instrument for roughly estima-
ting some of the benefits which a person derives from his

---

[1]J. R. Hicks, "Rehabilitation of Consumers' Surplus,"
REStud, Vol. VIII, 1940-41, p. 108.

[2]A. Marshall, Principles of Economics, 9th edition,
London, Macmillan and Co. Ltd., 1961, Book III, Chap. 6,
p. 128.

environments. He gives the example of a person who would
purchase different amounts of tea at different prices. If the
price of tea was 20 shillings per lb. he would buy 1 lb.; at
14 shillings 2 lbs., at 10 shillings 3 lbs., at 6 shillings
4 lbs., at 4 shillings 5 lbs., at 3 shillings 6 lbs., and at
2 shillings 7 lbs. When the actual price falls to 2 shillings
according to this example he buys 7 lbs., which are individ-
ually worth to him equal to 20, 14, 10, 6, 4, 3, 2 shillings
or 59 shillings in all. The surplus to him, the difference
between the total utility and the price actually paid is equal
to 59 - 14 = 45 shillings. This is the consumers' surplus,
the surplus of satisfaction which the consumer gets from
spending 14 shillings on tea rather than on other things.

FIGURE 2
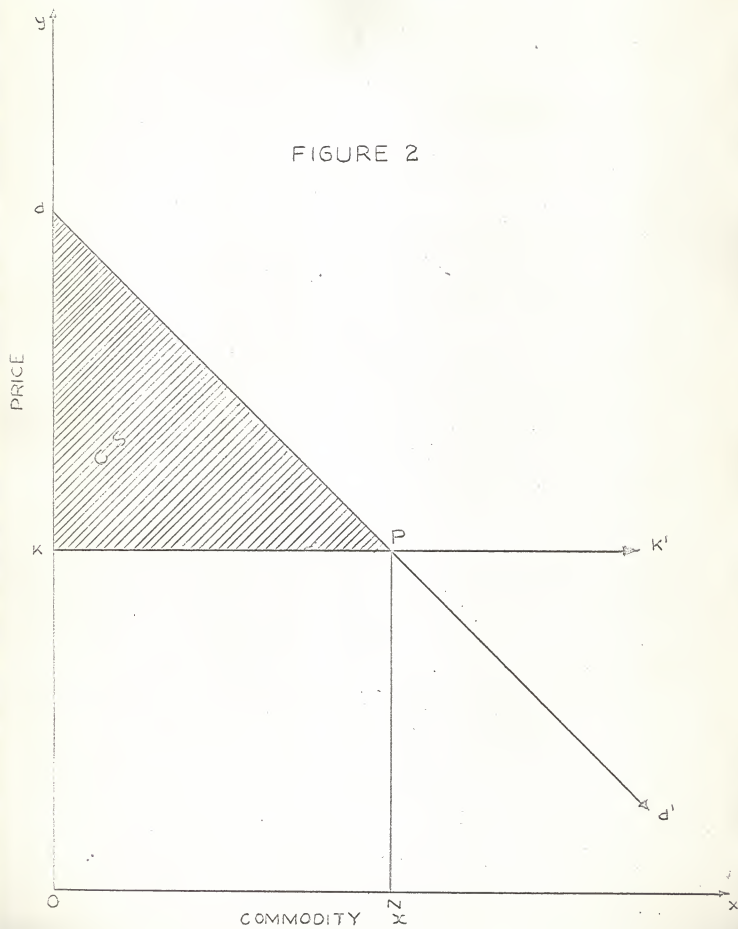
ON   = the number of units purchased.
ONPd = the amount of money the consumer is prepared to pay
       for ON units.
ONPK = the actual amount of money paid for ON units.
ONPd - ONPK = dPK, consumers' surplus.

This can also be expressed as the difference between total utility and the total sacrifice.

After showing that the individual consumers' surplus from tea is equal to the triangle under the demand curve for it, Marshall proceeded to equate the collective consumers' surplus from tea with the triangle under the collective demand curve in the tea market. The market demand curve is constructed on the same principles as the individual's demand curve; that is to say we start from a situation at which the price of tea is so much and then hypothetically vary the price and compile the schedule of different quantities of tea demanded by the market as a whole at various prices. As before we assume that the consumers' income and prices of other commodities are constant and that consumers as a body spend only a small proportion of their total incomes on tea. It will be seen that the total consumers' surplus on a given commodity like the individual consumers' surplus is a relative and not absolute concept.

To illustrate:[1]

---

[1] Ibid., p. 128.
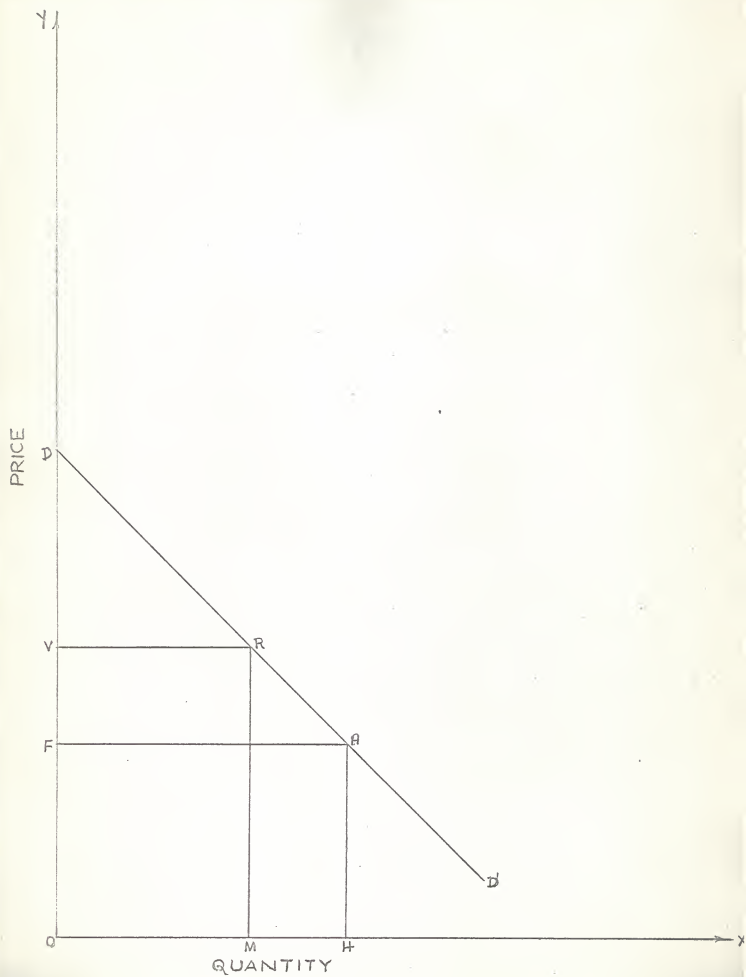
Let DD' be the market demand curve for tea. Let the quantity OH be bought at the price of OF in a given situation. When the price is raised to OV, the quantity bought will be reduced to OM. The area VRAF measures the loss of the consumers due to a movement from A to R. Similarly, the total consumers' surplus triangle DAF may be looked upon as the measure of what the consumers would have lost when the price of tea is raised beyond the highest point on the demand curve OD, which amounts to a complete withdrawal of tea from the market. Thus the calculation of the total consumers' surplus involves a comparison between two situations: one at which the commodity is available at a given price OF and the other at which it has disappeared from the market. However, as Marshall has warned us:

> Our list of demand prices is highly conjunctural except in the neighborhood of the customary price; and the best estimate we can form of the whole amount of the utility of anything are liable to large error.[1]

The market is, however, made up of many consumers with different tastes and incomes. Thus the change in the consumers' surplus merely shows the collective gain or loss of the consumers as a group, without telling us how this gain or loss is distributed amongst each of the individuals. This does not however, appreciably affect the usefulness of the concept if we are concerned with an "isolated" market, the rest of the economic system being assumed to be optimally organized. In such a case, an increase in the consumers'

---

[1]Ibid., p. 133.

surplus in the given market, other things being equal, should
represent a gain from the point of view of the community as
a whole. Each of the individual consumers in this market
would have gained equally, without making the consumers in
other markets worse off.

In practice, however, more frequently than not we will
have to face a change which increases the consumers' surplus
in one market (say due to a subsidy) and decreases the
consumers' surplus (say due to a tax). How then can we
compare the loss and gain in surpluses of different groups of
consumers? Marshall's method of getting out of this diffi-
culty was to assume that:

> ....by far the greater number of the events with
> which economics deals, affect in equal proportions the
> different classes of society; so that if the money
> measures of the happiness caused by two events are
> equal, there is not in general any very great
> difference between the amounts of happiness in the
> two cases.[1]

This assumption that quantities of money are propor-
tionate to quantities of satisfaction amounts to abstracting
from differences of incomes among individuals belonging to
each group and also from the differences of incomes among
different groups of individuals. It should, however, be noted
that in the actual applications of the consumers' surplus
analysis Marshall was well aware of the possible errors from
this generalization. Thus in the Mathematical Appendix,
Note XIV[b] he wrote:

---

[1] _Ibid._, p. 131.

We note that a few commodities are consumed mainly by the rich; and that in consequences their real total utilities are less than is suggested by the money measures of those utilities. But we assume, with the rest of the world, that as a rule, and in the absence of special causes to the contrary, the real total utilities of two commodities that are mainly consumed by the rich stand to one another is about the same relation as their money measures do: and that the same is in about the same relation as their money measures do; and that the same is true of commodities the consumption of which is divided out among rich and middle classes and poor in similar proportions. Such estimates are but rough approximations; but each particular difficulty, each source of possible error is pushed into prominence by the definiteness of our phrases.[1] (Mathematical Appendix, p. 851).

---

[1]*Ibid.*, Mathematical Appendix, p. 851.

CHAPTER II

WEAKNESSES OF OLDER CONCEPTIONS
AND ITS MEASURABILITY

1. Weaknesses of Older Conception
   of Consumers' Surplus

2. Its Measurability

CHAPTER II

WEAKNESSES OF OLDER CONCEPTIONS AND ITS MEASURABILITY

Weaknesses of Older Conception of Consumers' Surplus

Since the time of the publication of the "Principles"
in 1890, the theory of consumers' surplus has been under
constant attack. Hicks, Henderson, Nicholson, Cannan, very
vehemently criticized the concept.[1] Among the neo-classicals,
Knight and Robbins seriously challenged the validity of the

---

[1]J. R. Hicks, "Rehabilitation of Consumers' Surplus,"
REStud., 1940-41, Vol. VIII, No. 2, p. 108.

A. Henderson, "Consumers' Surplus and Compensating
Variation," REStud., 1940-41, Vol. VIII, No. 2, p. 117-121.

Nicholson's criticisms are contained in his Princi-
ples of Political Economy, Book I, Chap. III, and the Appendix
in the above volume on "Note on Marshall's Treatment of
Consumers' Rent."

E. Cannan, "Total Utility and Consumers' Surplus,"
Economica, 1923.

F. H. Knight, Risk, Uncertainty and Profit, Boston
and New York, Houghton Miffin Company, 1935, pp. 71-72.

L. Robbins, The Nature and Significance of Economic
Science, 2nd edition, London, Macmillan and Co. Ltd., 1937,
pp. 136-212.

Edgeworth, "Note on Prof. J. S. Nicholson on
Consumers' 'Rent'", E. J. 1894, Vol. IV, and Prof. Nicholson's
reply, "The Measurement of Utility by Money" in the same
journal, and Prof. Edgeworth's stubborn rejoinder in the same
issue.

concept. "Even the Cambridge began to lose faith."[1]  But with
the revolution in the technique of dealing with problems of
theory of value that was brought about by Hicks and Allen,[2] it
was demonstrated that the concept of consumers' surplus was
valid even if the assumption of measurability of utility was
not granted.

It may be pointed out that none of the critics appear
to have denied the existence of consumers' surplus itself;
most of the objections at the time of Marshall and even later
on have been directed towards the feasibility of utilizing the
area under the demand curve as a measure of the "excess" satis-
faction derived by the individual. This measure is now known
as the "Marshallian measure." Some of the criticisms pertained
to the practical utility of the above measure. Several of the
objections were based on a misunderstanding of what Marshall
really meant. Considerable misunderstanding could have been
avoided if the critics had noted that the "Marshallian
measure" was useful only for certain specific problems, that
Marshall himself was fully aware of the difficulties of
drawing the demand curve to its full length and that Marshall
was visualizing a "hypothetical" change in the conjuncture
when he was ascertaining the excess satisfaction derived by an
individual because of certain adaptations to his environment.
Nicholsons' objection, "Of what avail is it to say that the

---

[1] J. R. Hicks, "Rehabilitation of Consumers' Surplus,"
REStud., 1940-41, Vol. VIII, p. 108.

[2] Hicks and Allen, "Reconsideration of Theory of
Value," Economica, May, 1934, No. 2, p. 196.

utility of an income of (say)   100 a year is worth (say)
1000 a year?"[1] was replied to by Marshall as follows:

> There would be no avail in saying that....if a man
> pay 1 d. toll on a bridge, which saves him an addi-
> tional drive that would cost a shilling, we do not say
> that the penny is worth a shilling, but that the penny
> together with the advantage offered by the bridge
> (the part it plays in his conjuncture) is worth a
> shilling for that day.  Were the bridge swept away on
> a day on which he needed it, he would be in at
> least as bad a position as if he had been deprived of
> eleven pence.[2]

The same reply would be valid to another of
Nicholson's criticisms regarding the consumers' surplus of a
loaf of bread to a starving millionaire.  Prof. Hicks[3] has
rightly pointed out that the consumers' surplus should be
visualized as indicating the money measure of the variations
in an individual's well-being when he moves from one situation
to another.  Even other-wise the concept would tell us the
loss that would be sustained by an individual if the
situation underwent a change.

Marshall's concept has been subjected to five
important criticisms.  In the first place it was maintained
that money could not be an accurate measure of utility.
Secondly, the utility of different persons could not be com-
pared and the money measure of the utility to a group would

---

[1] J. A. Nicholson, *Principles of Political Economy*,
Vol. I, N. Y., 1898.

[2] Alfred Marshall, *Principles of Economics*, 9th
edition, London, Macmillan and Co. Ltd., 1961, p. 127.

[3] J. R. Hicks, "Rehabilitation of Consumers' Surplus,"
*REStud.*, Vol. VIII, 1940-41, pp. 108-16.

not have much meaning. Thirdly, the marginal utility of money
to a given individual would not be constant. Fourthly, the
total utility of several commodities or of a given amount of
income could not have any meaning. Fifthly, in the case of
related commodities the concept would not give precise results.
Most of these criticisms were levelled by Prof. Nicholson,[1]
and Edgeworth[2] attempted to meet almost all the points of
criticism. Marshall's elucidation and analysis of the concept
itself is very guarded and he himself has taken into account
several of these objections by imposing restrictions on the
practical application of the analysis. It may be noted that
the same objections have appeared in various guises even in
some of the recent discussions of the consumers' surplus
concept.

As regards the first point of the criticism, the reply
is that the money measure does not claim to measure utility
but only the relative strength of different motives. An
important idea underlying the entire "Principles" of Marshall,[3]
the actions of human beings could be subject to measurement
and that it would be possible to compare the relative strengths
of different motives. Though under certain circumstances,
individual human behavior would be subject to change, given

---

[1] J. A. Nicholson, Principles of Political Economy,
Book I, Chapter III, and the Appendix in the above volume on
"Note on Marshall's Treatment of Consumers' Rent."

[2] Edgeworth's Note on Prof. Nicholson on Consumers'
'Rent,' E. J., Vol. 21, 1894.

[3] A. Marshall, Principles of Economics, London,
Macmillan and Co., 9th edition, 1961, Chap. III.

a large number of people, these fitful variations would be smoothened and it would be possible to draw more or less precise conclusions regarding the reaction of individuals to different economic stimuli. Marshall clearly noted that the marginal utility of a particular commodity could vary in regard to the same individual under different circumstances. But this would in no way falsify the concept. If human beings were taken as members of groups, the behavior pattern was sufficiently regular enough to warrant measurement. Whatever the type of action, insofar as it involved economic phenomena, it could be brought under the category of "more or less."

The second problem is: can the utilities of different individuals be compared? Here also, Marshall[1] had a very important solution. He argued that given the same type of people, the average utility of a shilling would be the same to one Englishman as well as to another and insofar as different groups consisted of the same number of different individuals belonging to different groups.

## Its Measurability

But it is said by the ordinalist that the greatest deficiency of the Marshallian doctrine lies in the fact that it presupposes the cardinal utility function. It is assumed that utility can be measured in concrete terms. Therefore, on the other hand it was contended by Hicks and Allen that utility is a subjective phenomenon, it is, therefore,

---

[1] Ibid.

indeterminate.

The most serious error in the older conception of consumers' surplus lay in treating it as an absolute magnitude, in making statements such as that a consumer just because he is in such a such position is getting so and so much consumers' surplus. The newer conception (Hicks) is quite different from this. It is relative and not absolute. We are always considering the movement from one defined situation to another defined situation, we are asking what is the gain or (loss) of money income which would measure the gain (or loss) of economic welfare resulting from the movement. This gain or loss of income must itself always refer to one or other of the situations, otherwise it is meaningless.[1]

> Human satisfactions depend upon conventions and fashions. Thus my demand for, and satisfaction derived from, evening clothes depends principally on how many other people have got them, and what other people have got them, my maximum state of pleasure being reached when the other possessors are neither too many nor too few, and are the right people and not the wrong. The surrender of my evening clothes, other people retaining theirs, would involve me in a big loss of consumers' surplus; but, if all of us made a plot never to wear such things, as we did during the war, it may be that we should none of us be significantly worse off. Perhaps many consumers' surpluses are like bubbles--they are real things, but easily pricked, or like the claws of a lobster-- new ones grow fairly easily if old ones are lopped off. But it is important that they should grow again; for a lobster without claws is a poor animal and a world without consumers' surpluses would be, for most of us, a dull place.[2]

Most of the confusion about consumers' surplus can be

---

[1] J. R. Hicks, "Four Consumers' Surpluses," REStud., XI, 1943-44, p. 41.

[2] D. H. Robertson, Lectures on Economic Principles, Vol. I, Great Britian, Staples Ltd., 1957, p. 90.

traced to Marshall's unfortunate habit of obscuring the
assumptions needed to validate his concepts.[1]

In the present case he failed to distinguish care-
fully between three different definitions of consumers'
surplus. These are:

1. "The excess of the price which he (a consumer)
   is willing to pay....;" (Principles, p. 124).

2. The roughly triangular area lying under a demand
   curve and above the rectangle which represents
   actual money expenditure;

3. The area lying under a utility curve and above
   the rectangle which represents "effective
   utility," or marginal utility times the
   number of units consumed.[2]

Marshall was able to equate these three definitions by means
of his assumption that the marginal utility of money remain,
at least, approximately constant.[3] When the marginal utility
of money is not constant, the three meanings diverge. In this
case the third defintion must be considered the basic one:
total utility minus effective utility. Marshall's primary
concern was to emphasize that a consumer receives a greater
amount of utility than he pays for. The first two definitions
are used only as devices to _measure_ this surplus of utility.[4]

Only one essential assumption is necessary to
find this consumers' surplus. It is the same

---

[1]Robert L. Bishop, "Consumers' Surplus and Cardinal
Utility," _QJE_ LVII, May, 1943, p. 422.

[2]_Ibid._

[3]A. Marshall, _Principles_ _of_ _Economics_, 8th edition,
London, Macmillan, p. 124.

[4]R. L. Bishop, "Consumers' Surplus and Cardinal
Utility," _QJE_ LVII, May, 1943, p. 422.

assumption needed to establish an unambiguous cardinal
utility for each separate commodity in the first place:
that the marginal utility of a commodity depends solely
on the amount of that commodity, that it is independent
of the amounts of other commodities consumed by an
individual and of the amounts of all commodities
consumed by other individuals. To determine unambiguous
consumers' surpluses and yet stay within hailing
distance of Marshall's methods, we assume that each
utility is independent of the amounts of all other
commodities. This is called the assumption of
"universal independence." Granted this assumption,
consumers' surplus can be found without Marshall's
apologetic assumption that the marginal utility of
money be approximately constant. This is done by
making the marginal utility of money exactly constant,
and for this a "marginal utility demand curve" is used.[1]

Cannan attacked the doctrine along these lines:

If I am asked how much I would pay rather than go
without tea for the next 12 months, I shall want to
know (as Marshall admits, p. 131 n.) the price of
coffee and not only that but also the price of cocoa
and several other possible drinks, if the nearest
substitute is to be very dear: Queen Elizabeth drank
beer for breakfast, and what was good enough for her
will, at a pinch, be good for me. The consequence is
that the magnitude of the total utility which I am
calculated to get from my present consumption of tea
varies with the prices of a number of articles in which
as a matter of fact, I take not the least interest. I
certainly should have thought that it was the tea I
enjoyed, and not the high prices of substitutes for it.[2]

Another example which he, Marshall, uses is that of a
bridge over a river. Here the substitute is the next bridge,
so that, according to the doctrine the total utility of any
bridge to a person who uses it depends on the proximity of the
next bridge which he never uses: if the further bridge falls
down, the total utility of the nearer bridge and the consumers'

---

[1]Ibid., p. 423.

[2]Cannan, "Total Utility and Consumers' Surplus,"
Economica, Nov., 1923, p. 20.

surplus of satisfaction which he derives from it must suddenly rise.[1]

The real significance of Cannan's objection is that if consumers' surplus is to have any relation to cardinal utility at all, the interdependence of utilities is a serious difficulty, since it has generally been accepted as rendering cardinal measurement impossible. Hicks has shown that normal demand curves are consistent not only with increasing marginal utility schedules but even with increasing marginal utility, provided a high enough degree of complementarity of utility exists.[2] When we cannot find cardinal utility we cannot find consumers' surplus.

Another of Cannan's objections is also troublesome:

> How much would I give for two pairs of boots per annum, rather than have none at all? An immense sum if the usage of society and the price of boots remain what they are, and it is only I who have to make the choice; but not nearly so much if everyone has to make the same choice and the price actually changed by the boot-monopolist is so high that many people embrace the second alternative, so that I shall not look mean or mad if I go barefoot.[3]

Here the marginal utility of boots might be independent of the amounts of all other commodities Cannan buys, but since it is dependent on the amounts of boots that other people buy, we cannot safely measure his consumers' surplus

[1] Ibid., p. 20.

[2] J. R. Hicks, Value and Capital, London, Oxford University Press, 2nd edition, 1946, p. 16.

[3] E. Cannan, "Total Utility and Consumers' Surplus," Economica, Nov., 1923, p. 22.

or even find his indifference varieties, without making some assumption about other people's incomes and tastes and about the prices with which they are faced.

# CHAPTER III

## REHABILITATION OF CONSUMERS' SURPLUS

1. Use of Indifference Curve in the Analysis of Consumers' Surplus Instead of Demand and Marginal Utility

2. Hicksian Measure of Consumers' Surplus

3. Criticism of Hicks' Measure by Henderson

4. Hicks' Refinements

5. Hicks' Reply Showing Different Measures of Consumers' Surplus with Indifference Curve Analysis

6. Generalized Theory of Consumers' Surplus

CHAPTER III

REHABILITATION OF CONSUMERS' SURPLUS

Use of Indifference Curve in the Analysis of
Consumers' Surplus Instead of Demand
and Marginal Utility

In recent years there have been important developments
in the theory of consumers' surplus, chiefly by J. R. Hicks,
Henderson, Samuelson, Bishop, and H. W. Robinson.[1]  With the
revolution in the technique of dealing with the theory of
demand which Hicks brought about, it can be demonstrated that
the idea of consumers' surplus is valid even if we cannot
measure utility.  Hicks in his indifference curves analysis
takes recourse to the external behavior of a man where he

---

[1]J. R. Hicks, Value and Capital, 2nd edition, Oxford,
The Clarendon Press, 1946.  Note to Chap. II, p. 38, "Rehabila-
tation of Consumers' Surplus," Review of Economic Studies,
VIII, Feb., 1941, pp. 108-116.

"Consumers' Surplus and Index Numbers," REStud., IX,
1942, Summer, pp. 126-137.

A. Henderson, "Consumers' Surplus and Compensating
Variation," REStud., VIII, Feb., 1941, pp. 117-121.

P. A. Samuelson, Foundations of Economic Analysis,
Cambridge, Mass., Harvard University Press, 1947.

R. L. Bishop, "Consumers' Surplus and Cardinal
Utility," QJE, LVII, May, 1943, pp. 421-449.

H. W. Robinson, "Consumers' Surplus and Taxation:
EXAnte, Or Ex Post?" South African Journal of Economics,
Sept. 1939, pp. 270-80.

prefers one situation to another and with the help of this
ordinal utility function, finds out the measure of consumers'
surplus.  In the Figure 1:[1]

---

[1]J. R. Hicks, <u>Value</u> <u>and</u> <u>Capital</u>, 2nd edition, Oxford,
The Clarendon Press, 1946, Note to Chap. II, p. 39.
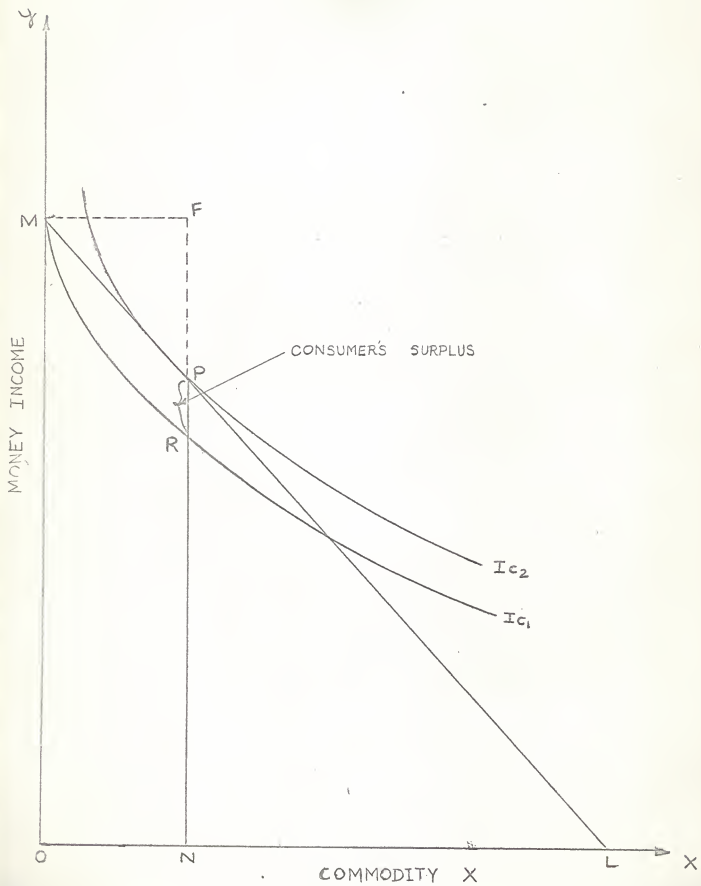
CONSUMER'S SURPLUS

## Hicksian Measure of Consumers' Surplus

Actual Price - PF
Prepared to pay - RF
RP = Consumers' Surplus

Let us suppose that consumer does not know the price of X. He chooses to have the combination represented by R on $Ic_1$--i.e. ON of x + RN of money. In other words he is prepared to pay for ON of X, FR of money. Now let us suppose that he knows the price of X which is indicated by price line ML. The consumer finds that he can get on to a higher indifference curve with the same income. The consumers' new equilibrium is represented by P - the tangency between $Ic_2$ and ML. At this point the consumers' combination is ON of x + PN of money. In other words the consumer has to spend only FP of money as compared to FR which he is prepared to pay for the same amount of X. Thus the consumers' surplus equivalent to PR is secured by the consumer. It can also be regarded as:

> The compensating variation in income whose loss
> would just offset a fall in price and leave the
> consumer no better off than before.[1]

## Criticism of Hicks Measure by Henderson

The concept of consumers' surplus has been rehabilitated after the attacks made on it by the exposition given by Prof. Hicks,[2] which avoids the usual difficulties by making it clear that what we are measuring is amounts of money and by abandoning the assumption that the marginal utility of money

---

[1] Ibid., Note to Chap. II, p. 41.

[2] Ibid., pp. 38-41.

is constant. But Henderson[1] still feels that there are two
difficulties which still remain even in the new formulations
owing to the failure to carry to its logical conclusions the
abandonment of the assumption as to the constancy of the
marginal utility of money.

He says that Hicks gives two statements of what we
mean by consumers' surplus, one being derived from Marshall
and the other his own but without realizing that they are
different.[2]

> Both of these definitions consider the consumers'
> surplus as consisting of a sum of money--but different
> sums of money. Marshall's definition corresponds to the
> amount which the consumer would be willing to pay if he
> could not get any of the commodity otherwise for the
> opportunity to buy at the existing price, the amount which
> he is in fact buying, whereas Hicks' definition refers
> to the amount which the individual would be willing to
> pay, if he had to, for the opportunity to buy the commod-
> ity in whatever quantities he wishes. It is clear that
> the second must exceed the first except in special case
> where the consumer would in fact leave his consumption
> of the commodity unchanged after his income had been
> reduced by his consumers' surplus. We will call the
> first of these expressions the Marshallian consumers'
> surplus and the second the "compensating variation."[3]
>
> Then since the compensating variation is wider it
> must be worth more unless the consumer would not want
> to take advantage of its wider scope. There is a
> difficulty arising out of the fact that it is not
> possible to express the consumers' surplus in terms of
> amounts of money income without specifying where the
> consumer is on his indifference map. Again the concept
> which we really have in mind is usually the compensa-
> ting variation.[4]

---

[1] A. Henderson, "Consumers' Surplus and Compensating
Variation, REStud., Vol. VIII, 1940-41, p. 117.

[2] Ibid.

[3] Ibid.

[4] Ibid.

## Hicks' Refinements

Marshall utilized the area under the demand curve as a measure of consumers' surplus. Considerable controversy has arisen as to whether such treatment would be valid. Marshall assumed constancy of the marginal utility of money. This assumption was necessary in order to endow the demand curve with practical utility. If the area under the demand curve could be utilized to represent the gains or losses due to price changes then one could extend the scope of economic analysis. We must remember Marshall was fully aware of the difficulties of such an assumption in regard to the ascertain-ment of the total income. The constancy assumption does not imply that Marshall considered the variations in the quantity bought to be independent of income. All that Marshall meant was that within the particular range of the demand curve under consideration, one could reasonably assume the constancy of the marginal utility of income.

When can we neglect the variations in the marginal utility of income? Marshall assumed that in the case of many commodities, the total outlay on each was only a part of an individual's income. Insofar as increases or decreases in the outlay on any marginally one commodity are concerned, the amount would be marginally withdrawn from several other commodities, (in the case of substitutes and other related commodities, we have to group them together as a single commodity). The outlay on any particular commodity would be

relatively small if the individual's income is also large.[1]
Apart from the above, it is not enough if the total outlay on
any given commodity is a small part of an individual's income.
It is also necessary that the consumers' surplus itself should
not be very large in relation to the income.[2]  For the purposes
for which Marshall intended the use of the area under the
demand curve, the restrictive assumptions would generally be
warranted and the Marshallian measure would approximately
indicate the actual amount of gain or loss.

What if the marginal utility of income varies?  It is
here that Prof. Hicks has made some significant contributions
and has literally freed the concept from criticisms on this
score.  He has worked out the possible variation that would
arise given the variation in the marginal utility of income.
He has shown that if that marginal utility of income varies
the consumers' surplus concept would be split into several
measures.[3]  In this way he has evolved four measures.

### Hicks Reply Showing Different Measures of Consumers' Surplus with Indifference Curve Analysis

These refinements can be indicated both on the
indifference diagram and on the usual price-quantity diagram.

---

[1]Nicholson's criticism that Marshallian analysis
would be applicable only in the case of only a few
millionaires, EJ 1896, p. 396.

[2]J. R. Hicks, Value and Capital, London, Oxford,
The Clarendon Press, 1946, p. 40.

[3]J. R. Hicks, "Four Consumers' Surpluses," REStud.,
Winter, 1943, Vol. XI, p. 31.

Let us take the first one:[1]

---

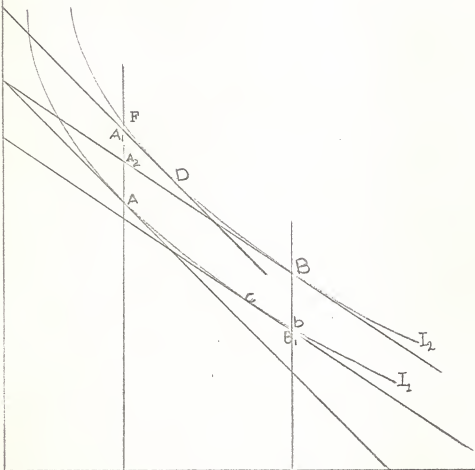[1]J. R. Hicks, "Consumers' Surplus and Index Numbers," <u>REStud.</u>, Vol. IX, 42-43, p. 126.

In the Figure OM is the individual's income. MA is the price line. The individuals marginal rates of substitution are given by indifference curve $II_1$. The indifference curve $II_1$ is tangent to the price line at A. Let us now suppose that there is à fall in the price of X. The new price line is given by MB. The individual is now in equilibrium at B on $II_2$. What can we say about the money measure of the increase in his well-being? Let us first ascertain the variation in income, which, if collected at B on $II_2$ would place the individual back on the same level of satisfaction as he had before the price change took place. In order to ascertain this we have to draw a line parallel to MB, which would just touch the indifference curve $II_1$. The sum that can be collected in this way is $BB_1$. This is the compensating variation in income for a price fall. Suppose we want to ascertain the off-setting variation in income, which the individual would be prepared to part with, in order to consume the same quantity of the commodity X as he is doing at B on $II_2$. Here it must be noted that because of the price fall the individual has been buying more of X on account of both the substitution effect as well as income effect. During the process of the movement from A to B the marginal utility of income need not be constant. So the off-setting variation in income which the consumer would be prepared to part with if he is forced to buy the same quantity of X, as he is doing at B would be Bb. Note that b on $II_1$ is not an equilibrium situation. Unless the individual is forced he would not stay in

this situation. This variation is called by Hicks as the
"quantity compensating variation" in income for an increase
in the quantity brought.

Suppose now the individual is at B on $II_2$. The price
is increased to MA. The individual is at equilibrium at A on
$II_1$. Suppose we want to find out what is the maximum amount
of income which the individual would be prepared to accept in
order to compensate him for the price rise. Here, the idea is
to keep the price MA but provide the individual with just that
much additional income as to make him as well off as he would
have been if the price were MB. We have to draw a line
parallel to MA which would just touch $II_2$ at D. $AA_1$ would be
the amount, which, if given to the individual at A on $II_1$,
would place him back on the same level of welfare, as he was
at B on $II_2$. This is called as the compensating variation of
a price rise. Suppose now the individual is at B on $II_2$. The
price rises to MA and he is in equilibrium at A on $II_1$: he is
forced to reduce the consumption of X by AB. Now what is the
amount of income which the individual would accept as just
compensating him for the loss of satisfaction due to reduc-
tion in the quantity of X consumed. This is called the
quantity compensating variation for a reduction in the avail-
able quantity and is given by AF. Suppose the individual was
at A on $II_1$. Now let us ascertain from him the maximum he
would accept to forgo the opportunity of the price fall. This
is the equivalent variation for a fall in price and is given
by $AA_1$. Note that this is the analogue of the compensating

variation for a price rise. Let us now ascertain from the
individual at A the maximum he would accept rather than forgo
the satisfaction he would have derived by consuming $OB_2$ of X.
This is given by AF and is called the equivalent variation
for an increase in quantity. Note that this is the analogue
of compensating variation for a reduction in quantity.

Thus in the case of each individual for any price
change there can be four variations which measure the effects
on his well-being.

### Generalized Theory of Consumers' Surplus

The same variation can be shown by means of a price
quantity diagram:[1]

---

[1] J. R. Hicks, "Generalized Theory of Consumers'
Surplus," REStud., Vol. XIII, No. 13, 1945-57, p. 68.
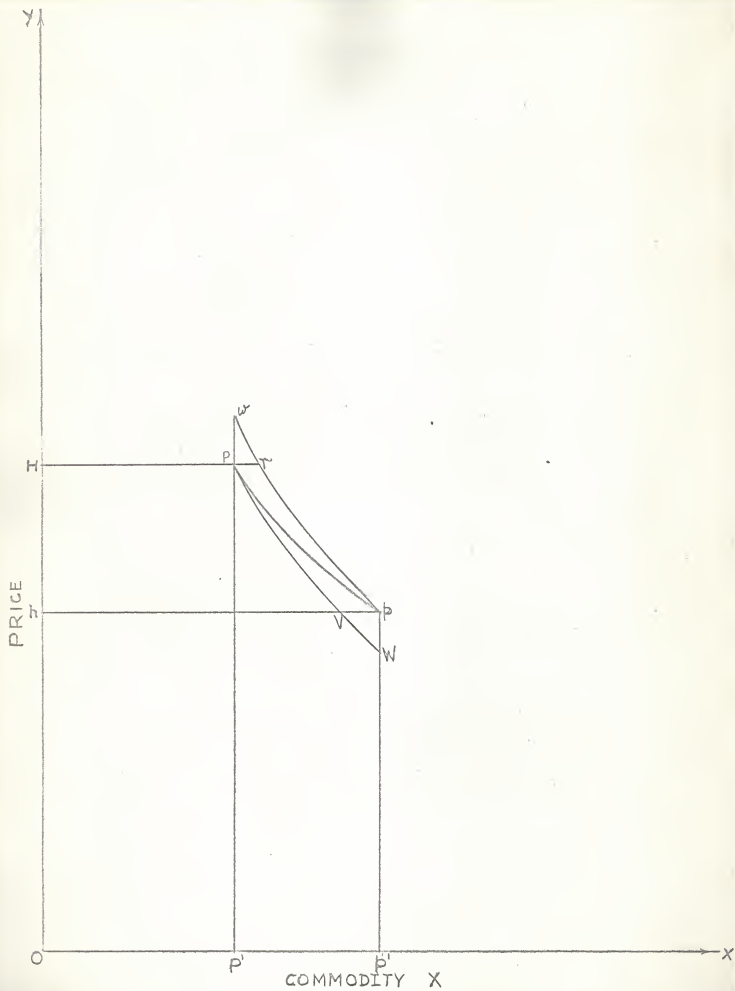
COMMODITY X

Now in the figure suppose an individual is buying OP units of a commodity at a price OH. Now the price falls to Oh. The individual now buys OP. Pp is the segment of the demand curve. Let us now collect from him the maximum sum he would be prepared to pay for each unit of the commodity, at each stage the consumer is just as well off as before. For the $OV^{th}$ unit he would just pay Oh. At V he is as well off as at P. We have collected from him HPVh. PV is called the marginal indifference curve. HPvh is the compensating variation in income for a price fall, or an equivalent variation for price rise. Note that if we had not followed the above procedure and allowed the price to fall from OH to Oh, the consumer would have bought Op'. Let us now ascertain by how much the price should be reduced if he is to buy Op'. HpVh - Vpw would be the compensating variation for an increase in the quantity of $x_1$, or the equivalent variation for quantity reduction. Let us now assume that the individual is at p and that the price is Oh. Suppose we go on purchasing from the consumer each unit of the commodity and pay him just that amount of money which would be equivalent to the disutility caused to him. We trace a new marginal indifference curve pvw. hpvPh would be the equivalent variation for the price fall; or compensating variation for the price rise. HPwvPVh would be the equivalent variation for the increase in quantity of the compensating variation for the reduction in quantity.

It may be noted that both the price compensating as well as the quantity compensating variation for a price rise,

and for the reduction in quantity are larger than the price
compensating variation as well as quantity compensating
variation for a price fall and increase in quantity. This is
because the individual is in two different equilibrium situa-
tions and the marginal utility of income in both the cases is
different.

Prof. Hicks has shown that some of the Marshallian
measure, i.e. the area under demand curve above the price
quantity axis, would fall midway between the price-compensating
variation and price-equivalent variation, and between the
quantity compensating variation and the quantity equivalent
variation. For small changes, we would not be doing much
violence of analysis if we take the Marshallian measure for
ascertaining the extent of gain or loss.

When we refer to consumers' surplus, we should clarify
the particular variation we have in our mind. Suppose for
example, we think in terms of the effects on well-being due to
changes in price. Here the price compensating and equivalent
variations are important. On the other hand we think, in
terms of changes in the quantity of different commodities
supplied we should have resort to the quantity compensating
and equivalent variations. Sometimes, then if the price rises
to scarcity value and the particular commodity has no substi-
tutes, we have to resort to the compensating variations for
quantity reductions. In a more general way we can classify
different changes according as they are adverse or beneficial.
From the point of view of those who have been benefited,

compensating variation tells us the maximum amount of income
that we can collect from them in order to place them back in
the same position as they were before the beneficial change
occured. On the other hand, in the case of those who have
been adversely affected, we have to ascertain the compensating
variation in income, which, if given to them, would place them
back in the same position as they were before the change
occured. If the sum of these variations is positive, then
the particular change is an improvement. The same can however
be looked in a different way. From the point of view of those
who are expected to gain from a change we can ascertain the
exact amount of income, which, if given to them, would make
them as well off as they would be if the change took place.
Note here that we assume that we deny the change to them in
order to ascertain the extent to which they consider them-
selves to be better off. This is the equivalent variation in
income for a beneficial effect. In the same way, we can
ascertain from the point of view of those who are expected to
be worse off by a change the amount of income which they would
part with than suffer the consequences of the change. This
would be the equivalent variation from the point of view of
those who are adversely affected. If a change is to be on
the whole beneficial, the sum of both the compensating as well
as the equivalent variation has to be positive. This is
necessary between two situations when changes in distribution
have taken place.

CHAPTER IV

SUMMARY AND CONCLUSIONS

We may now summarize our findings as regards the
question how far Marshall's original concept of consumers'
surplus has been reinterpreted in its recent rehabilitation.

The original inventor was Dupuit. The beginning of
the fundamental idea that consumers' surplus should be
regarded as a relative and not as an absolute concept may be
claimed for Marshall. Although this concept of the Aggregate
surplus for the community admits of absolute utility inter-
pretation, Marshall was concerned with the changes in the size
of the surpluses rather than with the size of surpluses as
they stand when he came to apply the surplus analysis in the
partial form. The new definition of consumers' surplus as the
sum of money which will offset the gain or loss due to a
movement from one situation to another has more pointedly
brought out the relativeness of the concept. But Marshall too
had clearly stated that:

> The chief applications of the doctrine of
> consumers' surplus are concerned with the changes
> in the price of commodity in question in the neigh-
> borhood of the customary price.[1]

---

[1]Alfred Marshall, _Principles of Economics_, London,
Macmillan and Co. Ltd., 9th edition, 1961, p. 133.

The indifference curve technique has provided us with a more refined analysis of the "income effects" which Marshall had deliberately ignored as he did not consider them to be quantitatively important. Recent investigations by Prof. Hicks, Mr. Henderson and others have shown us that when we introduce these refinements the consumers' surplus is not one concept, but many concepts. But these investigations have also confirmed Marshall's judgement that while these distinctions are interesting from a theoratical point of view, they are not likely to be of much practical significance.

Where the recent formulations have taken a significant departure from Marshall's original theory is in the principle of compensation. This method has enabled us to avoid the traditional bugbear of welfare analysis, viz., interpersonal comparison of utility. It has enabled us to dispense with the doubtful assumption Marshall was obliged to use, viz., that quantities of money are proportionate to quantities of satisfaction.

## ACKNOWLEDGMENTS

The author wishes to express her sincere appreciation to her major instructor, Dr. E. S. Bagley, Department of Economics and Sociology, for advice, constructive criticisms and patient counsel during the entire period. The cooperation and help given by other members of the Economics Department is also acknowledged.

The writer also wishes to express her deep gratitude to her parents, Satyabala and Vimochanrao, for inspiration and encouragement throughout the entire period of study.

# BIBLIOGRAPHY

## Books

Christ, Carl F., Friedman, Milton, Measurement in Economics, Stanford University Press, Stanford, California, 1963.

Hicks, J. R., Value and Capital: An Inquiry into some Fundamental Principles of Economic Theory, 2nd edition, London, Oxford, The Clarendon Press, 1946.

_____. Revision of Demand Theory, Oxford University Press, 1956.

Knight, F. H., Risk, Uncertainty and Profit, Boston and New York, Houghlin Miffin Company, 1923.

Little, I. M. D., A Critique of Welfare Economics, 2nd edition, London, Oxford University Press, 1957.

Marshall, Alfred, Principles of Economics, London, Macmillan, 8th edition, 1920. St. Martine, 9th edition (Variorum) edited by C. W. Guilleband, 1961.

Nicholson, J., Principles of Political Economy, Vol. II, N. Y., 1898.

Reder, M. W., Studies in the Theory of Welfare E. W. Oxford University Press, 1947.

Robbins, L., Nature and Significance of Economics Science, 2nd edition, London, Macmillan and Co. Ltd., 1937.

Robertson, D. H., Lectures on Economic Principles, Vol. I Great Britian, Staples Ltd., 1957.

Samuelson, P. A., Foundations of Economic Analysis, Cambridge, Harvard University Press, 1948.

## ABBREVIATIONS USED

| | | |
|---|---|---|
| JPE | - | Journal of Political Economy |
| QJE | - | Quarterly Journal of Economics |
| REStud | - | Review of Economic Studies |
| AER | - | American Economic Review |
| EJ | - | Economic Journal |
| SAJE | - | South African Journal of Economics |

## Articles

Alford, R. F. G., "Marshall's Demand Curve," _Economica_, 23, 1956.

Bailey, M. J., "The Marshallian Demand Curve," _JPE_, 62, 1954.

Bishop, Robert, "Consumers' Surplus and Cardinal Utility," _QJE_, 1943-44.

Cannan, E., "Total Utility and Consumers' Surplus," _Economica_, 1923.

Edgeworth, "Note on Prof. Nicholson on Consumers' 'Rent'", _EJ_, Vol. IV, 1894.

Friedman, Milton, "Marshallian Demand Curve," _JPE_ 57, 1949.

Henderson, A., "Consumers' Surplus and Compensating Variations," _REStud_, Vol. VIII, 1941.

Hicks and Allen, "Reconsideration of Theory of Value," _Economica_, May, 1934, No. 2.

Hicks, J. R., "The Generalized Theory of Consumers' Surplus," _REStud_, Vol. XIII (E), No. 34, 1945-46.

_____. "Four Consumers' Surpluses," _REStud_, Winter, 1943, Vol. XI.

_____. "Consumers' Surplus and Index Numbers," _REStud_, IX, No. II, 1942-43.

_____. "The Rehabilitation of Consumers' Surplus," _REStud_, Vol. VIII, No. 2, 1940-41.

Machlup, F., "Prof. Hicks Revision of Demand Theory," _AER_, March, 1957.

Mishan, E. J., "Realism and Relevance in Consumers' Surplus," _REStud_, 15, 1947-48.

Morgan, J. N., "The Measurement of Gains and Losses," _QJE_, Feb., 1948, No. II.

Robertson, D. H., "Utility a Rejoinder," _EJ_, 1955.

_____. "Utility and all What," Part III, _EJ_, 1954.

Robinson, H. W., "Consumers' Surplus and Taxation: EXAnte, or Ex Post?", _SAJE_, Sept., 1939.

Stigler, G. J., "The Development of Utility Theory," II, _JPE_ 58, 1950.

DOCTRINE OF CONSUMERS' SURPLUS

by

Miss Rohini V. Desai

B. A. Gujarat University, 1959

M. A. Sardar Vallabhbhai Vidyapeath, 1963

———————————

AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTERS OF ARTS

Department of Economics
and Sociology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1964

## Abstract

The original inventor of this concept of consumers'
surplus was Dupuit. Then Marshall refined it.

The money or what Marshall called the "economic"
measure of consumers' surplus is given by the difference
between the price a consumer is prepared to pay for a
commodity and the price which he actually does pay. As it
stood with Marshall the doctrine presupposed the cardinal
utility function. Besides it was assumed that:

1. The marginal utility of money is given and
   constant.

2. Each good is an independent one and there is no
   substitution or complementarity relation between
   goods.

3. The complete demand schedule is known.

For these unrealistic assumptions the measurement of
surplus appeared to be rather hypothetical. But this does not
mean that the concept as such is "unreal." It has been
rehabilitated by Hicks without assuming the cardinal utility
function. He found four different measures of this surplus
analysis and developed a generalized theory of consumers'
surplus in terms of indifference curve.