A THEORETICAL INVESTIGATION INTO HUMAN ACTION IN A DYNAMIC FRAMEWORK

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Abstract

This paper presents an alternative to the existing paradigm of rational choice theory as a means of evaluating economic behaviour where we introduce a dynamic framework to understand economic behaviour over time. We develop an analytical theory of goods and endeavour to provide a solution to the aggregation problem. The conceptual apparatus based on the work of Human action was originally developed by Ludwig von mises is expanded and is then used to explain the empirical regularities which are found in economic literature on consumer behaviour.

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Introduction

The economics profession today is ruled by the neoclassical paradigm which uses functional black box thinking and techniques to look at the world. This conception of looking at the world treats economic agents like physical world objects with no will or want of their own, they become mere objects which move due to force being applied on it.

Even a hesitant look away from the black board models is enough to assure anyone regarding the non-validity of their arguments. Human beings possess will, Human beings have wants, Turmoil and uncertainty are intrinsic elements to choice in the real world. While one can point out multiple errors with the neoclassical paradigm, Their greatest strength which is responsible for the general broad acceptance of their methods and conclusions lies in the coherent nature of their economic reasoning. A broad plan starting from individual unit which ends with exchange in general equilibrium

They start with some axioms for mathematical convenience which they use to construct a theory of preferences on the basis of which they construct utility functions. They use these utility functions to make indifference curves along with budget constraints to come up with consumer demand bundles. Although this coherent scheme allows them to exert force and clarity to their arguments, the non-economic nature of their axioms create an essential problem in understanding the real world as well

as serving a case for internal contradictions with results such as the Sonnenschein–Mantel–Debreu theorem

The refutation therefore of such a paradigm must also be in the same coherent broad plan but without internal contradictions. We have endeavoured in this paper to build such a coherent framework based on principles of Austrian economics which we then extend to solve the much dreaded "Aggregation Problem"

We start with building the essential elements for economic actions in a dynamic framework, then we introduce money and show the formation of prices. Then we point out essential faults with professor Samuelson's revealed preference approach and construct our own theory of preferences. The examination of economic behaviour across time under a dynamic framework follows from the theory of preferences. Finally, we articulate the theory of goods on the basis of which we solve the aggregation problem and look at some real world data.

Note to reader

Investment is the backbone of increasing productivity over time which leads to prosperity but the finance of stable investments can only be done through savings. The availability of savings allows the producers to invest in capital goods and workers without leading to inflationary pressures which are associated with artificially lowered interest rates financed expenditures. This reminds us therefore that by abstaining from present and immediate consumption the consumers allow the economy to head towards greater prosperity. This is the spirit under which we would request our readers to undertake this work. The long length of this work is necessary if we are to build a coherent scheme

and take things to their utmost conclusions. Thus the ripest fruits contained in this work can only be found through the complete journey of this work

The Need for a Dynamic framework

The conception of economic behaviour across multiple periods in the neoclassical mainstream paradigm as well as in other schools of thought has been examined under the idea of intertemporal choice. While it includes the notion of time, the current approach to intertemporal choice neglects the inherent variant nature of desires, the difference in valuation of the same good under these different states and under different intensities of desire which emerge from the variant nature of desires itself. It merely treats choices in future periods as merely mechanical iterations of choice in one period.

The determination of a choice rule under static state when extended to multiple periods means abstracting from any notion of change, the inclusion of time in such a framework acts only as an analytical tool to differentiate between two time periods without no economic meaning. The model of intertemporal choice will give us the same result whether we look at two consumption choices that spread across two years and two days as it looks merely at choice between now and future. It is purely abstract, devoid of any usage in interpreting the real world. This usage of the mechanical intertemporal choice models means looking at a dynamic world through a static lens therefore if we are to gauge a dynamic world where the variables impacting economic action change with actions undertaken and with time we must adopt a dynamic framework where we allow both the impact of economic action and time on the variables which influence economic action. Only then would we be able to explain economic behaviour and the processes which underlie them.

Economic Action in a Dynamic Framework

Economic action in a dynamic framework involves five components

1) *The nature of economic action*
2) *The process of valuation*
3) *The determination of the end to be pursued among alternative ends.*
4) *The choice among alternative means*
5) *The act of exchange*

The nature of economic action

Before any investigation into economic activity, the primary question with which we should concern ourselves with any action is, *why does an economic agent act.*

Any and every action that an economic agent undertakes has a teleological purpose, which means every action is aimed at an end, without the conception of an end the actor wouldn't be able to act as it wouldn't know what to do. It is only after the end is well defined to him that he can evaluate and choose among the respective alternative means available to him to attain the end. The pursuit of an end is motivated by a desire for an improved state of affairs. If there is no desire for a particular end that is better than the present, no action would be undertaken. Professor Mises illustrates the same concept of action and its relation in the following passage

"We *call contentment or satisfaction that state of a human being which does not and cannot result*

in any action. The acting man is eager to substitute a more satisfactory state of affairs for a less satisfactory one. His mind imagines conditions which suit him better, and his action aims at bringing about this desired state. The incentive that impels a man to act is always some uneasiness. A man perfectly content with the state of his affairs would have no incentive to change things. He would have neither wishes nor desires; he would be perfectly happy" (1.1)

The conception of action is motivated by the uneasiness that an economic agent feels due to desire for a possible better state and looks through action to remove the felt uneasiness and reach that better state.

We can think of this uneasiness felt through the concept of intensity of desire. The intensity of desire for an end is the level of uneasiness felt by the economic agent concerning its current state of affairs, where the end is a different warranted state than which it is currently in.

Utility and intensity of desire

The intensity of desire for an end motivates the actor to act, the action thus can take place only when the intensity of desire is greater than the cost of engaging in action. When the economic agent is satiated, comfortable, and satisfied with the present state of affairs the intensity of desire for any other state is quite low.

The term utility has had many different interpretations over its long history of development, the meaning under which we interpret utility relates to the conception of satisfaction that an agent receives from consumption of goods or services. *Utility is thus an emergent property which is*

experienced by the economic agent in the process of satisfying the desire of his want.

The felt utility is a reward which motivates the actor to act as well as to continue the action undertaken arising from consumption as a consequence of the satisfaction received from the lowering of intensity of desire for the want being pursued.

Law of diminishing marginal utility

The much coveted law of diminishing marginal utility becomes a natural implication of everything that has been said until now. *When utility is the the satisfaction received in the process of an economic agent looking to satiate the intensity of desire of a want, the highest marginal sensation of satisfaction during a period of continuous consumption would naturally be felt when the intensity of desire for the want is at its highest level and would fall subsequently as through the actions of the agent the intensity of desire for the want falls thereby reaching its lowest point where the end desired is achieved. At this level, the agent would not receive any utility.*

The end to economic action takes place when the intensity of desire for an end which is different from which it is currently in is lower than the cost of continuing the action which would take the agent towards that different end. An actor would thus refrain from acting in such a case as it lacks the motivation to act *due to the low level of utility* which would be received if the action is continued.

The process of valuation

The motive of this section is to provide an answer to the question of why and how economic agents value things. Valuation of something is intrinsically bound to an end as the process of valuation is used as a tool by the economic agent as a means of choosing among alternatives to reach the aimed end or among alternative means to pursue the end.

Without the pursuit of an end, there is no valuation as there is no need for a valuation. Values are situation-dependent decision helpers because they allow us to make decisions by differentiating between what is to be done, and what is not to be done.

Value is subjective because the process of valuation is undertaken only by an individual and since every individual experiences life in a different manner based on their respective preferences and belief systems until two agents have identical beliefs and Preferences and are in the same situation, the subjective value assigned by them would differ.

Value is context-dependent as the same individual in different contexts may value the same thing differently. This can be explained by the means of a thought experiment. When an economic agent is feeling a high intensity of desire for an end where the end is a warranted state of affairs different from the present and it is high enough that it is greater than the cost of acting he would

choose to act.

Then the action which the agent will undertake will involve making a choice among different alternatives, choosing among alternatives implies the selection of one among various alternative means, this requires some differentiating mechanism with which the agent can rank them and then based on his external constraints on the ability to use the means can choose that which is most valued to him.

The process of valuation thus acts as this differentiating mechanism that assigns value to each alternative in a subjective manner.

Marginal Valuation and Choice

The process of valuation has a special distinctive role in economic action as it provides the economic agents with the differentiating mechanism which helps the economic agent in the process of making a choice when faced with alternatives. The acknowledgement of such a differentiating mechanism poses another question with respect to the nature of this mechanism. What exactly is the nature of this mechanism and what is the nature of the rules it imposes upon the agent when confronted with a choice.

The valuation of an economic agent when faced with the problem of choice amongst alternatives *are marginal in nature. The reason for it being marginal in nature lies in how we*

experience time. Professor Bohm bawerk when expanding on his theory of the pure time preference rate of interest held that, the proofs sometimes of arguments we use in economic theory may lie outside economics. We take up this line of thought to expound the proof of why valuation among alternatives is always marginal in nature in connection to how we experience time.

We experience time as a sequence of discrete now's, in such a case every valuation can only be marginal in nature.

This conception of the experience of time has been explained in ***phenomenology*** by the example of listening to a melody.

For a melody to be a melody, it must have distinguishable though inseparable moments. And for consciousness to apprehend a melody, its structure must have features capable of respecting these features of temporal objects. Certainly, we can "time" the moments of a temporal object, a melody, with discrete seconds (measured by clocks) this is a notion of time which, following Newton considers time as an empty container of discrete, atomistic now's,

Therefore, as we experience events in time in sequential now's, we can only have a marginal valuation of things as any other conception of understanding of events is outside our experiential structures. More concretely: When in a real market a consumer chooses apples over oranges, he marginally prefers apples to oranges in the moment of choice as his

expectations of higher utility which he would receive from apples to oranges can only be gauged by that consumer in a sequential manner of discrete moments of consumption of them one after the other and not together.

This experiential conception of time is the bedrock into professor Menger's great insight into how the determination of value of things by economizing agents takes place.

In his words "If *the requirements for a good are larger than the quantity of it available, and some part of the needs involved must remain unsatisfied in any case, the available quantity of the good can be diminished by no part of the whole amount, in any way practically worthy of notice, without causing some need, previously provided for, to be satisfied either not at all or only less completely than would otherwise have been the case. The satisfaction of someone human need is therefore dependent on the availability of each concrete, practically*

significant quantity of all goods subject to this ***quantitative relationship.*** (1.2)

The realization of this quantitative relationship that professor Menger talks about can only come about to economic agents as a result of time and events being experienced in a sequential manner of discrete nows. *He goes on further*

"If economizing men become aware of this circumstance (that is, if they perceive that the satisfaction of one of their needs, or the greater or less completeness of its satisfaction, is dependent on their command of each portion of a quantity of goods or on each individual good

subject to the above quantitative relationship) these goods attain for them the significance we call value. Value is thus the importance that individual goods or quantities of goods attain for us because we are conscious of being dependent on command of them for the satisfaction of our needs." (1.3) The experience of perceiving things or events marginally and in isolation is a testament to marginal valuation.

The determination of the end to be pursued among alternative ends.

The need for economic action lies in the need to satisfy the desire which provides discomfort to the economic agent due to the present state of affairs and the conception of an end which is better than the present but as is evident from experiences in our own lives, there are various different wants with varying levels of desire, therefore, all economic agents in their lives have to deal with the problem of satisfying these different wants in a balance given the constraint of means available which is acceptable to the agent.

The existence of constraints on the availability of means to satisfy wants gives rise to *economizing behaviour*. The need for economizing behaviour has been explored by Carl Menger in the following passage,

"Wherever men recognize that the requirements for a good are greater than its available quantity—they achieve the further insight that no part of the available quantity, in any way practically significant, may lose its useful properties or be removed from human control without causing some

concrete human needs, previously provided for, to remain unsatisfied, or without causing these needs now to be satisfied less completely than before".(2)

In the context of a modern economy where the exchange takes place in the form of indirect exchange, the need for economizing behaviour arises when the total quantity of money available to the agent in a period is incapable of satisfying all wants of the agent with perfect levels of satiation in that period. A perfect level of satiation is that point where the intensity of desire of all wants are minimized.

When it becomes evident to the economic agent that all his wants cannot be satisfied with the given means, he has to engage in economizing behavior. Economizing behavior consists of the allocation of means to their most efficient use.

The process of economizing involves the usage of means available to the economic agent in satisfying the desire with the highest intensity in a sequential manner. We can imagine this process with the ranking of desire and allocation of means available in a sequential manner where the agent satisfies his highest ranking desire first and subsequently goes on until he runs out of his means or satisfies all his desires. Professor Menger explores the process of economizing in the following manner

" To make a choice between their more important needs, which they will satisfy with the available quantity of the good in question, and needs that they must leave unsatisfied, and to obtain the

greatest possible result with a given quantity of the good or a given result with the smallest possible quantity—or in other words, to direct the quantities of consumers' goods available to them, and particularly the available quantities of the means of production, to the satisfaction of their needs in the most appropriate manner."(3) The process of economizing mandates the ranking of ends based on the ranking of desires. The ranking of desires is undertaken based on their different intensities. The choice among alternative means is concerned with the problem of choice that

The choice among alternative means

The economic agent has to deal with choice amongst alternative means while engaging in economizing behavior in the pursuit of an end to satisfy the desire of a want.

This problem comes into being due to the concrete fact that there exist multiple objects which can be used to satisfy the same want, therefore the agent has to choose one among them to be used in the process of desire satiation. The choice of an object among alternative means is based on the same principles of valuation we have established in the previous sections.

The only difference lies in the fact that there are no limits or constraints on wants and subsequently the ranking of them whereas means which are to be used to satisfy those wants have constraints or limitations on them. This limitation in market exchange comes in the form of budget constraints.

The treatment of this problem in modern microeconomics is done through the idea of revealed preference theory, where economic agents are expected to reveal their preference in the form of choices. Revealed preference theory imposes static rules on economizing behaviour through axioms

of weak and strong axioms of revealed preference. It was developed by professor Samuelson in his papers on pure theory of consumer's behaviour.

Let us consider an initial price and income situation.

$$(p_1, \ldots p_n, I)$$

Corresponding to this set there is a given set of consumer's goods bought.

$$(\psi_1, \ldots \psi_n)$$

Now consider a second set of prices and income.

$$(p_1', \ldots p_n', I')$$

and

$$(\psi_1', \ldots \psi_n')$$

I introduce a bracket notation to indicate the following sum :

$$[\psi p]=\psi_1 p_1+\psi_2 p_2+ \ldots \psi_n p_n=\sum_{i=1}^{n} \psi_i p_i$$

or

$$[\psi p']=\psi_1 p_1'+\psi_2 p_2'+ \ldots \psi_n p_n'=\sum_{i=1}^{n} \psi_i p_i' \qquad (4.1)$$

Suppose now that we combine the prices of the first position with the batch of goods bought in the second. The total cost of such a batch would be

$$[\psi' p]=\sum_{i=1}^{n} \psi_i' p_i \qquad (5.0)$$

If this cost is less than or equal to the actual expenditure in the first period when the first batch of goods was actually bought, then it means that the individual could have purchased the second batch of goods with the price and income of the first situation, but did not choose to do so. That is, the first batch (x) was selected over (x'). We may express this symbolically by saying

$$[\psi' p] \leq [\psi p] \qquad (5.11)$$

implies

$$(\psi') \textcircled{<} (\psi) \qquad (5.12) \qquad (4.2)$$

What professor Samuelson tries to explain in his paper is a method of establishing rationality of consumer behaviour on the basis of consistency of consumer choices. While the logic of professor Samuelson's formulation is quite clear and elegant, he makes two vital mistakes.

Error #1

When he says, "If this cost is less than or equal to the actual expenditure in the first period when the first batch of goods was actually bought, then it means that the individual

could have purchased the second batch of goods with the price and income of the first situation, but did not choose to do so. That is, the first batch (x) was selected over (x')"

He mistakes *preferences of ends as preferences over means*, in his formulation each choice bundles consists of n number of goods at their given prices, consistency of preferences are maintained if one bundle say x1 is chosen over x2, while both were affordable, In such a case x2 can never be chosen over x1 if x1 is affordable.

But as we have already seen in the earlier sections that an object or a good is a means which is employed by the consumer when he is motivated by the intensity of desire in pursuit of an end which is his want thus each of these n different goods in the bundles effectively are employed by the consumer in satisfying his n different wants, in such a case the underlying intensities of desire of wants becomes the crucial factor in deciding what would be chosen and what would not be.

This can be further illustrated with the help of an exercise in Crusoeian economics. Robinson Crusoe is stranded on an island; He has at his disposal his hands with which he can catch a fish which would satisfy his hunger where a single fish takes 5 hours to catch or he can break coconuts to drink coconut water to satisfy his thirst where each coconut takes 2 hours.

He has 24 hours at his disposal out of which he prefers to spend 10 hours in leisure and remaining 14 in labor. In period one, it's a cloudy day where on the basis of his intensity of desire for two different wants, crusoe spends his total labor time in catching 2 fishes and 2 coconuts whereas in period two it's a hot and sunny day whereby based on his intensity of desire for wants, he spends his labor time catching one fish and four coconuts.

As is clearly evident the bundle chosen in period B was available to be chosen in A as neither the total time of 24 hours neither his preferred labor time of ten hours has changed, what has effectively changed is the underlying relative intensities of desire for different wants, in period two due to the weather being extra hot, his intensity of desire of thirst goes up relative to his hunger, thus constraint being fixed he chooses more of coconuts to get water over catching fish.

Now are we supposed to consider this behavior irrational? one can hardly imagine a better rational response to change in underlying desire states than by changing the choices to satisfy them.

When one wants to establish rationality of consumer behavior on the basis of consistency of preferences of choices on the market, one is effectively arguing for holding the intensities of all

different wants as the same across different time periods but as we know that desire is always variant in its nature, the usage of such an analysis losses its *"operational meaning."* .

The usage of term "operational meaning" may seem superfluous here but if one looks at the history of development of modern symbolic rational choice theory, the endorsement of operational meaning was the verbatim used to advance the positivist cause of explanation of economic behavior.

Error #2

The second error is a direct implication due to the first error, this error lies in the idea of consistency of preferences. As we have seen arguing for consistency of preferences is equivalent to the assumption of keeping the underlying intensity of desire fixed, which leads to the natural result where professor Samuelsson is assuming constancy, this error was captured by professor mises and pointed by professor rothbard

"The "revealed preference" theorists do not recognize that they are assuming constancy; they believe that their assumption is simply that of consistent behavior, which they identify with "rationality." They will admit that people are not always "rational," but uphold their theory as being a good first approximation or even as having normative value. However, as Mises has pointed out, constancy and consistency are two entirely

different things. Consistency means that a person maintains a transitive order of rank on his

preference scale (if A is preferred to B and B is preferred to C, then A is preferred to C). But the revealed preference procedure does not rest on this assumption so much as on

an assumption of constancy—that an individual maintains the same value scale over time" (5)

The choice among alternative means rooted in economic action

The proper conception of *choice among alternative means* on the market place lies in the acknowledgement that *all the alternative means satisfy the same wan*t, that is to say the preferences of consumers over alternatives in the market are preferences of consumers among different objects which satisfy the same want.

Therefore the theory of preferences is actually *the theory of development of preferences* which are rooted in economic actions and learning behavior where preferences are formulated and reformulated based on internal and external changing conditions.

The internal conditions which lead to formulation and reformulation of preferences lie in the expectation that consumers have about the ability of objects to satisfy their wants along with the actual experience that consumers have upon consuming those objects in relation with evaluation of their abilities to satisfy the concerned wants.

The external conditions which influence development of preferences are concerned with the relative price of alternative objects which satisfy the same want along with new availability of

new objects and changes in the material nature of them.

Let's understand this with the help by expanding the availability of means which are available to Robinson Crusoe. As opposed to the earlier example where there was only one object which could satisfy crusoe's want of satisfying thirst, we introduce two different goods, One of them is the coconut which crusoe can gather from coconut trees with a per unit labor time of 2 hours while the other would be drinking water through Desalination from the oceanic water, which is the process of taking salty or "brackish water" and turning it into drinking water. This has a per unit labor time of 3 hrs.

The formation of preferences of crusoe over these two goods which satisfy the same want is a discovery procedure which crusoe engages in through action, forming expectations and reorienting its relative expectation of their want satisfying ability on the basis of its actual consumption experience where the formulation of expectation precedes actual choice and reformulation takes place after choice.

In period one crusoe subjectively values coconut water more than drinking water on the basis of comparison of its expectations of their want satisfying abilities and their respective costs (per unit labor time) thus choosing to consume coconut water over desalinated drinking water.

At the end of the next period, if there wasn't a perfect match between his expectation and actual

experience, Crusoe would revise his expectation about coconut water and subsequently its subjective valuation of coconut. Suppose it happens that after the actual experience of consumption of coconut, the subjective value scales are overturned where drinking water is now preferred to coconut therefore Crusoe in this period would choose to consume drinking water in place of coconut water.

This choice would follow the same logical sequence where after the end of second period, if there wasn't a perfect match between the expectation and actual want satisfying ability, the expectation would be revised along with it the subjective valuation of drinking water.

The choice in subsequent periods would follow the same dynamic process of comparison of expectations with actual experience to produce *a consistent preference* structure over time which will be consistent along as the external conditions of cost structures don't change and new goods are not introduced into the event.

The act of exchange

The act of exchanging goods for money and alternatively money for goods has become an all pervasive phenomenon, one can scarcely find a human being in modern economies who has not internalized or has not become acquainted with this action.

But as is the case with every economic action, there is more to what meets the eye in this simple act of exchanging things.

It is thus our role as economists to delve under the surface of what economic agents engage in without thinking too much and come up to the surface to describe what the underlying process and mechanisms of such actions are. Therefore the best starting position one can take is thinking about *"What is an exchange, Why does an exchange takes place and What are the essential elements for an exchange to take place"*

The economic action of exchange consists in substitution of one thing for another. Exchange in modern economies takes place in the form of indirect exchange, where money acts as the facilitator of exchange.

Economic agents in pursuit of their valued wants exchange money for the goods they desire and exchange goods they produce to get money with which they can get ownership over these desired means.

The foundation for all exchange lies in s*urplus produce, unequal valuation of objects of exchange by their respective possessing parties and multiplicity of human wants.* One cannot imagine any exchange in the absence of either one. Only after the direct needs with respect to stock of goods is met that the economic agent can exchange it for another good thereby reaping indirect gains from it. Thus surplus produce makes it possible for exchange to take place.

Direct Needs and Surplus

The quantity of goods which the individual intends to consume out of the total stock which the

individual possesses is that amount upon whose consumption the intensity of desire of the most preferred want being pursued is not higher than the second most preferred want that the agent must have. This can be described as the *consumption limit.* Any amount above this quantity out of the total which the individual possesses becomes surplus to him which can be potentially exchanged for goods which may satisfy his other wants.

Multiplicity of wants

If the wants of agents were unitary in nature, even in the presence of surplus produce there would be no exchange, as the economic agent in the absence of any felt discomfort due to intensity of desire for a want would find no reason to engage in the economic action of exchange.

Unequal valuation of each other's goods by respective parties

Economic exchange can take place only when there is an unequal valuation of the goods by their respective exchange parties. This idea flows from the existence of multiplicity of wants that economic agents face. As we had seen in the earlier section, the process of valuation is used by economic agents in the form of context dependent decision helpers.

When the basic needs for an object are fulfilled and there is still an excess quantity, the subjective valuation of the agent for that object becomes relatively less than an object which can satisfy its other unfulfilled desires. *In exchange, this is the state of both parties, whose valuations for each other's objects is higher than the valuation of their own.*

When we combine all ideas on exchange from above we reach the definite conclusion that an exchange takes place in the process of economic agents pursuing their own valued wants where they use other's productive power in return for their own. These provide the answers to all the questions which we had proposed in the beginning of our discussion of exchange.

Marginal valuation as the governor of exchange

The marginal valuation i.e the valuation of each unit of a good which the individual possesses is the value to him which would be lost if he were to lose possession of it. This valuation in economic exchange is compared to the value of goods which it would be exchanged with. Only when the valuation of the good being received is higher than the value of good being given that exchange can take place and it will go on being exchanged as long as the value being gained is higher than the value being lost.

The idea that marginal valuation of goods by the economic agent acts as the governor of exchange flows directly and is a necessary consequence from the two of the three essential basis of exchange that we have pointed out earlier namely *multiplicity of economic wants, existence of surplus and process of valuation.*

Marginal valuation and respective unequal valuation

When an economic agent has a multiplicity of wants in the form of different ends that it wants to

pursue, he ranks them in order of their intensity of desire and pursues it in that given order. During the process of satiation of desire through economic actions the intensity of desire goes on falling, as the intensity of desire falls so does the value of the good to the agent, this value of the good can be described as the utility which would be lost if that good were taken away.

Utility happens to fall as utility is an emergent property which stems from consumption of a good in the process of desire satiation therefore when desire is low, so would be the utility which the agent derives from it. If the economic agent in such a state possessed surplus amount and were to be offered the good which satisfies his second highest want, he would value that good *marginally more* as the intensity of desire of his second unfulfilled want is greater than the intensity of desire of the want at consumption limit.

Robinson Crusoe and direct exchange

Robinson Crusoe one day decides to spend 10 hours of his total labor time in catching fish, and catches two of them at the end of it, when he is on his way to the coconut tree to get coconuts he encounters another man Mark Estrano who was also stranded on the island but without Crusoe's knowledge of it.

Crusoe looks at the stock of coconuts that Estrano had gathered, Crusoe realizes that out of his total quantity of fishes, his hunger would be satiated with one fish at the *consumption limit*. He thinks of making a possible exchange where he would offer his fish in exchange for 4 coconuts which would

save him the labor time of 4 hours which he can now consume as leisure.

He offers Estrano the choice of exchanging his 4 coconuts for a fish, Estrano has 10 coconuts and he realizes that *he values a fish more than his 4 coconuts due to the marginal value of one fish when he has no fish being more than 4 coconuts in presence of his stock of 10 coconuts* and subsequently exchange it.

Money and Indirect Exchange

The process of valuation acts as the differentiating mechanism which allows us to make judgements amongst alternatives but while internally the intensity of desire allows for greater and lower valuation amongst different ends to be pursued there is no such internal mechanism available for making choice amongst numerous alternative goods owned by multiple participants on the market through determination of value which is unique for each market participant.

The uniqueness of value of goods to every agent is important as it has to be compared with the intensity of desire felt for the want and since comparisons can only be made in common units, the subjective value of an end has to be compared with the subjective value of the good.

Money wouldn't be needed if the economic agent possessed a single economic goods in some supply which could potentially satisfy all his wants if it was available in unlimited supply, in that case it would just be a matter of allocation of that one good in varying proportion of its available supply

with respect to the intensity of desire of wants, the greater the desire of a good the larger proportion of the supply would be devoted to it just on the basis of subjective valuations of each.

But since there doesn't exist such a good which can directly satisfy all of the different wants of an agent, money becomes that good whose supply allows the agent to satisfy all his economic wants indirectly through exchange.

Robinson Crusoe and the magical hat

Robinson Crusoe one day on his way to fishing stumbles upon a hat half buried into the sand, as he comes near the hat, the hat in an animated manner calls upon Crusoe to get it out of the ground, and offers in return which would shapeshift and satisfy any of this six desires to his consumption limit

Crusoe gets the hat out of the ground and receives the shapeshifting good, now let's imagine Crusoe has 10 different of wants of varying intensities which it ranks in the order of highest to lowest, since this good can in principle satisfy all of his wants he doesn't need the assistance of any other good.

Crusoe would use the good in varying proportions to satisfy all of his wants some more completely some less in order of their ranking based on intensity of desire. If Crusoe Doesn't want to improve his current levels of satiation of desire he would need no reason to trade and if there is no complex trade, there would be no basis for the formation of indirect exchange.

Role of money in the process of valuation

Money fills in the role of absence of the internal mechanism we argued in the previous paragraph. Money functioning in the market process allows for the conversion of information about the desirability of the goods amongst market participants dispersed throughout the market into normalized historical market prices which can turn the objective conditions of market about demand and supply of the good due to actions on the market into a unique subjective valuation with respect to the desirability of the good which can then be used by consumers as well as entrepreneurs can to engage in economic calculations to perform the act of exchange through their own process of economizing on goods.

This normalization which money performs is with respect to the vast dispersed information of actual quantity and desirability of heterogeneous goods into a common unit of account reflecting changes in scarcity or abundance due to changes in demand and supply for them. It acts as the calculation of its value on the market through the market process which participants would then use to set the terms of exchange in the form of historical market prices.

Money thus becomes the basis for economizing behavior in indirect exchange and would look to economize on money in pursuit of satiation of its as it does with any other good. The usage of money is essentially the same in valuation as the magical *hat* played in Crusoe's case.

Money thus becomes the basis for economizing behavior in indirect exchange and agents would look to economize on money in pursuit of satiation of its as it does with any other good. The usage of money is essentially the same in valuation as the magical *hat* played in Crusoe's case.

Money and economizing behavior

An economic agent has a given stock of money which it can use in exchange on the market for the goods it needs to satisfy its wants. Unless the total stock of money is greater than which is needed to satisfy all his desires he has to engage in economizing behavior.

It uses the given stock of money available to him in a sequential manner of satisfying the highest ranking want based on their relatively higher intensity of desire. We can illustrate this further with the help of a simple thought experiment

Let's imagine that an agent has 10 different wants and a given stock of money which is lower than which can satisfy all of his desires. The acknowledgment that some of his needs would remain unfulfilled and due to the discomfort felt in proportion to the intensity of desire of unfulfilled desires prompts him to economize on money. He would satisfy the want with the greatest intensity of desire, it is only after his highest valued end has been achieved he can now move to his less desired ends.

The total stock of money which was available to the agent has now decreased which leads the agent to increase the degree of economizing. *The degree of economizing increases with each unit of decreasing stock of money as the subjective valuation of each unit of available money increases based*

on recognition that some of the desired ends won't be achieved so it has to be applied in the process of satiation of the remaining most valued ends.

The rate of increase of degree of economizing will be in proportion to the total no of unfulfilled desires. This takes place due to the effect of the role money plays in indirect exchange on the intensity of its desire where on *one hand it is a means with which to get goods which directly satisfy wants and reach desired ends while on the other it is a want, the want to have the means to satisfy more unfulfilled ends.*

The value of money therefore as a means to satisfy the end where it is currently being employed falls as the intensity of desire for the want diminishes due to the consumption already undertaken whereas the value of money as a want to satisfy other ends rises as its overall quantity which could have been allocated towards satisfying other unfulfilled wants falls with every exchange of it on present pursuit of want. Therefore the agent has to economize on every unit of existing money increasing its value.

Thus although the intensity of desire for money falls with respect to the end where it is being allocated provided that want is being satisfied, its intensity of desire rises with respect to its unfulfilled wants due to its falling quantity and subsequently its falling ability of allocation towards unfulfilled desired ends.

This insight into the dual nature of money resolves the age-old conflict which treats the demand for money as a medium of exchange and asset differently in economic analysis. The intensity of desire of money as a want to satisfy other wants leads to accumulation of money as an asset due to its increased ability to satisfy the number of wants that agents can pursue with this accumulated wealth.

Robinson Crusoe and indirect exchange

We begin by stating the proposition that a fish doesn't go bad for 3, berries 5 and coconuts for 30 days.

One day Robinson Crusoe was returning after catching fish, he sees Mark Estrano collecting coconuts and having a pile of red berries with him, Crusoe since he had earlier exchanged 4 coconuts knows that Estrano may be open to the possibility of making an exchange but the realization that he has berries with him ends up making him offer the exchange conditions which include one fish for 2 coconuts and half the pile of berries. Estrano who has a pile of berries numerous in quantity and 10 coconuts where both berries and coconuts are beyond his *consumption limit* of them, he values the combination of 2 coconuts and half the pile of berries marginally less than the fish he is being offered. Therefore exchange takes place.

Next day Crusoe finds bushes of black red and collects 2 piles of them, after the collection as he was about to walk towards catching fish he comes across Crusoe who has 4 fishes with him. Their previous experience of exchange prompts Crusoe to make the offer of trading 1 pile of black berries

for 1 fish. Estrano's valuation for 1 fish is lower than the valuation for 1 pile of black berries which leads him to making the exchange.

A few days later Crusoe develops a preference for one extra fish to one hour of leisure and thus catches 4 fishes. One his watch to gather coconuts, he encounters Estrano finishing his day's labor after collecting 10 coconuts and having with him 1 pile of red berries and 1 pile of black berries. Crusoe in view of previous exchange offers Estrano 1 fish for a combination of 2 coconuts and ½ piles of both berries, Estrano with no fish has a higher marginal valuation of fish in relation to 2 coconuts out of 10 and ½ piles of both berries and therefore exchange takes place.

The same process goes on over time where different quantities of different goods are exchanged for fishes both by Estrano and Crusoe

Crusoe and Estrano due to their subsequent trades over time come to the recognition that Fish can be used as an medium of exchange for anything else that the other might possess, Fish comes out as the medium of exchange due to its relatively higher density of exchange capability. This higher density is a result of the fish's higher valuation by both agents relative to every other good.

Money and price determination

Money enjoys an almost exclusive position amongst goods as it has intensity of desire and subsequently marginal valuation both *as a means to an end* and *as end* itself. Its valuation is concerned with the existing money stock with respect to it being exchanged for a final good which provides satisfaction whereas its intensity of desire as a want is with respect to money's ability to satisfy other unfulfilled wants.

During the process of exchange of money for goods which the agent uses to satisfy its wants, the marginal value of money as a means to be spent on that good is compared with the marginal value of money to be spent on the next best end. As long as the marginal value of money as means to be spent on current end is greater than the marginal value of money to be spent on the next best end due to the higher intensity of desire of current warrant in comparison to the next best want the exchange for current good would continue.

After the marginal value of money as a want becomes greater than marginal value of money as a means to be spent on the current desired end due to the greater intensity of the second best want in comparison to the intensity of desire of the fulfilled want, it will be allocated on the next best use. The same process would continue until the agent runs out of money stock.

Prices are historical monetary units which are exchanged for goods based on intensity of its desire as a means on current end, and its intensity of desire as a want to be used towards unfulfilled but desired ends by the consumer and its intensity of desire as a want by the seller.

Robinson Crusoe and the determination of prices through commodity money

- *Fish as money:*

Money is a network good, which means the usability of an object as a medium of exchange is in relation to how many other agents use it in exchange. This property is essential to a commodity which possesses use-value apart from medium of exchange. The other important property which a commodity must possess for it to become a medium of exchange is its restricted or low quantity, the restriction on its quantity is an essential component for the preservation of value that the commodity would enjoy in terms of exchange value.

The mutual recognition that fish is both desired and highly valued by both Crusoe and Estrano due the numerous exchanges which have taken place between them makes fish a commodity money which apart from its usage for pure consumption purposes is now additionally desired for indirect exchange. *This high mutual desirability solves the problem of network goods, whereas the high labor time required to catch fishes and the "**Verstehen"** understanding of both agents that overfishing*

would lead to fall in valuation of other goods resolves the problem of low quantity and preservation of value.

- *Determination of money Prices of goods in fish units*

The determination of exchange units of fishes for every other goods are dependent upon their valuation which is determined by the intensity of desire for the respective goods for the want they satisfy along with their available quantity which determines the degree of economizing needed.

The mutual understanding by both agents for the basis of cooperation which would make them both better makes them come up with a spontaneous rule of law where they would both fish on alternative days with a maximum of 3 fishes a day. *This law is like any other rule that human agents come up with and agree upon voluntarily to minimize the cost of human interaction in social interaction.* They are both free to collect and consume as many of their other goods as they want, therefore the element of choice and human action which takes place in these goods and consumption choices over fish determines the prices of goods.

In period one, Crusoe spends his labor time catching fish, he catches 3 fishes by its labor allocation. He goes to Estrano who, like the previous exchange, has 1 pile of red berries, 1 pile of black berries and 10 coconuts. He exchanges 1 fish for ½ piles of both berries and 2 coconuts. Therefore, the price if established as

Price in Fish units	1 pile of red berries	= 1 Fish
Price in Fish units	1 pile of black berries	= 1 Fish
Price in Fish units	1 coconut	= ¼ Fish

The formation of this set of historical prices are based on the intensity of desire of wants they satisfy along with the exact quantity of each of their availability where change in either one of them will change the values of the prices.

Crusoe consumes 1 fish out of his stock of 2 along with all 4 coconuts and the entire stock of blue and black berries he has, while Estrano consumes 1 fish, 4 coconuts and all his remaining berries.

For simplification purposes, we hold the intensity of desire to be constant across time periods of consumption, we will remove this assumption and discuss the actual process of change and its effect on agent's actions in next sections.

At the start of the next day Crusoe has 1 fish, and 2 coconuts, while Estrano has 6 coconuts. Estrano spends his time fishing and catches 4 fish and goes to Crusoe who has meanwhile collected 4 coconuts and 2 piles of both berries.

Estrano makes Crusoe the offer of exchanging 2 fishes for One pile of each berries on the basis of past determined prices but Crusoe doesn't accept since his underlying valuation has changed due his stock of already existing fish, *his marginal for one pile of berries is greater than 1 fish due his already existing stock which he can still use.*

He offers 1 and ½ piles of red berries and 1 pile of black ones for 3 fishes. Estrano accepts this offer since his marginal valuation of extra ½ pile of red berries is greater than 1 fish since he has none of berries and 1 fish which is his consumption limit.

We therefore see that the price of berries has changed, *1 fish gives only 0.75 berries*. This result comes out from the changes in quantity of fish in original endowment where Crusoe already had one fish which is his consumption limit therefore his need for economizing and the valuation for fish is lower in comparison to his stock of berries.

This small exercise demonstrates the fact that originally all prices were determined on the basis of valuation of commodity money on the basis of its relative usefulness to every other good which changed historically due to changes in quantity of medium of exchange and *changes in quantities of endowment of money and goods.*

The effect of these three changes, changes in quantity of money, changes in quantity of endowment of goods desired through exchanged and changes in intensity of desire for wants which these goods satisfy led to changes in valuation for goods to be expressed through changes in price.

Our focus until now had been to establish a dynamic framework for understanding and evaluating economic actions. The fruits from the work of toil will bear its sweetest fruit from this section onwards.

Economic Actions across time

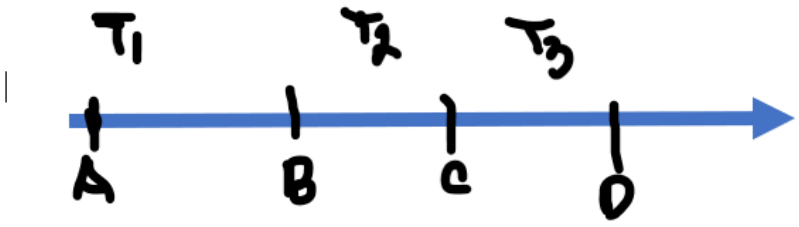
Modern economic theory approaches economic actions from the point of view of the results, the end outcomes in ideal states. This mode of analysis of market outcomes is quite useful for laying out the general arguments with the purpose of cost and benefit analysis for giving concrete policy outcomes but what is gained in emphasis is lost when the understanding of economic actions are concerned in the midst of a dynamic market process.

Market process is dynamic and changing therefore its true understanding can only come about with the conception of economic actions in dynamic and in changing forms. Up until now we have established the framework within which to conceptualize the behavior. The goal of this section is to demonstrate how actions take place across time

Let us define what we mean by economic actions across time with the help of the concept of *time periods* and *states* of economic agent. A time period in economic action is defined as the interval of economic actions which takes place across states of an economic agent. A state begins when the intensity of desire for an end motivates the agent to act and gets completed when the agent is fully satiated or is satisfied with his current intensity of desire, this is the end which was aimed at by the agent through his economic action at the beginning of the state.

GRAPHICAL ILLUSTRATION

It would be quite useful to use a graph to illustrate the same.



State A is the state where the economic agent decides to begin his action and state B is the point where he ends his current pursuit of want. All economic actions which would be undertaken between A and B consist of actions within a time period.

When economic actions are examined across such multiple time periods with a focus on the analytical description of the process of his actions across those time periods and changes in them due to changes in elements which influence economic actions with consideration for learning behavior from past time periods, it would be called Economic actions across time.

Robinson Crusoe consumption choices across time

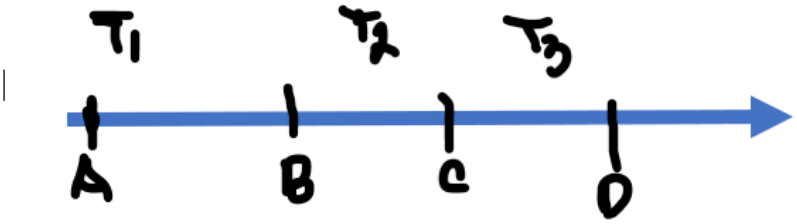
Robinson Crusoe begins his economic actions in time period 1 due to the high intensity of desire for hunger. This we shall call as state A. He begins economic action desiring an end which we would call state B, where his intensity of desire is minimized due to his actions to the point acceptable to him.

In state A his intensity of desire is quite high let us assume he has 1 fish, he establishes the causal relation between the use of fish as a means to satiate his hunger. He begins the process of consumption, as he goes on eating the fish his intensity of desire diminishes as his hunger is being satiated. He feels utility as an emergent process through his act of desire satiation. He consumes till his desire is fully satiated, at this point the marginal utility he would receive from consumption would be either zero as he has no desire for consumption. Crusoe has reached the state B which he was aiming at while he was in state A, this marks the end of time period 1.

The phenomenon of falling marginal utility with each unit of consumption of the fish is termed as *the law of diminishing marginal utility.* Crusoe has reached the state B which he was aiming at

while he was in state A.

We now introduce the principle of refiling utility with Crusoe in state B with the beginning of time period 2, this principle states once the agent has attained the desired end and abstains from further economic actions in the same sphere. The intensity of desire which was low at the point of satiation will as time passes start increasing, without such an increase in the previously diminished desire. Action couldn't take place as every action is aimed at an end which is desired. As desire increases the opportunity for experiencing utility also increases as utility is felt through desire satiation. This principle works till state C is reached by the economic agent. This marks the end of time period 2 for the economic agent.



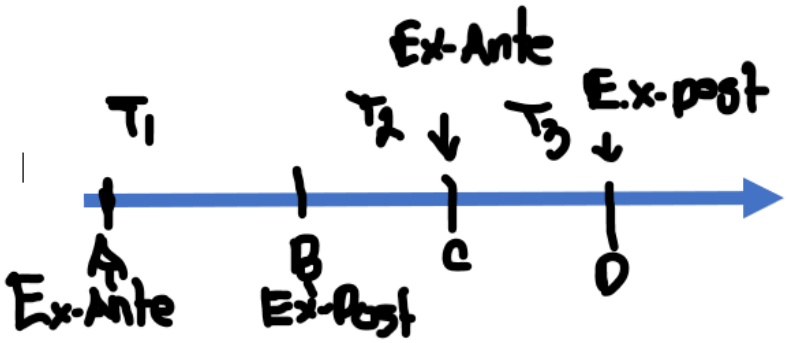
At the end of time period 2, Crusoe has reached state C where his intensity of desire due to refilling marginal utility has reached to the point where it cannot be further tolerated by economic agent. It is in state C that the economic agent again begins the process of desire satiation aiming at the end where

his desire is satiated provided he has the means to do so. He will go on consuming till his intensity of desire for the end is minimized which is state D. This will mark the end of time period 3. This process goes on indefinitely as long as Robinson Crusoe will be alive.

The development of preferences

The development of preferences pertains to the problem of how does it come to be that out of numerous available alternatives some are selected consistently for consumption choices across time, how do these preferences break down and are reformulated.

Let us define the ex-ante and ex-post state of an agent. In time period 1, A is the ex-ante state of the agent, where he acts due to the high intensity of desire choosing an object among multiple alternatives which satisfy the same desire. In the ex-ante state the agent makes a choice of the object of desire satiation based on some expected desire satiable ability of the object, *which is his expectations with regards to how well the chosen object of consumption will satisfy his desire.* State B is the ex-post state of agent with regards to the economic action undertaken, in state B his desire is satiated and has actually *experienced the desire satiation ability of the object which was selected.*



The time period between state B and C is called the reflection period where the agent reflects on his choice, the costs and benefits associated with it in comparison to other alternative objects which could have been chosen. This takes place while the intensity of desire which had diminished in the satiated state B is increasing due to the passage of time and becomes its Highest at state C which is the ex-ante state for the economic activity in the next period.

He chooses an object basis of changed valuations as a result of revised expectations due to the period of reflection, uses it to satiate his desire till state D is reached which is the expost period of economic activity in time period 3. In state D he has again experienced what the desire satiation ability of the object chosen has been in relation to his expectation of it. This is succeeded by again a period of reflection and then consumption. The same process goes on indefinitely.

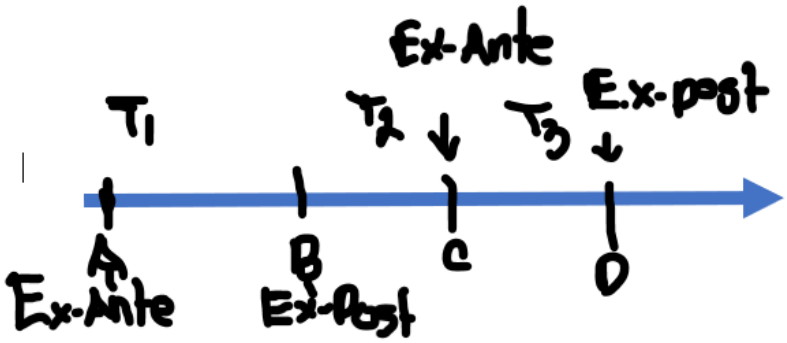
- Process of choice of alternative means across time

An agent at the start of a time period has a given stock of money and different ends of varying intensities it wants to attain. Each end involves the satisfaction of the desire of a want. The agent on the basis of these different ends ranks them in descending order of importance.

The agent starts economic action in period 1 in ex-ante with a given stock of wealth, The marginal valuation of units of money is lower than the marginal valuation of the goods which would be received in return due to the high intensity of desire of the want being pursued in this state.

The agent is offered multiple goods in different combinations on the market by the sellers where the marginal valuation of each of their costs in in terms of money units which would be received is higher than the valuation of their good for which they would be exchanged.

The agent forms an expectation with regards to the usability of different good bundles in the process of his desire satiation. *This expectation is with regards to how well the good will serve the purpose of desire satiation in relation to other goods which satisfy the same need. The goods are compared in their subjective valuation by the agent on the basis of his expectations about their usefulness and the good which has the highest ability to satisfy the agent's desire based on his expectation is used in the process of consumption.*



This process takes place at the ex-ante position of the agent in state A during time period one, he uses the good to start the process of desire satiation reaches state B. This is the ex-post situation of the agent where the agent has actually experienced through consumption of the good the satisfaction it provides to him. State B marks the start of time period B where the process of *refilling of his desire* begins as he abstains from consumption for that desire.

During this phase the agent compares the ex-ante expectation that he had about the usability of the good and ex-post actual realization of the same. It is through this comparison that the agent changes his ex-ante expectations and subsequently his valuation about that good in the next time period T3.

At the beginning of the period in T3 when the agent is in ex-ante state C he compares his subjective valuation of all other alternative means based on his underlying expectation about how well they can satisfy his desire of the same want in relation to his subjective valuation of the good chosen in last period based on his actual experienced satisfaction which the good chosen in the last period gave.

The consumer will continue choosing the present good as long as his expectations and subsequently his valuation about that good's usability are greater than any other which is available to him. Given two goods X, Y, and Z where X was the good which was chosen in last period if it *happens that Y's expected usability is lower than good X's then Y would be chosen for consumption in that period*

It is through an interchange of expected and actual experience of a good's ability to satisfy the agent's desire that preferences for one good over another are formed and subsequently changed in the process of consumption choices over time.

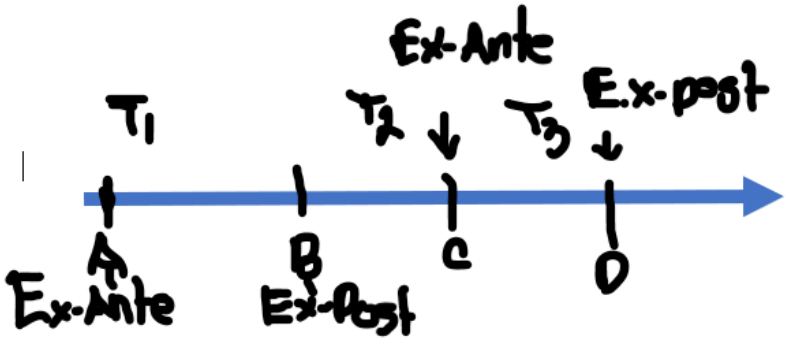
- The development of quantitative relationships in units of chosen goods in consumption.

The consistent choice of certain units of a good over time follows the same process where the agent forms expectation with regards to a certain quantity of goods chosen which will satisfy his desire and then re updates the expectation about certain units of that good. The changes in expectation may bring about changes in actual choice of units consumed. We will illustrate this further by -

Robinson Crusoe and development of preferences

Robinson Crusoe is in time period one in state A which is his ex-ante position with respect to economic action in that period. He has 2 hours of labor time left for which he has the choice of either spending on collecting either 1 pile of black berries or 1 pile of red berries. He chooses to spend his remaining labor time collecting red berries as he expects their ability to satisfy his wants higher than black berries.

He consumes the pile of red berries and after consumption is over in time period 1 where he is state B, he realizes that his expectation about 1 pile of red berries were over higher than what he actually experienced through their consumption. He also realizes that 1 pile wasn't enough to satiate his hunger therefore in the next period he decides to give up on two hours of leisure in favor of collecting 1 more pile of berries as on the margin he prefers the satisfaction of eating 1 pile of berries to 2 hours of leisure.



He arises in state C when his desire has re-arisen, during this exante state he compares 2 piles of red berries with 2 piles of black berries. As a result of his previous consumption he updates his expectations about red berries which lead to him preferring 2 piles of black berries over red ones. He consumes 2 piles of black berries which leaves him perfectly satiated expost in state D at the end of time period 2.

Due to the fact that he is content with this current choice of bundle he wouldn't change it in the next time period. He will be consistent with this preference and choice of this bundle as long as there is no dissonance between his expectation about the bundle and actual experience of satisfaction he derives from then.

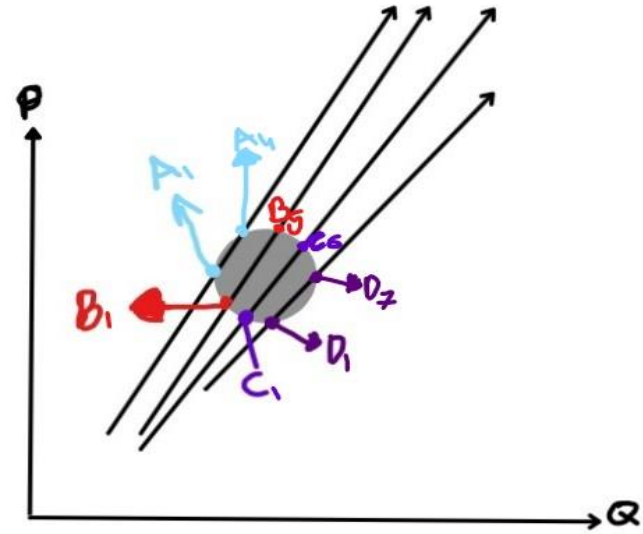
An instance where he can change his choice without changes in actual and expected satisfaction in choice of the good is when new goods are introduced and he forms a higher expectation of their want satisfying ability.

General indirect exchange

In the context of general exchange there is a single agent who has a multiplicity of human wants each with its own intensity of desire who faces the market which offers multiple alternative means which the agent can use to satisfy his multiple wants. The agent starts with a stock of money whose spending is governed by the principles of valuation of money against sellers who have their own intensity of want for money. The process of exchange makes both agents better off by providing both of them what with which they would be better off due to inequality of their valuations for each other's endowments.

In the workings of general exchange on the market, each buyer faces multiple sellers and subsequently each buyer is one among many buyers that each seller encounters.

Graphical Illustration –



This graph illustrates the general mechanism of exchange from the consumer's point of view. The vertical and horizontal axis represent prices and quantity respectively. The multiple goods offered as alternatives are represented by various supply curves A,B,C,D at their respective prices and quantities. The upward sloping smooth supply curves are assumed for the purpose of simplicity.

The gray shaded area represents the area of compatibility where the marginal valuation of money and goods by consumers and suppliers are such that exchange can take place making both of them better off. *Before that region the marginal valuation of money by the consumer is higher than his marginal valuation for the goods being offered and after that region the seller's marginal valuation of goods is higher than the marginal valuation of the money being offered by the buyer*.

All the goods offered by each seller are alternatives that the consumer can use to satiate his desire.

The choice set of alternatives available to the consumer are as follows-

1) From Supplier A = (A1, A2, A3, A4 units)
2) From Supplier B = (B1,B2,B3,B4,B5 units)
3) From Supplier C = (C1,C2.C3.C4.C5.C6 units)
4) From Supplier D = (D1,D2,D3,D4,D5,D6,D7 units)

The consumer has to choose a bundle from any of the sellers. Each bundle can at minimum consist 1 and maximum the entire bundle available to him from that seller.

The consumer will make his choice from the alternative bundles using the same process that was discussed in the earlier section on *economic actions across time.*

The consumer beginning in time period 1 forms expectations based on a certain quantity of units in a bundle for each of the different alternatives.

He chooses the bundle based on his subjective valuation due to his expectations with regards to how well they would satisfy his want and chooses the bundle with certain units whose valuation is the highest among them. During the ex-post state he updates his expectations about the choice of bundle and makes choices with changed valuations due to changed expectations.

Theory of Goods

A good is any object which the agent can use in the process of satisfying the desire of a want. Every good has a number of intrinsic characteristics which allows it to be placed in a causal relationship of desire satiation by the agent. Professor menger expounds on the same property in the following manner

"If a thing is to become a good, or in other words, if it is to acquire goods character, all four of the following prerequisites must be simultaneously present:

1) A human need.
2) Such properties as render the thing capable of being brought into a causal connection with the satisfaction of this need.
3) Human knowledge of this causal connection.
4) Command of the thing sufficient to direct it to the satisfaction of the need."

Absence of one of these, an object would cease to be a good. As every good has multiple intrinsic characteristics, it can be used to serve various alternative ends by the owner of the good. Any good which can be used in multiple different ways and by different agents implies its valuation by the agent is subjective in relation to the end where it is being used.

Based on the above, let us define the intrinsic property of usefulness of a good in light of its subjective usage by *the rate of useability. The rate of useability of a good is the rate at which the usefulness of a good falls for the agent in the process of economic action aimed at an end.*

This rate is related to the objective material nature of the good in line with the subjective perception of its usage by the agent. A mobile phone has an objective rate of decay in terms of the services it provides, i.e. the maximum amount of time for which the phone will provide those services are the same for everyone but as a mobile phone provides a number of different services like calling facilities, internet facilities, portrayal of social signalling, the rate of usability for the same phone will be different depending on the core purpose that the agent uses the phone for.

This leads to the result where it happens to be the case that an agent who buys a certain phone as means in the form of social signaling towards attaining a rank in the society will use the same phone for a different period of time than an agent who intends to use it for just calling facilities.

If the agent intends to use the phone for achieving a social rank as an end which is dependent upon the general social acceptance of that phone as a signal of social standing, when that phone is replaced by something else, then that phone loses its useability towards that end whereas if the agent uses the phone for calling facilities then the useability of the good depends upon the operational material conditions of the phone.

Every good has a rate of useability which ends at zero after which it cannot be applied in the process of desire satiation. The degree of change in rate of useability depends upon the material intrinsic qualities of the good in connection with the end where it is applied at by the agent.

Goods whose material intrinsic qualities have a very low connection with the end for which it desired, may have a high degree of fall in useability. This is the case with goods which are primarily used as fashion signals. These goods lose their useability when they cease to be socially accepted forms of fashion, therefore a cloth which may still be wearable based on the low amounts of wear and tear it experiences will not be worn by an agent who uses it for fashion signaling when it has ceased to be a fashion signal.

On the other hand goods whose rate of useability is in close connection with its material conditions will be in a close one to one relationship to the normal material life of a good, If an agent buys a car for the purpose of commuting its rate of useability will be quite low as the material normal life a car in absence of exceptional events tends to high.

- Degree of use ability and Diminishing marginal utility

  We have established that an agent experiences diminishing marginal utility in consumption as a result of falling intensity of desire which leads the agent to experience falling emergent utilities from consumption of the good.

We now introduce another reason for the diminishing marginal utility from consumption which takes place not due to satisfaction of desire but due to the fall of useability of the good being consumed. When such a good fails to satisfy the intensity of desire, the utility the individual receives from each

unit of consumption falls to the point the agent doesn't derive any utility from consumption as utility is an emergent property felt due to satisfaction of desire. This happens due to the subjective perceptions of a good's useability by the agent in the process of his desire satiation. Thus the falling marginal utility takes place not because desire is satiated but because the good has lost its ability to satisfy the desire.

If the fall of useability of a good is due to the material nature of the good and not because of subjective perceptions of its useability, more units of that good would be consumed to the point where the agent establishes a fixed quantitative relationship of that good and the want it satisfies over time based on the process of development of preferences discussed earlier.

A simple example can be when multiple units of the same food are bought. When the Crusoe realizes that a single unit of fish is not able to satisfy his want of removal of his hunger. He would engage in the process of discovery until he establishes a fixed quantitative relationship between the units of fish and his want of removal of hunger.

- Durable and Non-Durable Goods

Every good has a rate of fall of useability and associated with every good there is a rate of fall of intensity of desire when the agent uses the good in desire satiation. If the rate of fall of useability due

to material conditions of the good is greater than the rate of fall of intensity of desire in the time period of consumption, then such a good would be called *Non-durable good*.

While if the fall of useability of the good due to its material conditions is lower than the rate of fall of intensity of desire in that time period of consumption then such a good would be called *Durable good.*

During the entire process of consumption in a time period, if the fall of rate of useability is greater than the fall of rate of intensity of desire, then it's a nondurable good, because it cannot be consumed over different time periods as such a good would lose its complete usefulness before the consumer's desire has been satiated within the specific time period of consumption.

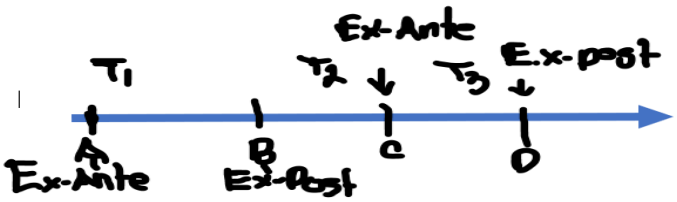
A good whose rate of fall of useability is lower than the intensity of desire of the want where it is being used to attain will be called durable because the desire of want with consumption of such a good will be fulfilled within the specific time period while the good would still be useful to the agent capable of satisfying the same want when desire re-emerges in the future time periods.

The durability of a good is in proportion to it's availability for consumption in different periods of consumption over time, i.e the lower rate of fall in useability of a good upon re-emergence of desire of want for which the good is to be used towards satiation. The more times the good is available to be used upon re-emergence of desire, The more durable the good is.

A television is an example of a durable good as the rate of fall of its useability based on its material conditions do not get over in a single time period it is available to be used by the agent across multiple such time periods whenever the desire for watching tv emerges.

While food grains are examples of non-durable goods whose rate of fall in useability due to their material conditions requires the consumer to buy large stocks of grains and buy them over time.

- Consumer behavior in non-durable goods across time



A non-durable good due to its material conditions has a greater rate of fall in useability than the fall of intensity of desire it provides, this leads the agent to purchase multiple units of such a good upon recognition of the good's non-durable nature in the ex-ante state in a given time period.

Due to its non-durable nature, when the desire for consumption re- emerges in the next time period he has to again purchase these goods. This leads to nature of consumption due to the material

condition of the good being in terms of a relatively high frequency of purchases that the agent has to make over time.

It therefore becomes easier to develop consistent preferences and fixed quantitative relationships over these goods as the consumer gets more chances to realign his expectations about that good with actual experience more often.

*This development of fixed quantitative relationship implies even if the income of the consumer increases, the proportion of income which goes towards such non-durables will fall over time as the consumer was already content with his choices of consumption bundle of a higher ranked desire across time before his income increased. The increased income will thus go towards satisfying his lower ranked unfulfilled desir*es.

The Aggregation Problem

The aggregation problem is the bane of all macroeconomic modeling based on micro-foundations, while the majority of the economics profession digests the important insight that it is only individual that acts and choose it contradicts itself in pursuit of aggregating across heterogeneous consumers, capital and their production technologies. By ignoring the most basic axioms of addition in mathematics which states that only homogeneous elements can be added or subtracted likewise we don’t aggregate choices 2 apples and 3 oranges and come up with one choice as a result.

The aggregation problem leads to a build-up of contradictions inside macroeconomic thinking which on one hand realizes the idea of individual choice but with the other hand adds them up in a homogenous blob. The problem of aggregation is the problem of finding a valid way to treat an empirical or theoretical aggregate in a manner where they acted like a less-aggregated measure, where we can effectively know and understand how changes in heterogenous individual choices would play out on the macro level.

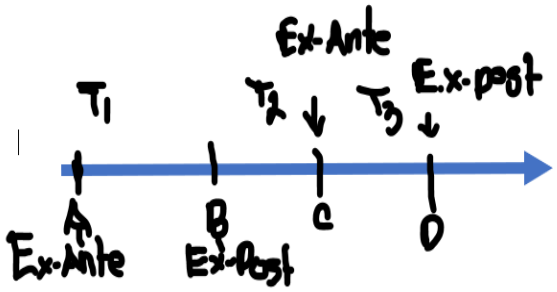
While it is true that each car out of the millions of cars produced in the world is different based on qualitative differences, there lies an element of homogeneity in them. This homogeneity is borne in their material nature and with respect to how the agents in the economy use them as objects in pursuit of an end. While every consumer is different in in terms of its tastes and preferences, the process which the consumer undertakes to form those taste and preferences are essentially the same and therefore their treatment of goods of similar nature is also essentially the same. Therefore, while we cannot aggregate individual demand functions of all consumers across the economy, we can define a good analytically and look to describe how the economic behavior of agents would act towards such analytical goods. Then since we can add homogeneous elements, we can look at the aggregated behavior of economic agents within the framework of common analytical goods.

We do not need to assume homogeneity, independence or any other common place assumptions used to describe macroeconomic behavior because the description and process of choice which flows from

the analytical dynamic framework is the same for every economic agent and the behavior of the agent with regards to analytically defined goods is a necessary consequence of such a framework.

In more concrete terms we can solve the aggregation problem despite the individual differences among agents of any economy which lead to them, by creating analytical bifurcations among goods and using the framework of economic actions developed earlier which are shared across all economic agents we can understand macroeconomic behavior by taking insights from our framework for such goods in light of explaining macroeconomic behavior of expenditures on goods.

Robin Crusoe Consumption of non-durables over time



Robinson Crusoe at the beginning of time period one in ex-ante state decides to spend all his labor time catching fish, he catches 4 fishes at the end of his working day. At the end of the working day he goes to Mark Estrano who has 2 piles of black and red berries each. At the cost of 1 fish for 1 pile of berries, he exchanges 2 fishes for 1 pile each of black and red berries. The exchange takes place because the marginal valuation of 2 fish is higher for the Estrano than the berries he gives in return; vice versa Crusoe values the berries more than the fish which he is willing to part with. Crusoe in ex-ante state expects that 1 pile of each of the berries would satiate his desire for berries but after consumption ends in state B, ex-post he realizes that he needs more. Here both black and red berries are non-durable goods as due to their material conditions their useability falls before his desire for berries gets satiated.

At the beginning of time period 2, in state B Robinson Crusoe finds a stick which he realizes can help catch fishes, he devotes 2 hours out of his labor time sharpening the stick and gets it ready. The stick therefore now becomes a capital good which increases his productivity, with the stick at the end of his labor time he manages to catch 12 fishes. He goes to Estrano who has with him 1 fish, 3 piles of black and red berries each.

As Estrano already has one fish with him, his marginal valuation for each fish is lower in comparison to last period whereas Crusoe wants to have higher amounts of berries due his ex-post realization.

Therefore, the exchange relationship is now established at 2 fish for 1 pile of berries. He exchanges 8 fishes for 2 piles of black and red berries each.

He starts the process of consumption in time period 3 in state C, he consumes 2 piles of each of the berries and they leave him fully satiated expost in State D. T*his realization ex-post establishes the quantitative relationship of non-durable goods and his wants for Crusoe*

At the beginning of the next time period, Crusoe hones his skill with his capital good stick and manages to catch 20 fish at the end of his labor time. He goes to Estrano who has a stock of 6 fishes with him and 3 piles of black and red berries. The changed stock of goods again creates a change in marginal valuation for fishes and berries. The new exchange price is determined at 3 fishes for 1 pile of berries. Crusoe, due to his ex-post realization, knows he only needs 2 piles each of black and red berries and therefore pays 12 fishes for them. He subsequently consumes them to his total satisfaction.

The crucial point this simple exercise teaches us is that due to the high frequency of choice that Crusoe has to make as a result of the non-durable goods nature of berries, he establishes a quantitative relationship between units of consumption of berries and his want satisfaction.

Upon the determination of want satisfaction, we see that the percentage of expenditure spent upon berries out of his total income falls as his income increases. This takes place as a result of his

increased income and development of the quantitative relationship between units of goods and want. If the goods were not to be durable, there wouldn't be higher frequency of consumption choices which wouldn't have allowed the formation of a quantitative relationship as a result of discovery procedure associated with learning.

Engel Curve: Consumer Non-Durables

An Engel curve is a graph which shows the relationship between demand for a good (on x-axis) and income level (on y-axis). If the slope of the curve is positive, the good is a normal good but if it is negative, the good is an inferior good.

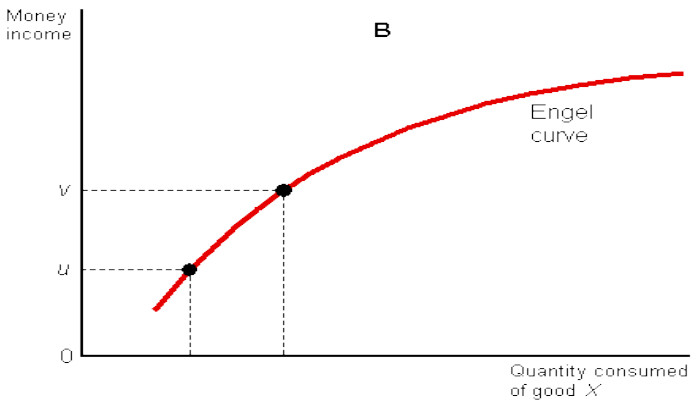


Figure 4.3 B ENGEL CURVES: VARIOUS SHAPES

Equation: EQ01 Workfile: NEW ECONOMETRIC DAT...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: LOG(EXPENDITURE)
Method: Least Squares
Date: 12/06/21 Time: 14:34
Sample: 1 30
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(INCOME)	0.709577	0.013423	52.86299	0.0000
C	3.261147	0.183391	17.78244	0.0000

R-squared	0.990080	Mean dependent var	12.95316
Adjusted R-squared	0.989725	S.D. dependent var	0.229933
S.E. of regression	0.023307	Akaike info criterion	-4.615796
Sum squared resid	0.015210	Schwarz criterion	-4.522383
Log likelihood	71.23694	Hannan-Quinn criter.	-4.585912
F-statistic	2794.496	Durbin-Watson stat	0.996909
Prob(F-statistic)	0.000000		

Equation: EQ02 Workfile: NEW ECONOMETRIC DAT...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: LOG(EXPENDITURE)
Method: Least Squares
Date: 12/06/21 Time: 14:35
Sample: 30 50
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(INCOME)	0.620742	0.011799	52.61145	0.0000
C	4.559900	0.173093	26.34365	0.0000

R-squared	0.993183	Mean dependent var	13.66434
Adjusted R-squared	0.992824	S.D. dependent var	0.207445
S.E. of regression	0.017573	Akaike info criterion	-5.154484
Sum squared resid	0.005868	Schwarz criterion	-5.055006
Log likelihood	56.12208	Hannan-Quinn criter.	-5.132895
F-statistic	2767.965	Durbin-Watson stat	2.396721
Prob(F-statistic)	0.000000		

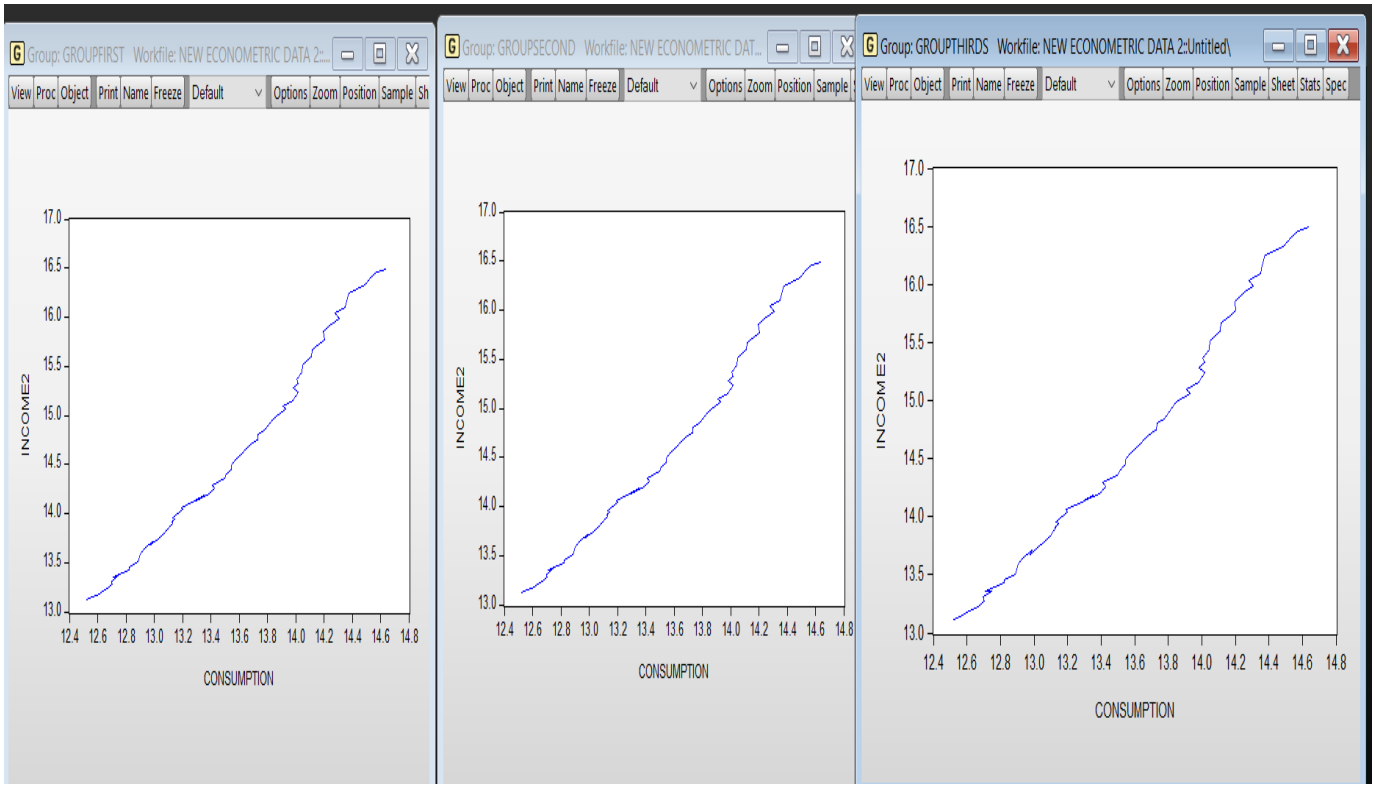
Equation: UNTITLED Workfile: NEW ECONOMETRIC...

View | Proc | Object | Print | Name | Freeze | Estimate | Forecast | Stats | Resids

Dependent Variable: LOG(EXPENDITURE)
Method: Least Squares
Date: 12/16/21 Time: 02:21
Sample: 50 70
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(INCOME)	0.485474	0.021341	22.74848	0.0000
C	6.545452	0.338447	19.33967	0.0000

R-squared	0.964585	Mean dependent var	14.24221
Adjusted R-squared	0.962721	S.D. dependent var	0.200059
S.E. of regression	0.038627	Akaike info criterion	-3.579333
Sum squared resid	0.028349	Schwarz criterion	-3.479855
Log likelihood	39.58300	Hannan-Quinn criter.	-3.557744
F-statistic	517.4932	Durbin-Watson stat	0.850030
Prob(F-statistic)	0.000000		



We took the data of Indian expenditure on non-durable consumer goods or which in economic literature are called inferior goods which we then divided into three time periods for allowing the Engel curve effect to be visible, we had 70 data points, dividing into three parts of 20, 20 and 30, in the regression equation we took the log of expenditure with regressor as log of income.

If we look at the regression equations, we clearly see as time goes on, the regression coefficient value drops, which is to say the change in consumption with respect to change in income drops, demonstrating the Engle effect, the same is reflect by the concave shape of the income consumption curve.

This macro effect is easily explained by the consumption behavior of agents with respect to non-durable consumer goods. As these goods are consumer non-durables they involve a higher frequency of consumption decisions, due to which overtime the consumer develops a quantitative understanding between the units of goods required to reach his desired level of satisfaction. After such a bundle is available for consumption, the consumer wouldn’t spend further on these as he is already in his desired result due to which as income would grow the proportion of total money stock spent on these goods would fall.

Conclusion

At the beginning of our paper, we laid down our fundamental reasons for OUR aversions to the neo-classical approach to understand economic actions. We constructed the dynamic framework needed to understand economic actions in a dynamic world, on the basis of which we got results which have validity in daily economic life and introduced the principle of refiling utility. We have built a theory of economic action in a dynamic world based on Austrian principles which is free from contradictory results which plague neo-classical economics due to their uses of non-economic natured axioms in favour of axioms which are chosen for mathematical modelling simplicity, in the process offering an alternative way to understand economic actions in a coherent schema. On the basis of economic actions in our dynamic framework across time periods we have laid down results which after solving the problem of aggregation through our theory of goods we find explanations for the empirical regularity of the Engle curve.

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