ON VALUE AND PRICE

An alternative approach to value/price theory

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ABSTRACT: Modern economic science has become a **grand parable, the study of a virtual economic world where the interactive robots engage in mechanical relationships**. Although the natural sciences that initially inspired many economists has undergone drastic changes since Newton's era, "modern" economic science has grown up to become a castle of rigid conservatism. Theory of price, the backbone of all theories, is a typical example. This study is an alternative value-price theory, a labor embodied approach. The key concept of analysis is **mental labor, the source of all value-added and accumulated**, given natural resources and physical labor.

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"Where is the discussion of mental labor and technological change in the theory of Value / Price?"

Introduction

In the theory of growth until 1950s, only a lip service was paid to technological change, which came manna from heaven whenever required. Since 1950s, concepts like technological change and mental labor (human capital) have been re-discovered as vital, essential and indispensable ingredients of the growth theory. Nowadays there is a range of endogenous growth theories constructed on these concepts. In spite of many prevailing shortcomings the trend is promising to construct more realistic and reliable growth models capable of accounting for actual global economic facts and developments.

Meanwhile, however, the backbone or the substance of all theories, the value / price theory still fails to keep pace with these developments in growth theory neglecting the incorporation of key concepts like technological change and mental labor in the analysis. As a result, the "modern" sterile price theory is bound to fail to account properly for the price formation in actual markets. Nor does it provide any appropriate and sound premises for the construction of related economic theories influenced by price signals from the markets.

The purpose

The purpose, or rather the hypothesis of this paper, is to show that all value-created or added to the resources (gifts) of nature originates from the labor-power[1] that offers two kinds of services; **mental labor** and **physical labor.** The former, the mental labor, is the original source of value that constantly introduces "new ideas" or rather "new technologies" to transform (reshape) the natural produce. Meanwhile the latter, physical labor plays a complementary role in accordance with instructions from mind. As the paper aims to analyze values/prices, all concepts and definitions refer to an exchange-economy in which, given the natural resources, the **mental labor is the genesis and incessant source of all value created**.

The approach is basically a labor embodied approach, but somewhat distinct from the Classical ones, including Marx. Though it acknowledges the labor-power as the genesis and incessant source, it makes no claim to be an "invariable" measure nor does it assert that the profit (surplus value) is "unpaid" or "surplus" part of labor. In addition, it does not make any claim that proper exchange relations should be based on "equal quantities" of labor-time employed.

Given demand, new exchange relations are determined by the new conditions created by "new technologies", output of **productive knowledge of mind**, i.e., the mental labor, cet. par. In other words, the productive faculty of human mind is assigned a key role in all exchanges of relative values and price formation, with due regard to demand. As Marshall pointed out:

> **Man cannot create material things. ... indeed he may produce new ideas, ... his efforts and sacrifices result in changing the form or arrangement of matter to adapt it better for the satisfaction of**

> **wants. All that he can do in the physical world is either to readjust matter so to make it more useful, ... or to put it in the way of being made more useful by nature... (Marshall; 1990; 53)**

The emphasis of analysis is on the "relative" values/prices followed by a brief analysis of actual market values/prices. The reason for that is not because relative exchange relations provide a better premise for analysis of "actual" price formation but because it has been customary to start with relative values since the time of Classical economists.

Why price theory?

The value / price theory holds a very crucial and central position in economics as the basic tool and backbone or rather as the "substance" of all economic analysis including predictions. As commonly known, producers as well as consumers adjust their market behavior according to the price signals, which determine the allocation of their resources. Price signals are capable of influencing crucial variables like growth rate, inflation, employment, etc. Therefore, it is imperative to have access to a competent price theory, which is logical, consistent as well as accountable for actual transactions. As the "modern" theory fails to satisfy the last condition, the need for an alternative theory emerges.

A realistic price theory should not only be capable of explaining the exchange ratios, e.g., relative prices, between the two commodities, but also the market prices of all commodities (tangibles) produced. In addition, the price theory should also be able to explain the pricing system in the intangible service sector, the neglected "stepchild" of price theories. Nowadays, the service sector accounts for the greater part of the GDP in modern economies in terms of

output and employment and displays distinctive features than the tangible goods producing manufacturing sector.

And, perhaps most important of all, the price theory must be able to account for the past, present and future source of all value generation, transformation of these values into prices and distribution of income between wages, profits and interest. Only then one could have a more realistic insight into, and interpretation of, the actual economic relations. Such a theory would also pave the way for the further development of both sound and realistic theories in the related fields like growth, trade, employment, etc.

Mode of vision

As Schumpeter quite rightly pointed out:

> **"..... in practice we mostly do not start from a vision of our own but from the work of our predecessors or from ideas that float in the public mind." (Schumpeter, 1954; 562)**

Throughout this study, the purpose was to escape from the habitual modes of vision (thoughts and expressions), which naturally shapes or heavily influences the backbone of any student of economics. It is not an easy task after years or decades of indoctrination. As Keynes, put it:

> **"The difficulty lies, not in the new ideas, but in escaping from the old ones, which ramify, for those brought up as most of us have been, into every corner of our minds." (Keynes, 1973; Preface, xxiii)**

A brief historical review

In contrast to the "modern" approach, economic science before 1870s was treated more like an interrelated social science. Inexact but actual, rather than exact and fictitious economic relations were the point of departure. Theory of value was considered as the backbone of political economy and the concepts like "justice" and "equality" were not regarded as irrelevant. Extremely abstract mathematical reasoning of economic relations free of any kind of "human" weaknesses is the result of more than a century long attempts to make economic science an "exact" science like astronomy and physics and the economic scholars have come a long way in this respect. British economist Jevons once had proudly claimed that his model of exchange relations did

> **"... not differ in general character from those which are really treated in many branches of physical science". (Blaug, 1990,p.147)**

But the models created were nothing but oversimplified idealizations, a hypothetical version of the reality, a "virtual economy". Marshall had foreseen the pathetic trend and warned the economists to be cautious in the application of mathematics and not to transform economic science into a branch of it, but did not succeed. In time, physical sciences bowed to the developments in science and undergone drastic changes upgrading itself to the new trajectories from Newtonian physics to "Quantum" physics, while economics, the "degenerated natural science", has remained faithful to the obsolete initial philosophical criteria.

For many prominent economists, the Neoclassical heritage still represents the **holy ground** of the analysis capable of revealing the true nature of economic man and his actions. Any dissent from this holy world of eternal truth is

regarded as a serious error, if not a sin. An outside observer can easily get the impression that the Neoclassical teaching is the **final frontier** and the **highest stage** of economic thought. Naturally, all scholars do not agree. As Hicks put it:

> **"Pure economics has a remarkable way of producing beavers out of hats -apparently a priori propositions which apparently refer to reality. It is fascinating to try to discover how they got in; for those of us who do not believe in magic must be convinced that they got in somehow."**
>
> **(Hicks, 1983,p.367)**

And Hicks continues:

> **"Economics is a social study. It is concerned with the operations of human beings, who are not omniscient, and not wholly rational; who (perhaps because they are not wholly rational) have diverse, and not wholly consistent, ends. As such, it cannot be reduced to a pure technics."** **(Hicks, 1983,p.289)**

The question is; do we have a logical and consistent alternative theory?

The original sources of value: nature and labor-power

Let us begin with a definition of value. In economic terminology, value of a product, whether it be a commodity or service, is the relative worth that can either be exchanged for other product(s) (exchange-value) or be used for personal consumption (use-value). The latter is a subjective concept and its magnitude depends, given income, on the ranking of products in accordance with the subjective needs and preferences. The former, exchange-value, expressed in terms of market prices, depends partly on the costs of production and partly on demand for the specific product, given the competitive environment.

There are only two initial sources of value-generation, the labor-power and the nature. The nature provides a wide range of exogenous given and unlabored (unprocessed) objects with use-values. The labor-power adds value to the nature's objects by transforming (reshaping) them, into commercial products containing exchange-values, by utilizing mental and physical capabilities. In other words, the past and present services of labor-power transforms natural products into useful products either for immediate consumption or into inputs of production or into capital goods to increase the productivity labor-power.

To start a value creation process, the capital owner, e.g., the entrepreneur has to have access to money capital (savings) to combine (purchase/hire) the material inputs of production such as raw materials, machinery, tools, energy, etc., with the services of labor-power, e.g., mental and physical labor. This feature of savings might give the impression that capital is one of the "productive" factors of production, although there is no universally acknowledged definition of capital (Hausman, 1981). In some analysis it appears in monetary form and in others as physical inputs like tools/machinery and sometimes it refers to both. Both, money-capital and capital goods are the necessary ingredients of production but certainly not productive ones in the sense like value adding labor-power or like the initial supplier of objects, i.e., the nature. At first glance, savings seems like a fertile factor of production as it gives rise to the employment of productive labor-power along with implements of production. But, money as such, e.g., savings, cannot be productive, as it is not capable of producing any value. Therefore, money is definitely not a productive factor.

Capital goods are not any more productive than the savings itself. Being man-made inputs of production, capital goods help to increase the productivity of

man or the output of per unit of account. There would be no capital goods unless the natural objects were transformed by the services of labor-power. Capital goods can only transfer value to the product at the rate of its depreciation; nothing more, nothing less.

Labor-power

The labor-power is embodied in products in the form of mental and physical labor, e.g., skilled and unskilled labor. Thus, the labor-power can be defined as;

> **"... the aggregate of those mental and physical capabilities existing in the physical form, the living personality, of a human being, capabilities which he sets in motion whenever he produces a use-value of any kind". (Marx, Vol. I: 270)**

It is the mental component of that generates the productive knowledge that accounts for both the quantitative growth and qualitative improvement of the physical objects as well as of the services supplied. The physical labor is a necessary ingredient of the production but not a sufficient one alone to increase value-added to nature's produce. Without the contribution of mental labor, it would not be possible to produce the sophisticated goods and services and reach the contemporary standards of living that, some of us around the globe, so lavishly enjoys. In other words, to possess an exchange value, the contribution of both mental and physical labor, one way or another, to more or lesser degree, is imperative at every stage of production. But, while physical labor's contribution is rather limited, the mental labor is capable of incessantly producing (creates) new values.

The contributions of mental labor-power (new technologies) can be analyzed in two groups:

1. **New goods / services** (entirely new ones or old ones in new form usually accompanied by "new" methods of production);
2. **Given goods/services but "new" production processes** which reduces costs per unit output

Value creation due to new technologies, as indicated above, can also be referred to as **macro-productivity** growth. But, there are, certainly, other measures to increase the productivity with "given" technology, which may be referred to as **micro-productivity** growth. (Gürak, 2000) which has limited impact in the short-run until reaching optimum levels..

To sum up; it is the mental faculty of the labor-power that accounts for the ever increasing value creation and sophisticated living standards. But it would have no significance if there were no gifts of nature to be transformed into useful things. Men and nature are, therefore, two indispensable and inseparable sources, or "**complementary productive factors**", of wealth. And all physical products, no matter how complex and sophisticated, can be reduced to nature's gifts as raw materials, if stripped from its past and present mental and physical labor content. Thus, every product may be reduced, in the final analysis, to nature and labor-power.

Mental labor (productive knowledge) and value generation

The crucial and central question in relation to value/price formation is: What are the conditions determining the relative exchange-value of a product? Is it the supply-demand conditions? The labor embodied in, or commanded by, the final products? Or both?

Value generation - A simple model

Below, a simple alternative labor embodied model of value-generation will be presented to see how the "productive knowledge" of mind (mental labor) enters into production process and how it effects the exchange relations in terms of relative values.

Let us begin, like Adam Smith did, with the well-known hunter model and assume two hunters and no tools of production at all, except for the services of labor-power with its two basic faculties, physical and mental labor. Being a quantitative concept, the physical labor is easily measurable by the hours, days or some other unit of account while the latter term, the mental labor, the source of productive knowledge (new technologies), refers to an analytical concept and is unlikely to be estimated accurately.

Leaving aside, for the time being, the distinctive contribution of mental labor, let us assume that the two hunters in our model work 10 hours a day and the first one, Maria, hunts 2 deer while the second, Leyla, hunts 4 beavers a day. If they had lived in a self-sufficient society meaning that all the catch is consumed within the family of each hunter respectively, there would be no need for exchange relations. In the absence of exchange relations, there would be no exchange-values, either. But, our hunters do exchange.

Initial Exchange Conditions:

Given the tastes and preferences, assume that at the end of the day, the two hunters exchange one deer for two beavers, half a day's physical work[2], which is a fair exchange with respect to the physical labor embodied, e.g., 10 hours' work, in both products. Leyla consumes one deer and two beavers just like Maria

does. Nobody is better off or worse off after the exchange, and the supply-demand is in balance after the egalitarian exchange.

Leyla's supply = 4 beavers = 10 hours' physical labor (1)

Maria's supply = 2 deer = 10 hours' physical labor (2)

Total supply / a day = 2 deer + 4 beavers = 20 hours' physical labor. (3)

Leyla's consumption= 1 deer+2 beavers= 10 hours' physical labor (4)

Maria's consumption = 1 deer + 2 beavers = 10 hours' physical labor (5)

So far, our two hunters did not make any use of their mental faculties (mental labor) in their daily work meaning there is no vale-added except for the services of physical labor. Ten hours' physical labor of Leyla is exchanged for ten hours' physical labor of Maria. Under the circumstances, the only way to increase the total value added is to extend the hunting time of physical labor. But by assumption, 10 hours' a day is the limit that can be employed and thus, the total output cannot be increased beyond its present level. The best the community can do is to re-produce the given value the following day. The prosperity would never improve.

Assume that some day one of the hunters, say Leyla, utilizing her mental faculties develops an **idea**, a new hunting method (a **new technology**) which enables her to double the daily catch from 4 beavers to 8 beavers within the same 10 hour time-span a day. To be more specific, let us assume that she makes some simple tools to assist her in the hunt of beavers. Leyla's daily production in terms of hunting hour's increases from 10 to 20 hours' of physical labor, although the hours effectively employed are still 10.

New total supply/a day= 2 deer+8 beavers= 20 hours' physical labor (6)

but the total value generated is worth 30 hours' physical labor

or, alternatively

New total supply/day=20 hours' total PL+Leyla's ML worth 10 hours' PL (7)

ML denotes mental labor or alternatively productive knowledge/new technology while **PL** denotes physical labor. Leyla's mental contribution (new technology) is worth 10 hours' physical labor. In other words, the value-added worth 10 hours' of physical labor implies that Leyla's productivity increased by 100 percent a day. The community has become richer.

What would happen to the exchange relations with the other hunter Maria now? Previously, there were 2 deer and 4 beavers in the market. Now, there are 2 deer and 8 beavers. With regard to the new situation, the exchange relations will have to change. What would the new exchange ratios look like?

'Unfair" equilibrium

Case:1-A: Following the footsteps of Classical economists, one can argue that after Leyla's mental contribution, it still requires 10 hours' work to catch 2 deer or, alternatively 8 beavers. Equal quantities of labor time are valid for both hunters, and therefore, 1 deer should exchange for 4 beavers instead of 2, in order to maintain equality of exchange of labor-time employed. As a result, at the end of the day, Leyla would be expected to give up 4 beavers which equal 5 hours' physical labor in return of 1 deer which also requires 5 hours' physical labor a day.

Leyla's consumption = 1 deer + 4 beavers = 10 hours' physical labor (8)

Maria's consumption = 1 deer + 4 beavers = 10 hours' physical labor (9)

But in terms of initial values, each consumes products now worth 15 hours' PL instead of 10. Maria's total physical labor a day could purchase 4 beavers,

initially. Now, she can get 8 beavers, double as much without any contribution to total wealth from her side.

Is this "fair" and/or "rational"?

If one ignores productivity increasing contribution of Leyla's mental labor, exchanging 1 deer for 4 beavers would seem like an egalitarian exchange, at first sight. But Leyla has not been rewarded, yet, for her mental contribution to the common wealth which doubled her productivity. Instead of a combined value worth 20 hours' PL, there is now a total value worth 30 hours' of PL. Maria, the other hunter, who made no mental contribution to common wealth would be the beneficiary of the new exchange relations based on the time spent approach. She works only 10 hours but consumes output worth 15 hours' value in terms of labor-time employed. Meanwhile, Leyla producing 20 hours' value in terms labor-time employed enjoys 15 hours' output only. Such exchange relations would not provide encouraging premises for the further development of productivity (new technologies) since the system rewards the infertile person, not the fertile one. In other words, the system is unable to provide any incentives for further value generation and therefore the new exchange relations are neither logical nor economically rational.

Unequal exchange?

Case:1-B: Initially, Maria and Leyla were exchanging 1 deer for 2 beavers. Assume that after the introduction of new technology developed by Leyla, the initial exchange relations are maintained. Maria and Leyla still exchange and consume 1 deer and 2 beavers each. But now, Leyla has access to additional 4 beavers worth 10 hours' PL, which she can exchange for another product she wants, say for 2 sheep worth 10 hours' PL in another community. Maria still

consumes 1 deer and 2 beavers (equivalent to 10 hours' PL) while Leyla now has 1 deer, 2 beavers and additional 2 sheep at her disposal for daily consumption. Leyla's mental contribution entitles her, given the demand, to higher consumption level. Maria's standard is unchanged, but the community as a whole is more prosperous.

Leyla's consumption=1 deer+2 beavers+2 sheep=worth 20 hours' PL (10)

Maria's consumption = 1 deer + 2 beavers = worth 10 hours' PL (11)

In this case, there is no egalitarian exchange in the Classical tradition of equal quantities of labor expressed in time-unit employed. Nevertheless, neither Leyla nor Maria consumes less; in fact, there is an increase in total consumption due to Leyla's mental contribution. This outcome seems to be both, more logical and economically rational, than the foregoing Case:1-A.

A more likely outcome

Case:1-C: If there is insufficient demand for Leyla's additional 4 beavers outside her own community, then even Maria might benefit from the new exchange relations and enjoy more consumption. Assume that Leyla can exchange only 2 beavers for 1 sheep outside her community, which consists of Maria and herself. Leyla would now have 6 beavers at her disposal before entering the exchange relations with Maria, the other member of her community. If the market is to be cleared, Leyla will have to accept a new exchange relation where 1 deer is exchanged for 3 beavers. Now, it is not only Leyla who is better off but so is Maria who actually made no mental contribution to the increased total supply.

Leyla's consumption = 1 deer + 3 beavers +1 sheep (12)

Maria's consumption = 1 deer + 3 beavers (13)

This outcome seems to have a closer resemblance to the reality than the prior two cases, for it allows even the less productive person(s)/sector(s) of the economy to benefit from the overall development originating from other "dynamic" sectors. In other words, not only the inherently more dynamic industrial/manufacturing sector but also the service sector, which is prone to relatively lower productivity growth, benefits from developments in the former.

Different qualities of mental labor

In the simple model presented above, increase in total wealth was the result of Leyla's "creative" contribution in the absence of any formal education or training. This creative feature of human mind helps to change and control our environment by "new" technologies. Only human mind possesses the "creative" mental faculty to transform nature's objects into useful things for consumption. The case of Leyla was aimed to demonstrate the mental labor's contribution within the framework of a simple model. Her contribution and countless numbers of other contributions have been generated and accumulated for centuries/milleniums. The accumulated knowledge constitutes an immense pool at the service of mankind, nowadays.

Nobody, no matter how brilliant his/her mental abilities are, acquires the knowledge "manna from heaven". In our age, knowledge is normally acquired through long years of (formal-informal) education/training and is elaborated by talent and experience including learning-by-doing. Personal abilities as well as allocation of socio-economic conditions (opportunities) naturally play a significant, if not a determinant, role in the final quality stage of abilities. Persons who are more fortunate than the others with regard to the natural allocation of mental endowments and/or man-made opportunities naturally

acquire higher degree of qualification. Neither labor-power nor labor is a homogenous entity; on the contrary, they are rather heterogeneous influenced by socio-economic environment, given the natural abilities.

A contemporary labor force is expected to be able to make the best use of technologically sophisticated and complex production methods. But there is another and more significant contribution expected from the labor-power; that is the introduction of "new" and more advanced technologies. Therefore, it would be more appropriate to analyze the labor-power's contribution in two categories;

1- to maximize output with "given" technologies and resources (micro-productivity); and
2- to produce "new" products and/or production methods (macro-productivity).

The impact of macro-productivity is ever increasing wealth of nations and individuals, while the former, making the best use of "given" technology and resources, has only limited impact.

Consequently, we can conclude that, given the natural endowments, the creative capacity of mental labor assisted by physical labor, is the only value-adding source of all past and present value generated and of future growth. Or, to put it in William Petty's terms;

"... labor is the father of material wealth, the earth is its mother."

(in Marx, Vol.I, 133-134)

Keynes, unlike the Neoclassicals, had no problem with this notion.

> **"I sympathise ... with the pre-classical doctrine that everything is produced by labour..... It is preferable to regard labour .... as the sole factor of production." [Keynes, 1991,213-214]**

Value-price relation

How are the values transformed into prices? That was one the central issues troubling the minds of Classical economists. Ricardo had searched for an "invariable measure" of value to but could not find one, which satisfied him. He claimed that;

> **"... there is no commodity which is not itself exposed to the same variations as the things, the value of which is to be ascertained; that is, there is none which is not subject to require more or less labor for its production." [Ricardo, 1990, pp.44-45]**

For Marx, using the same exchange-value relations developed by Ricardo, the answer was obvious but Ricardo was unaware of his own discovery. The invariable measure Ricardo was looking for was the services of labor-power, which Marx defined as;

> **"... the aggregate of those mental and physical capabilities existing in the physical form, the living personality." [Marx, Vol. I, p.270]**

Marx had attempted to reduce the labor-power with its physical and mental faculties into a simple quantitative concept in terms of socially necessary labor measurable by hours employed, neglecting or overlooking the contribution of the productive knowledge, the product of mental faculty of mind. As a result, the exchange relations as in the Case:1 above, where equal quantities of labor time embodied were exchanged, seemed as an egalitarian exchange relation.

As we have seen in the previous parts, given the nature's indispensable role in production, the mental labor with its distinctive creative faculties is the only source of our ever-increasing value. Therefore, the exchange relations in a proper "relative" value/price theory have to be based on a labor embodied approach with its dual properties, mental and physical. Estimation of the amount of physical labor employed is a relatively easy quantitative process. But, where to find a proper unit of account capable of measuring the contribution of mental faculties? If there is none, how to transform values into prices in a dynamic economy where introduction of new technologies is an incessant process? Would demand schedule provide a resolution?

Relative prices

Value of a product is the "value transmitted" to the product, given demand. In our simple model in Case:1-A, the relative values were determined by the physical-labor expended. But external demand as in Case:1-B and external-internal demand relations as in Case:1-C, showed that the magnitude of demand is a rather important element in the determination of relative values. Bearing in mind that the accurate measurement of the value transmitted by mental labor is highly unlikely, the relative market prices will be assumed to reflect the values transmitted and magnitude of demand. It is important to note that relative price ratios do not reflect the transactions in a monetary economy properly. But they can be used as tools to demonstrate the crucial role of mental contribution, "new" technology, in the formation of emerging new price level, given demand.

Case:2-A: Let us start by reconsidering our simple economy with two hunters and introduce money as the sole medium of exchange in transactions. Ignoring

aspects like risk and profits for the sake of simplicity, assume that one deer is worth 30 $ and one beaver 15 $. Initial exchange relations based on 10 hours' physical labor a day can be expressed as follows:

2 (deer) * 30 $ = 4 (beavers) * 15 $ (14)

where;

1 deer = 2 beavers (15)

or

30 $ = 2 * 15 $ (16)

Now, let us assume once again that Leyla, the beaver hunter, utilizing her mental faculties, develops a new hunting method which doubles her productivity from 4 to 8 beavers within the same time-span of 10-hours. Disregarding any reward to Leyla for her productive contribution, and estimating the value created by labor embodied in time-units, the new exchange relation between Maria and Leyla would look like as follows:

2 (deer) * 30 $ = 8 (beavers) * 7.5 $ (17)

where;

1 deer = 4 beavers (18)

or

30 $ = 4 * 7.5 $ (19)

In terms of initial prices, Maria's labor (worth 30$) commands now 60 $ worth beavers. Is this a "fair", "logical" and/or "rational" exchange relation?

The equal labor-time approach of exchange rewards the less productive hunter, Maria, and penalizes the more productive one, Leyla. Under the circumstances, there would be no incentives for Leyla to make any efforts to further improve productivity. Naturally, a person might also be driven by motives other than financial rewards. But for the sake of argument, we shall ignore such cases.

Case:2-B: Given the initial price and demand where 1 deer is exchanged for 2 beavers, Leyla, the more productive hunter, could be in a better-off position if she can sell the additional 4 beavers in other markets. Given demand by third party consumer at the initial price of beaver (15 $ each), Leyla's total income could increase from 60 $ to 120 $ a day, while that of Maria, the less productive one, remains at 60 $ a day.

Leyla's consumption = 1 deer (30 $)+ 6 beavers (6*15 $) = 120 $ (20)

Maria's consumption = 1 deer (30 $)+ 2 beavers (2*15 $) = 60 $ (21)

Meanwhile, the total income of both, Maria and Leyla, would increase from 120 $ to 180 $ thanks to the contribution of Leyla's productive knowledge. The greater income of Leyla is the result of and justified reward for her intellectual contribution (productivity growth).

New total wealth/day =120$(8 beavers*15 $)+60$ (2 deer*30$)=180 $(22)

The price level has remained unchanged due to sustained demand by "others" at initial prices.

Case:2-C: Suppose that the external demand is such that it causes the price of one beaver to decline from 15 $l to 10 $ and only two are required. As a result, and in order to clear the markets, one deer will have to be exchanged for 3 beavers in our original community. New but somewhat deteriorated exchange ratio for Leyla would look like as follows;

1 (deer) * 30 $ = 3 (beavers) * 10 $ (23)

plus two beavers worth 20 $ sold at external markets.

Leyla's new income = 6*10$ + 2*10$ = 80 $ (24)

Total income = Leyla's income 80 $ + Maria's income 60 $ = 140 $ (25)

Maria now consumes 3 beavers instead of 2, a 50 % improvement in her consumption level. And the total income of Maria and Leyla together is now 140 $. As a result, even the stagnant deer hunter benefits from the productivity growth of Leyla as she eventually ends up with decreasing terms of trade. Both Leyla and Maria are now better off.

Relative prices in the service sector

In the view of many Classical economists including Marx, the output of service sector was considered as "unproductive". But, in the modern economies, it is an acknowledged and quantitatively proved fact that service sector output is not only productive (value-producing) but also constitutes the largest share of GDP or GNP. There is nothing tangible / storable produced in the service sector, as in commodity producing sectors. Thus, there are no physical quantities to exchange as in the simple model above. In commodity production, there is a close relationship between the "tangible" inputs and "tangible" output, normally moving in the same direction. In other words, given the fixed costs, each unit output's cost is closely related with costs of material inputs. In contrast, service sector output is characterized by higher intensity of labor-power services. Unit costs are closely related to labor-power costs as a function of time-employed, given the initial fixed and capital-goods costs. For instance, a teacher, a hairdresser, a business consultant or a musician can increase the total service supplied by working longer hours a day or week with given initial combination of physical inputs.

Reducing the contribution of labor-power services into a standard unit of account like the time-spent might seem as an appropriate means to analyze the relative values/prices in service sector activities. But, once we take into

consideration the different qualities of mental labor required to produce different kinds of services and the different costs of education/training, such quantitative comparisons lose most of their credibility. The value/price of different qualities of labor-power services would be different for each kind of service demanded and thus, the value/price of each specific service would be different, even if equal labor-power time is employed for the supply of each service. In spite of its significance on national economy, a separate value/price analysis in the service sector will be neglected simply because of the limited space in this paper.

Commodity sector price formation

So far, the analysis was focused on the creation and exchange of **relative-values/prices** in commodity producing (tangible) sector. But, the analysis fails to reflect the actual situation adequately; for the role of profit and its rate in the process of production, price formation and exchange relations has been neglected. In this part, profit will be introduced into price formation analysis in a monetary exchange economy. Introducing profits would inevitably lead to the simultaneous study of functional income distribution, which, however, will be neglected due to the limited space. The formation of new prices after the introduction of new technologies, also referred to as **macro-productivity**[3], shall be dealt with only briefly, again as a result of limited space.

Transformation of values into prices in "barter-exchange"

In barter exchange relations as in the simple model presented above, the exchange-value of each product was determined by the (mental/physical) labor embodied (**LE**), i.e., the objective value (**OV**) and magnitude of demand for the product (**D**), i.e., the subjective value (**SV**). The latter reflected the value the end-users are willing to give up in exchange of a product desired, while the former, **OV**, reflected the value of past ($\mathbf{LE_{t-1}}$) and present ($\mathbf{LE_t}$) mental/physical labor embodied (**LE**), excluding profits. Initially, one deer was exchanged for two beavers. But after the mental contribution, Leyla's possession had doubled and in order to clear the market, one deer had to be exchanged for four beavers, as in Case:1-A and Case:2-A. In Case:1-B and Case:2-B, there was demand for additional four beavers outside the community and as a result, Leyla's income had doubled. In a more realistic and rational exchange relations perspective, as in Case:1-C and Case:2-C, both members of the community had benefited from Leyla's mental contribution but Leyla's gain was more. All these indicate that the market (exchange-) value (**MV**) of a product is determined by **LE** and **D**. Thus, in the absence of profits, **MV** equation can be shown as;

$$\mathbf{MV = f\ (OV\ ;\ SV)} \qquad (26)$$

or, alternatively

$$\mathbf{MV = f\ (LE\ ;\ D)} \qquad (27)$$

implying that **LE** is the sole source of value generation while **D** gives the final shape to exchange relations by "haggling and bargaining". There was no profits involved and exchange was based on equal quantities of **MVs**, as in Case:1-C.

$$\mathbf{1\ MV^d = 3\ MV^b} \qquad (28)$$

instead of initial

$$\mathbf{1\ MV^d = 2\ MV^b} \qquad (29)$$

$\mathbf{MV^d}$ and $\mathbf{MV^b}$ denotes the market values of deer and beaver, respectively. The critical question in relative exchange relations is;

how to transform values into market prices (MPs) in "barter" exchange?

To obtain the **MP** we simply have to add profits (π) to both sides of the equations in exchange relations. Since profit rates are expected to be equal as a result of competition, new exchange relations would not affect the essence of exchange and be based on, in a sense, original **MV**s of deer and beaver respectively.

$$\mathbf{MP^d = MV^d + \pi^d} \qquad \text{one deer's MP} \qquad (30)$$

$$\mathbf{MP^b = MV^b + \pi^b} \qquad \text{one beaver's MP} \qquad (31)$$

$$\mathbf{\pi = f\ (SV)} \qquad \text{or} \qquad \mathbf{\pi = f\ (D)} \qquad (32)$$

and, in view of Case:1-C;

$$\mathbf{1MV^d + \pi^d = 3\ MV^b + \pi^b} \qquad (33)$$

By assumption;

$$\mathbf{\pi^d = \pi^b} \qquad (34)$$

then,

$$\mathbf{1MV^d = 3\ MV^b} \qquad \text{as in (Eq.28), or, alternatively}$$

$$\mathbf{1MP^d = 3\ MP^b} \qquad (35)$$

In other words, in a "barter" exchange model **MP**s deviate from **MV**s only to the extent of size of profits. Since profit rates are assumed to be uniform, **MP**s would reflect actual **MV**s. But, as we all know, barter exchange is only a rare exception in modern economies.

Price formation in a monetary economy

In monetary economies, given the fair competitive environment and appropriate institutional/ cultural settings, prices are determined by each firm in every sector on the costs plus mark-up basis in accordance with long-run profit maximization goals, given demand. Costs includes the prices of all inputs of production including profits along with present wages but excludes opportunity cost of savings / capital as well as present profits. There are no homogeneous products and thus no uniform price, even within the same (sub-) sector(s). Accordingly, there are no homogeneous production methods, either. Each product can be produced by a different production method and displays product specific unique features. In other words, each firm may require labor-power services as well as financial/organizational/ technological settings at different qualities and quantities. Given these features, each firm would have different break-even points and different optimum plant capacities. As distinct from the simple model above, we have to keep in mind that there may be at least one input of production other than the services of labor-power.

Although the labor-power is the sole source of all value generation, as before, the **MP** paid by end-users normally exceeds the value transmitted to the product. The reason for the difference is the "**profit**" (π) paid to entrepreneur for the "**risk**" assumed. It is not payment for a value transmitted to the product by capital. In fact, it is a payment in excess of the costs. In a sense, it is a "**surplus cost**" but not an "unpaid surplus value" to labor-power for the labor-power receives pre-determined wages in return of their services. This additional payment or "**surplus cost**" is a necessary and indispensable ingredient for the functioning of capitalist system. Thus, the **MP** can be defined as monetary expression of a product regulated by **CP** plus π (**surplus cost**) shaped by **D**.

Assume an economy where labor-power is the only input of production of Commodity-**X**. Given **D**, the cost of production (**CP**) of **X** would be determined by;

$$\mathbf{CP^x = w * L} \qquad (36)$$

and;

$$\mathbf{MP^x = CP^x + \pi^x} \qquad (37)$$

In this initial stage of production with "labor-power input only", the **MV** of product equals the **CP** while the **MP > MV** by the size of "profit". In other words, whenever profits are introduced, neither **CP** nor **MP** would not reflect the **MV** of the product anymore.

Production with multiple inputs

Assume that Commodity-**X** produced yesterday is used as input in the supply of Commodity-**Y** today. The **CP** of **Y** would comprise of past and present **w*L** plus past π;

$$\mathbf{CP^y = w^x * L^x + \pi^x + w^y * L^y} \qquad (38)$$

but,

$$\mathbf{MV^y = w^x * L^x + w^y * L^y} \qquad (39)$$

And, keeping in mind that **D** effects both π and relative exchange ratios as in the simple model;

$$\mathbf{MP^y = w^x * L^x + \pi^x + w^y * L^y + \pi^y} \qquad (40)$$

where, $\mathbf{MP^y > MV^y}$ by the amount of $\pi^x + \pi^y$

To put it differently;

$$\mathbf{MP^y = wL + In + \pi^y} \qquad (41)$$

"**w**" denotes the present wage-rate, "**L**" the number of present employees, "**In**" the price of input(s) including past profits (π^x) plus past labor embodied (**LE** ^{x}). And, (**wL + In**) together make up total costs of production today. Alternatively;

$$\mathbf{MP}_{t+1} = \mathbf{wL}_{t+1} + \pi_{t+1} + \mathbf{In}_{t} \quad (42)$$

where **t** denotes time.

Regarding a product with "**n**" inputs, the **MV** and **MP** would be:

$$\mathbf{MV}^{n} = \Sigma\, \mathbf{LE}^{n} \quad (43)$$

$$\mathbf{MP}^{n} = \Sigma\, \mathbf{LE}^{n} + \Sigma\, \pi^{n} \quad (44)$$

Per unit $\mathbf{MP}_{t+1} = \mathbf{CP}_{t}$ only at the break-even price level (**B**). But firms guided by long-run profit motive would be reluctant to produce at **B**, at least, in the long run.

Although **MP** always includes payment in excess of the **MV** of a product under normal conditions, the exchange of two producers might present a different and interesting result. Assume two producers, uniform rate of profit and equal amount of total expenditure on consumption, say 100 TL each. The capitalists would be exchanging equal quantities of **MV**s among themselves in a "**barter-like**" manner. In other words, since $\pi^a = \pi^b$, then $\mathbf{CP}^a = \mathbf{CP}^b$ and accordingly, $\mathbf{MP}^a = \mathbf{MP}^b$. In a sense, they would be paying the break-even price.

Meanwhile, however, the rest, or the non-capitalist end-users, has to pay profits in excess of **CP** for the functioning of system, which leads to different implications with regard to income distribution. It implys that some value beyond the production costs is being transferred from non-capitalists to capitalists. The same would apply for capitalists in less profitable sectors, tough to much lesser extent, as a result of unequal amount of profits exchanged.

Now, in the light of above arguments, the relevant and critical question is; where to set the **MP** in a competitive market for a given product with regard to mental contribution? Below, three different cases of price formation will be studied.

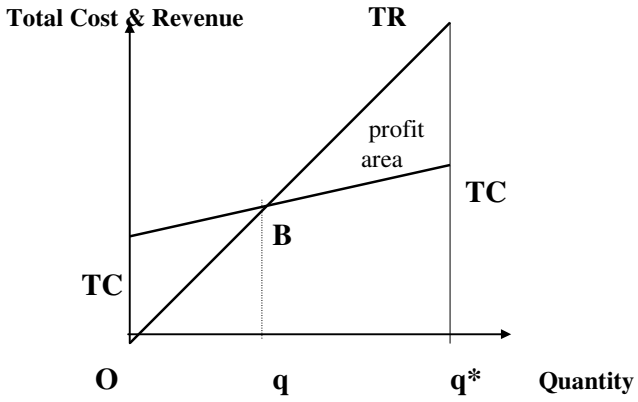
1. **Given** product and **given** technology (production method);
2. **Given** product but **new** production method introduced by mental labor, and;
3. **New** products supplied by **new** production methods.

1- "Given" product/production method and price

Let us first consider a case with **given** technology (**previously introduced mental contribution**) embodied in capital goods and ignoring all non-profit motives. Given optimum plant capacity with **CP** schedule and assuming optimum micro-productivity, i.e., optimum allocation of inputs of production, the rate of profit (**r**) would be determined by **MP** set on (**CP + π)** basis where π would be subject to magnitude of demand (**D**). Or, to put it differently, the projected size/rate of profit by the firm would determine the **MP** and quantity demanded/supplied (**q)**, given **PC** and **CP**-schedule.

Figure-1 shows the relationship between the quantities supplied and profits with given plant capacity. **B** denotes the break-even point of production where average unit costs equal the average unit returns, leaving no profits. The size as well as the rate of profit per unit output would increase as the total quantity supplied moves to the right of **q** towards **q***. Given **D**, at maximum output level (**q***) determined by the plant capacity, the size and rate of profit would be at highest possible level.

Figure -1

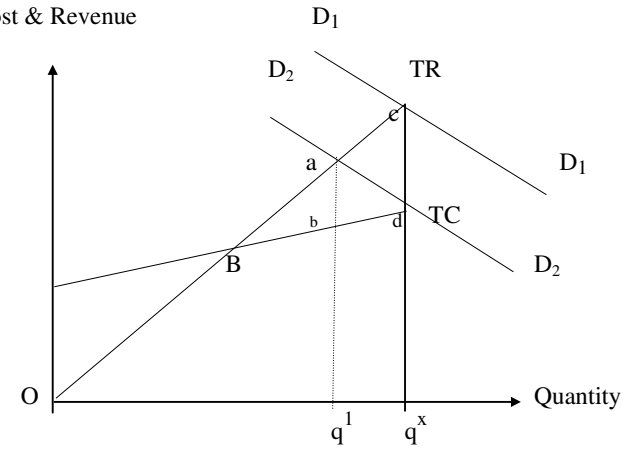


Assume uniform price for a product in a specific sector and "given" but "heterogeneous" production methods, ***CP***-schedules and plant capacities. Profit rate for each firm might be different than the average profit rate in sector as quantities demanded/supplied vary from firm to firm, cet. par. In other words, the same or similar products produced by different types of technologies would naturally produce different unit production costs, optimum plant sizes, break-even points and size/rates of profits at different quantities demanded/supplied.

How influential is variations in demand?

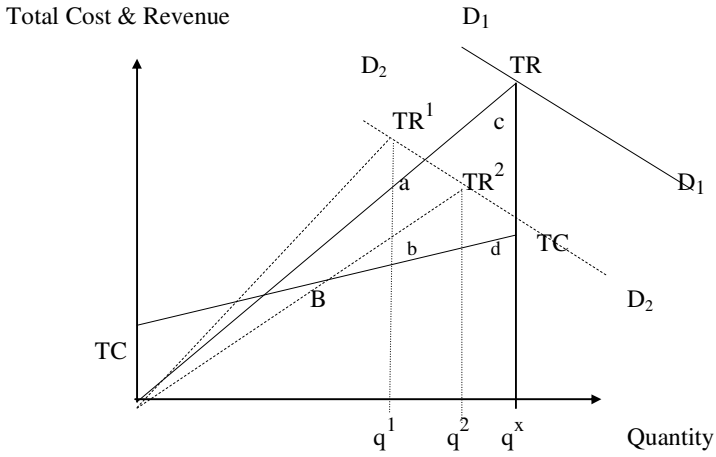
Assume that **MP** is initially set at a level, which assured sufficient demand for full plant capacity utilization. But, then, for some reason demand curve shifts towards the origin, from D_1D_1 to D_2D_2. Given **MP** and full plant output capacity by **q***, as in Figure-2, the shift in demand curve would cause alterations not only in the quantities produced but also in the size and rate of total profits. The profit would follow decline in **D** and drop by the area of rectangular "**abcd**", to triangle "**abB**", also causing a decline in the quantity produced by the gap of q^1q^x, e.g., $Oq^x - Oq^1$. The new but inefficient capacity utilization level is denoted by dashed line aq^1. At that level, both the size as well as the rate of profit would be lower.

Figure-2



Following the decline in demand and ensuing excess plant capacity, the firm may respond by changing its price. If **MP** is increased, revenue line **OTR** would become steeper, **OTR**^{1}, but it would be hardly likely to restore the initial profit size and full plant capacity level. (Figure:3) If **MP** is reduced in response to fall in demand curve, the **OTR** revenue line would become flatter; **OTR**^{2}, and the plant capacity utilization would increase, if end-users respond by increasing demand. But restoration of the initial profit level would be impossible.

Figure -3



To conclude; labor-embodied (**LE**) argument alone falls short of explaining the market prices, especially in case of supply-demand imbalance. **CP**, which reflects (past/present) **LE** and past π seems to regulate the minimum **MP**- level, which, in

the final stage, is adjusted by the "haggling and bargaining" in the market. Thus, fluctuations in demand causing imbalance in supply-demand conditions have an influential impact on the determination of short-run **MP**. With "given" technology and supply-demand balance, the long-run **MP** is more likely to reflect **LE** and past π, plus present π shaped by present **D**-schedule. But, there is a crucial reality; technology (mental contribution) is not given, on the contrary, incessantly changing.

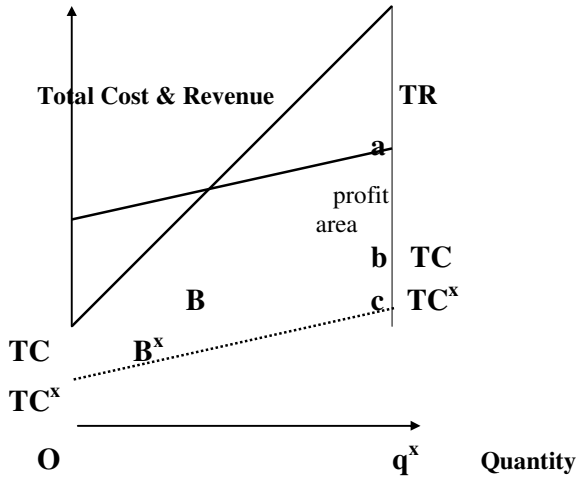
Macro-economic productivity (Technological Change) & Price

The major distinction of the following analysis is the introduction of "new" technologies, the products of mind. By assumption, demand is given and there is no excess plant capacity.

2- "Given" product but "new" production method and price

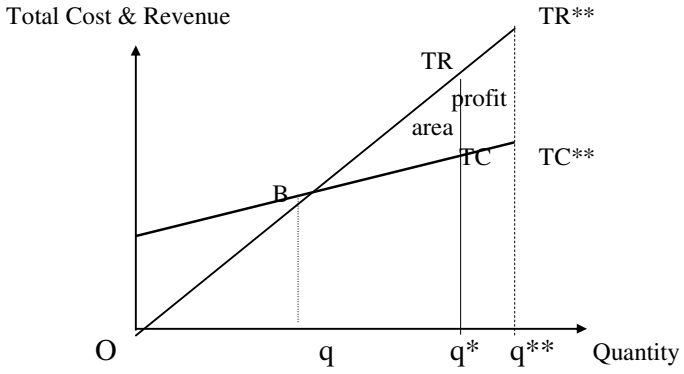
There are two motives for a profit guided firm to produce a "given" product with a "new" technology; either (a) to make higher profits by reducing unit **CP**, and/or (b) to become more price competitive. After the introduction of new method[4];, the **expected** and normally **realized** rate of profit would be higher than before, at least until the others catch up. Figure:4 shows a hypothetical case of declining costs and increasing profits in relation to a cost-saving technological change with given output. $\mathbf{TC^x}$**-**$\mathbf{TC^x}$ line indicates the new cost curve, which is now closer to the origin as a result of new method indicating lower production costs, thus higher profits. The new profit area is $\mathbf{acB^x}$ where $\mathbf{acB^x > abB}$. The profit area before the introduction of new productive knowledge (technology) is indicated by the triangle **abB**.

Figure -4



If "new" technology facilitates increased supply with "given" inputs, then, again, the size and the rate of profits would rise, cet. par. (Figure:5) New plant capacity is denoted by Oq^{xx} while BTR^{xx} TC^{xx} denotes the new profit area, which is larger than **BTRTC**. The new situation also implies lower ***CP*** per unit output as the share of fixed costs in per unit output declines.

Figure -5



Now the unit production costs being lower, will price remain unchanged?

If there is sustained demand at the initial price level, there would be no need to change the price, as in the Cases 1-B and 2-B in simple relative exchange model with two hunters. As a result of new technology, the size and the rate of profits would increase. If the firm wants to improve its competitive position, then it would have to lower the price. The limit of price decline would be determined by

the long-term targets of firm. Reducing the price until the previous level of profit rate is restored would not be an irrational behavior, cet. par.

Conclusion; as a result of mental labor's contribution, the new price level will have to be set somewhere between the prevailing **MP** and a lower level above break-even price in accordance with firm's short- and long-run targets and magnitude of demand.

3- "New" products - production methods and price

The distinctive feature of economies is the incessant introduction of "new" products as well as production methods, which seems to have accelerated in so called "the age of information". Since both, the products as well as the production methods are **new**, there would be no preceding prices to compare with. In other words, a study of price effect of a **new technology** on a **new product/production method** would only give us information on "new" sets of prices. It can be claimed, however, without hesitation, that the **expected**, and normally the **realized**, profit rate would be higher than the prevailing average market rate, until the competitors catch up. Otherwise, there would be no incentives for the commercial firms to engage in the costly and risky process of R&D for new products and production methods.[5]

Concluding remarks

The purpose of this paper was to display the genesis and incessant source of value. Analysis so far indicated that, given natural resources and physical labor, productive knowledge[6] of labor-power is **the sole source of all exchange-values created and wealth accumulated**.

All commodities are originally the produce of nature transformed (re-shaped) by labor-power. Given the limited impact of physical labor, the creative mental faculty of labor-power incessantly introduces new ideas to change and control our environment, which in its turn changes our entire way of living. Assuming optimum resource (micro-economic) efficiency in production, mental labor's "new" contribution ("new" technology) influences the price-level by introducing either;

1- cost-saving "new" method of production, "given" the product; or
2- "new" products / production methods with "new" sets of values/prices.

In both cases, the expected and normally realized profit rate is higher than the average rate.

Regarding the variations in mental-labor embodied and impracticality of its estimation as well as variations in demand, there is no way to predetermine at what rates (prices) exactly the products would be exchanged in the market. However, in order to assure production, the price has to include **profits**, which is **no value transmitted** to the commodity, but is a necessary ingredient of the system to be functional.

Unequal distribution of income has always been one of the major problem areas and an embarrassment for both economic science and economists. The analysis above indicate that this problem can be tackled, at least to some extent, by increasing the number of persons in "barter-like" exchange, that is by making people "profit receivers" who exchange products with profits instead of being just wage-earners who have to pay in excess of the value transmitted to products.

NOTLAR:

[1] Labor-power is the capacity to labor, embodied in the worker and consisting of mental and physical faculties; the source of value-added.

Labor is the result of work; the actual use of labor power in the performance of a specific task.

[2] Physical labor or synonymously manual labor refers to the basic capabilities of an "able bodied" man like pushing a button, painting the wall, sweeping the streets, etc. Although the command for even such low level activities originates from brain, for the sake of simplicity we regard all kind of physical labor as if an instinctive reflection, without any qualitative distinction related to mental labor.

[3] Macro-productivity refers to cases where input/output ratio changes due to new technologies, i.e., new mental contributions, while micro-productivity refers to changes in (human-financial-etc.) resource efficiency. The former is a long-run incessant process while the latter is limited by the optimum levels implying that once optimum capacities are reached, the economy becomes stationary.

[4] Regardless of the kind of new production method whether it is cost-saving with given output or output-increasing with given costs or cost falling faster than output or output increasing faster than costs, the anticipated impact of new technology is to increase the profit rate per unit of output.

[5] In addition to previously "unknown" products, a GSM telephone, or a new generation of TV sets with Internet connection, or a new design of ergonomic chair, etc., are all considered as "new" products generally produced with "new" production methods, although the telephones or TV-sets or chairs have been existing for many decades in "other" forms.

[6] The present level of productive knowledge is a common inheritance of all mankind accumulated in thousands of years. Available productive knowledge (technology) would not be diminished by the use of others. In fact, total productive knowledge is more likely to increase faster if shared by more people. Therefore, it is not only fair that all nations share the available knowledge in a more "just" way, but it is also logical and economically rather rational

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