

THEORY OF TEMPORAL IMPUTATION A Praxeological Reconstruction of Value, Capital and Price

GIORGIO MICOLI*

Date received: 27 November 2025

Date of acceptance: 14 May 2026

Abstract: This article proposes a praxeological reconstruction of economic theory based on the temporal structure of human action. Its central thesis is that value does not derive from the physical properties of goods or from the productive past, but rather from the allocation that the agent makes from the future end to the present means. Building on this relationship, the article examines time preference, cost, capital, interest and price as categories derived from the intertemporal coordination of individual plans. The paper distinguishes between physical time and praxeological time, engages with the Austrian tradition of capital and the literature on radical uncertainty, and specifies that indirect production only increases productivity when the means are entrepreneurially coordinated with valued future ends. The contribution lies in systematising economics as the science of purpose-oriented human time.

Keywords: temporal imputation; human action; time preference; capital; Austrian School.

JEL codes: B13; B53; D46; E22; E43.

1. Introduction

Economic theory arises when human action is regarded not as a physical event, but as intentional behaviour aimed at replacing a

* (ORCID 0009-0004-5338-8843) Professional affiliation: Piemy, Taranto, Italy. The author would like to thank Jesús Huerta de Soto, Miguel Anxo Bastos Boubeta and the scientific tradition of the Austrian School of Economics for the intellectual inspiration that has made the completion of this work possible. The arguments, formulations and any errors contained in this article are the sole responsibility of the author.

present situation with a future state deemed preferable. The agent does not merely move within the world: they plan, compare, hope, forgo and coordinate scarce resources in view of ends that do not yet exist. Consequently, time is not an element external to the economy, nor a chronological variable added from outside to an already constructed theory. Time constitutes the very form of action, because every action presupposes a distance between the present state that one wishes to move beyond and the future state that one wishes to attain.

The tradition of the Austrian School has consistently recognised this temporal dimension. Menger's subjective theory of value showed that economic goods derive their significance from the causal relationship that the agent establishes between the available means and the satisfaction of their needs (Menger, 1871). Böhm-Bawerk placed time at the centre of the theory of capital and interest by analysing indirect production and the differential valuation between present and future goods (Böhm-Bawerk, 1884; 1889). Mises formulated praxeology as a general science of human action and derived from it time preference as a category inseparable from action (Mises, 1949). Hayek, for his part, developed the idea that production and capital can only be understood as structures for the intertemporal coordination of dispersed plans (Hayek, 1937; 1941; 1945).

This article is part of that tradition, but proposes a specific formulation: the theory of temporal imputation. Its central thesis can be expressed as follows: economic value does not flow from the past to the present, nor does it derive from the physical properties of goods or from the labour incorporated in them, but rather flows from the future end towards the present means. The agent anticipates a desired future state and, on the basis of that anticipation, imputes value to the means they consider suitable for achieving it. The valued future does not causally produce the present, but it orders it praxeologically. In this sense, temporal imputation denotes the logical link through which future ends confer economic meaning on present means.

This formulation allows for a unified reconstruction of some of the fundamental categories of economic theory: value, cost, time preference, capital, interest and price. Value appears as value imputed from an end; cost as a temporal sacrifice of incompatible

courses of action; capital as a temporal order of means; interest as an expression of the value difference between present and future availability; and price as the result of the convergence of subjective temporal valuations in a market process. Economics, understood in this way, does not study isolated objects or static quantities, but rather temporal processes of goal-oriented action.

The article also addresses a significant difficulty. The relationship between time, ignorance and uncertainty has been examined by authors who have emphasised the impossibility of reducing human action to probabilistic calculation or to maximisation under given data. O'Driscoll and Rizzo developed a theory of the market as a temporal process under ignorance and real change (O'Driscoll & Rizzo, 1985). Kay and King, from a different perspective, have emphasised the relevance of radical uncertainty for understanding human action in contexts that cannot be reduced to known probability distributions (Kay & King, 2020). The theory proposed here does not seek to deny these developments, but rather to show that the temporal dimension can be situated at a more fundamental level: that of the praxeological imputation linking present means and future ends.

The contribution of this article does not, therefore, consist simply in asserting that time matters. That assertion is already present in the Austrian tradition and in contemporary literature on uncertainty. The contribution consists in maintaining that the time of action is not merely an additional dimension amongst others, but rather the formal principle that enables us to explain the unity of the main economic categories. Economics is the science of human action; and human action, being oriented towards future ends, is always temporal. Economic analysis must therefore begin with the temporal structure of action.

The paper is organised as follows. Section 2 situates the proposal within the Austrian literature and sets out its method. Section 3 distinguishes between physical time and praxeological time. Section 4 formulates the theory of the temporal imputation of value. Section 5 examines its implications for time preference, capital and interest. Section 6 analyses price as the temporal coordination of subjective valuations. Section 7 examines temporal confidence under radical uncertainty. Section 8 discusses the

contribution, limitations and main objections, including the criticism that not all accumulation of indirect means automatically leads to greater productivity. Section 9 presents the conclusions.

2. Methodology and Position within the Austrian Literature

2.1. *Human action and praxeology*

The method employed is praxeological. This means that the analysis does not start from aggregate data, statistical functions or equilibrium models, but from the logical implications of the fact that man acts. Human action is not merely one piece of empirical data amongst others, but the condition from which data can acquire economic significance. To deny that man acts is to perform an act of denial, that is, an action; therefore, the axiom of action possesses a performatively undeniable structure (Mises, 1949).

Praxeology does not seek to describe all the psychological aspects of behaviour. It does not study specific preferences, inner motives or the particular mental states of the agent. Its object is more formal: the categories that are necessarily involved in every action. Wherever there is action, there is an agent, a present situation deemed unsatisfactory, a future end deemed preferable, means deemed suitable, uncertainty regarding the outcome, and the renunciation of incompatible alternatives. These categories are not added to the action from outside; they are already contained within the very concept of acting.

This perspective makes it possible to avoid two forms of reductionism. The first is physicalist reductionism, which interprets economics as if it were the study of relationships between things. From a praxeological point of view, no object is economic in and of itself. A good is not such because of its material composition, but because an agent incorporates it into a plan. The second is psychologistic reductionism, which confuses valuation with a purely internal subjective state. Valuation is not a measurable psychological datum, but a relationship manifested in action. The agent demonstrates that they prefer one course of action to another by allocating scarce resources over time.

The methodological consequence is decisive: economic time cannot be reduced to physical time. The clock measures the homogeneous succession of moments, but action structures time in accordance with ends. For the agent, a minute's wait, a year's investment or a decade of productive maturation are not merely equivalent physical units. They are positions within a plan. Economics, as the science of action, must study this structure of positions, not merely the quantitative duration that accompanies them.

2.2. *Imputation, capital and temporality*

The theory of value imputation emerges in the Austrian tradition as a development of the subjective theory of value. Menger showed that the value of higher-order goods depends on the value attributed to the lower-order goods that contribute to their production. The causal direction of physical production runs from the means to the product, but the economic direction of valuation runs from the end to the means (Menger, 1871). Imputation is therefore not a material transfer of properties, but a logical relationship between a valued outcome and the means deemed necessary to achieve it.

Böhm-Bawerk expanded on this insight by linking capital, indirect production and time. Indirect methods of production allow, under certain conditions, for more productive outcomes than direct methods; but they require waiting, saving and the coordination of successive stages (Böhm-Bawerk, 1889). Capital thus ceases to be a mere mass of physical objects. It is a temporal structure of heterogeneous goods organised towards future ends. This idea would later be central to Hayek, for whom the productive structure can only be understood as an intertemporal order of complementary and revisable plans (Hayek, 1941).

The theory of temporal imputation retains these elements, but formulates them from the perspective of the agent who directs present means towards future ends. Imputation is not limited to explaining the value of capital goods within production; it explains the general economic structure of action. Every means derives its meaning from an end. Every cost arises from a temporary sacrifice. Every preference involves a comparison between present

availability and future satisfaction. All capital is a means situated within a sequence. Every price encapsulates temporal valuations found in exchange.

This broadening does not break with the Austrian tradition, but rather seeks to make explicit its unifying principle. If value is subjective, and if economic subjectivity manifests itself in goal-oriented action, then value is necessarily temporal. There is no economic valuation outside a horizon of action. The agent does not value things in the abstract; they value the contribution that certain means can make to the realisation of future ends.

2.3. Time, ignorance and radical uncertainty

The economics of time cannot be separated from ignorance. The future towards which action is directed is not a given fact, but an open realm. If the future were entirely predetermined, action would lose its specifically human meaning: there would be no discovery, error, entrepreneurial creativity or coordination of plans. Uncertainty is not an accidental imperfection of the market, but a constitutive condition of action.

O'Driscoll and Rizzo emphasised that real time implies genuine change and that market processes cannot be reduced to a sequence of instantaneous equilibria. The market is not a snapshot of resource allocations, but a dynamic coordination of plans under conditions of ignorance, revision and learning (O'Driscoll & Rizzo, 1985). Lachmann, from another Austrian perspective, emphasised the heterogeneity of capital and the role of expectations in the coordination of productive structures (Lachmann, 1956). Kirzner developed the concept of the entrepreneurial function as the discovery of previously unrecognised opportunities (Kirzner, 1973).

Contemporary literature on radical uncertainty reinforces this line of argument. Kay and King argue that many relevant human actions cannot be treated as problems of probabilistic calculation, because the agent does not know all possible states of the world nor can they assign meaningful probabilities to each of them (Kay & King, 2020). Although their approach is not strictly praxeological, it

converges with an essential idea: the human future cannot be reduced to a table of calculable outcomes.

The theory of temporal imputation takes this uncertainty as a given. The actor imputes value from future ends that do not yet exist and which may not come to pass. Consequently, imputation is always entrepreneurial in the broad sense: every actor interprets the future and organises present means under conditions of ignorance. Entrepreneurship here does not refer to a particular profession, but to the universal function of acting under uncertainty, anticipating ends and reorganising means (Huerta de Soto, 1992).

2.4. Originality and scope of the proposal

The originality of the theory of temporal imputation is not to be found in the isolated assertion that value is subjective, nor in the general idea that time matters, nor in the identification of uncertainty as an economic problem. These elements already form part of the Austrian tradition and the literature on market processes. The originality lies in the systematisation: all these categories are interpreted as manifestations of a single temporal structure of action.

Temporal imputation makes it possible to explain why the future can guide the present without reversing physical causality. Physically, present means precede future results. Praxeologically, the anticipated future end confers meaning upon the present means. This dual direction is central to avoiding confusion: it is not claimed that the future materially causes the present, but rather that the future end, insofar as it is anticipated by the agent, logically orders the use of the means.

The scope of this proposal is theoretical and categorical. It is not a question of constructing an empirical predictive model or a quantitative theory of prices. It is a question of clarifying the logical foundation of economic categories from the perspective of temporal action. For this reason, the theses of this article should be read as praxeological propositions: they indicate what is implied by action as action, not what occurs in each specific historical case with a measurable intensity known in advance.

This clarification is important to avoid an overly broad interpretation of the theory. Indirect production, for example, is not automatically more productive simply because it accumulates more means or involves more stages. It can only be more productive when the structure of means is correctly coordinated with valued future ends. The theory of temporal imputation does not equate productivity with physical accumulation, but rather with the entrepreneurial coordination of heterogeneous means over time.

3. Physical time and praxeological time

3.1. *The homogeneous nature of physical time*

Physical time is homogeneous, quantitative and measurable. It can be divided into equivalent units and represented by clocks, calendars or time series. From the perspective of the natural sciences, this conception is indispensable: it allows us to measure duration, speed, frequency and succession. However, its usefulness must not lead us to confuse physical time with the time relevant to economics.

In a physical theory, two intervals of equal duration are equivalent in terms of duration. In human action, however, two physically equal intervals may have completely different economic meanings. An hour's wait before consuming an urgent good is not praxeologically equivalent to an hour's maturation of a long-term investment. The clock measures the same thing; the action does not mean the same thing. The difference arises because the time of the action is not merely duration, but a position within a project.

Physical time is indifferent to ends. It passes uniformly even if no agent values it, awaits it or organises it. Praxeological time, by contrast, exists for the economy only to the extent that the agent structures it through ends and means. What is decisive is not that an action lasts a certain number of chronological units, but that the agent must traverse a distance between intention and realisation. That distance can be measured physically, but its economic significance is not exhausted by the measurement.

Confusion between these two levels leads to analytical errors. If economic time is treated as a purely physical variable, time preference may appear to be a psychological anomaly, interest a contingent institutional price, and capital a technical accumulation of goods. If, on the other hand, it is considered praxeologically, time preference, interest and capital appear as categories that express the temporal structure of action.

3.2. *The teleological nature of praxeological time*

Praxeological time is the time of purpose-directed action. It is not a substance distinct from physical time, but rather the meaning that succession acquires when an agent integrates it into a plan. Action does not unfold in a neutral flow of moments, but in an order of relevance: before and after, means and end, expectation and realisation, sacrifice and satisfaction. These relationships are not physical in the strict sense, but they are indispensable for understanding the economy.

To act is to introduce a difference between the present and the future. The present is the situation from which the agent sets out; the future is the state the agent hopes to attain. Between the two lie means, stages, uncertainty, costs and revisions. The future is not simply what will happen next; it is that towards which the agent directs their conduct. In this sense, praxeological time is inseparable from teleology.

Teleology does not imply an arbitrary psychological explanation. It is not a matter of reconstructing all the subject's inner motives, but of recognising that action has a means-end structure. The economist does not need to know the ultimate reason why a person desires a particular end in order to understand that, if they act, they organise means in accordance with that end. The formal structure of action is sufficient to derive the fundamental economic categories.

Praxeological time is also qualitative. The stages of a process are not interchangeable because they occupy distinct positions within the plan. A resource available at the start of a production chain does not perform the same function as one available at the

end. A promise of future delivery does not have the same meaning as present availability. An investment requiring ten years is not simply a sum of years; it is a structure of waiting, coordination and exposure to uncertainty.

3.3. *Irreversibility, waiting and the structure of action*

All action involves irreversibility. The actor may correct, abandon or modify their plan, but they cannot reclaim time already spent as if it had not been spent. This irreversibility turns action into a sacrifice. To act in one way is to rule out other incompatible courses of action. The economic cost arises not only from the scarcity of physical goods, but from the fact that the actor's time cannot be devoted simultaneously to all possibilities.

Waiting is the praxeological form of the interval between intention and realisation. It should not necessarily be understood as psychological suffering. Waiting may be accepted, desired or even enjoyed; but, as an economic category, it indicates that the result is not immediately available. Where there is action, there is a 'not yet'. The agent is faced with a gap that must be bridged by means of ordered actions.

The temporal structure of action can be described in terms of three minimal elements. First, a future end that guides the process. Second, present or relatively near-term means that the agent considers appropriate. Third, a temporal gap characterised by uncertainty. If the end is missing, there is no direction; if the means are missing, there is no action but mere aspiration; if there is no temporal distance, there is no process to organise. Economics begins where these three elements come together.

This structure helps us understand why time is not a secondary category. Value, cost, capital and price are not phenomena occurring within a neutral time-frame; they are ways of organising the time of action. Value imputes meaning to the means from the end; cost expresses the renunciation of incompatible possibilities; capital extends action in stages; price coordinates temporal plans amongst actors. Economic theory is, in this sense, a praxeological theory of temporality.

4. The temporal imputation of value

4.1. *From the future end to the present means*

Temporal imputation denotes the logical link by which the agent attributes value to present means in relation to a future end. A means has no economic value in itself. It acquires value because the agent considers it capable of contributing to the realisation of a valued future state. Value is not found in the object as a physical property, nor does it derive mechanically from past effort. It arises from the relationship between an anticipated end and a means employed in the action.

This thesis does not deny technical causality. To produce a table, grow wheat or manufacture a tool, the physical means must act causally before the product comes into being. But the economic causality of valuation works in the opposite direction. The agent values the product or the expected satisfaction and, from there, values the means they consider necessary. Wood, labour, machinery or production time derive their economic significance from the end that is intended to be achieved.

The direction of imputation is, therefore, praxeological rather than chronological. The future end does not yet exist as a material fact, but it exists as the object of anticipated valuation. This anticipation does not physically cause the present; it orders it. The agent acts now because they attribute meaning to a possible future. Without this anticipation, the means would be mere objects or capacities without any defined economic relevance.

The theory of temporal imputation allows us to formulate a precise critique of objective theories of value. If value depended on the labour embodied, the physical quantity of matter, or some objective property of the good, it would be impossible to explain why the same object has different values for different agents, or why value changes when ends change. The praxeological explanation is more fundamental: goods have value because they are integrated into goal-oriented plans. Value is a relationship of temporal imputation.

4.2. *Value, cost and scale of priorities*

Value is inseparable from action. The agent does not first assess everything in the abstract and then act; in acting, they reveal an order of priority. This order should not be conceived as a psychological list pre-written in the mind. It is the structure of the action itself, considered from the point of view of preference. Employing a means for an end shows that, at that moment, that course of action has been preferred over incompatible alternatives.

Cost thus appears as the flip side of value. By attributing value to an end and employing means to achieve it, the agent forgoes other ends that those same means might have served. Cost is not simply a monetary outlay, nor suffering, nor an objective quantity. It is the most highly valued alternative that is abandoned when acting. Given that action unfolds over time and time is irreversible, cost has a temporal structure: it is the loss of a possibility that cannot be realised simultaneously.

The scale of priorities manifests itself temporally. The agent does not rank ends from an absolute and eternal standpoint, but within the context of a specific situation, with specific means and under specific uncertainty. A distant end may justify a present sacrifice if its imputed value is sufficient. An immediate end may take precedence over a more distant one if urgency or uncertainty alters the valuation. The order of action is always a temporal order of ends.

This relationship between value and cost shows that temporal imputation is not a partial theory of capital, but a general theory of economic action. Every act of valuation implies an orientation towards the future and a sacrifice in the present. Consequently, economics cannot understand value without understanding the temporality that makes it possible.

4.3. *Time-based allocation and the entrepreneurial function*

Temporal imputation is necessarily entrepreneurial in the broadest sense. The agent does not know the future; he interprets it. When employing present means, he does not apply a mechanical

calculation based on complete data, but rather formulates a conjecture about the relationship between means and ends. This conjecture may be correct or erroneous. Economic error is, to a large extent, an error of temporal imputation: the agent has attributed to certain means a capacity to realise ends which subsequently proves not to be the case.

The entrepreneurial function consists of discovering, anticipating and reorganising relationships between present means and future ends. In Kirzner's theory, the entrepreneur discerns opportunities that others have not seen and coordinates resources around them (Kirzner, 1973). From the perspective of time allocation, this entrepreneurial insight is a form of interpreting the future. The entrepreneur does not merely discover price differences; he discovers possible temporal structures of action.

Within this framework, profit and loss can be interpreted as the results of correct or erroneous temporal allocations. If the actor coordinates present means towards future ends that others come to value sufficiently, they make a profit. If they organise means towards ends that do not materialise or are not valued, they incur a loss. The market does not eliminate uncertainty; it subjects it to a process of testing, correction and learning.

This perspective allows us to integrate the theory of subjective value with the theory of the market process. Value is not an isolated fact that precedes the market as complete information. It is formed, revised and corrected within the very process of coordination. Temporal allocation operates within each agent, but its results are socially tested through exchange, prices, profits and losses. Thus, the economy appears as a continuous process of revising allocations under uncertainty.

5. Time preference, capital and interest

5.1. *Time preference as a category of action*

Time preference expresses the differential valuation between present and future goods. All other things being equal, the agent prefers a satisfaction available now to an identical satisfaction

available later. This proposition should not be interpreted as a psychological observation about impatience, but rather as a logical implication of action. The agent acts in the present to achieve future ends; therefore, the present availability of means has a function that future availability does not possess.

Mises argued that time preference is inseparable from human action and that original interest does not arise from an institutional convention, but from the value difference between the present and the future (Mises, 1949). Rothbard developed this idea by linking time preference, saving, investment and the structure of production (Rothbard, 1962). The theory of temporal imputation confirms this approach: if the future end imputes value to present means, the temporal distance between the means and the end must be valued by the agent.

Time preference does not mean that the agent always chooses immediate consumption. They may prefer to save, invest or wait. But even when they wait, they do so because they consider that the future end justifies the present sacrifice. Waiting requires a value-based compensation. The agent agrees to postpone satisfaction only if the expected outcome possesses, for them, sufficient value in relation to the present means sacrificed.

Nor should time preference be confused with a numerical rate predetermined in advance. Market interest rates express specific monetary and institutional relationships; time preference, by contrast, is a more fundamental category. Prior to any credit market, action implies a difference between present and future availability. The market does not create time preference; it reveals it, coordinates it and transforms it into observable exchange relationships.

5.2. *Capital as a temporal order of means*

Capital is not a homogeneous mass of physical goods. It is a temporal order of heterogeneous means integrated into productive processes. A machine, a tool, a raw material or a facility is not capital by virtue of its mere materiality, but by virtue of its place within a production plan oriented towards future ends. The same object

may be capital in one plan, a consumer good in another, or a mere thing of no economic significance in yet another context.

Austrian capital theory has emphasised the heterogeneity and complementarity of capital goods. Hayek stressed that the productive structure consists of temporally coordinated stages and that the economic problem is not merely to accumulate capital, but to coordinate it correctly (Hayek, 1941). Lachmann emphasised that capital is a structure of complementary goods whose coherence depends on plans and expectations (Lachmann, 1956).

From the perspective of temporal allocation, capital appears as time organised in the form of means. Each capital good represents a stage, an anticipation and a wait. Its value depends on the future end to which it is linked and on the coherence of the productive sequence into which it is embedded. For this reason, capital cannot be adequately understood through homogeneous aggregates. Physically aggregating capital goods is not the same as constructing a viable productive structure.

Capital is, therefore, a praxeological category rather than a technical one. Technique indicates possible physical relationships between inputs and outputs; praxeology explains why certain inputs are selected, combined and sequenced over time by an agent. A capital structure only exists economically when the means are integrated into a plan oriented towards valued ends.

5.3. Temporal productivity and the limits of indirect production

Indirect production can increase productivity because it allows for the use of stages, tools and capital goods that expand the capacity to achieve future ends. However, this proposition requires a crucial clarification: the greater productivity of indirect methods is not an automatic property of any accumulation of means, but a praxeological possibility conditioned by sound managerial coordination between present means, productive stages and valued future ends.

The accumulation of indirect means may be excessive, incoherent or misdirected. A firm may acquire machines that do not complement one another, prolong processes that do not add value, invest

in stages that do not meet future demand, or tie up resources in projects that are never completed. In such cases, there is no temporal productivity, but rather entrepreneurial error. The mere length of the production process does not guarantee its superiority.

This clarification addresses a well-known objection to certain simplified formulations of the Austrian theory of capital. Blaug pointed out that it cannot simply be assumed that greater roundaboutness necessarily leads to greater productivity, as the relationship between temporal structure and outcome depends on specific technical and economic conditions (Blaug, 1997). The theory of temporal imputation accepts this caveat. It does not equate productivity with duration, but rather with coordination.

Temporal productivity must therefore be understood as the capacity of a structure of means to bring the agent closer to more highly valued future ends through an appropriate temporal organisation. A longer structure may be superior if it enables outcomes that the direct method would not have achieved. But it may be inferior if it adds unnecessary stages, excessive costs or a lack of coordination. The economic criterion is not the physical length of the process, but the correct allocation between means and ends.

This interpretation preserves the core of Austrian theory without turning it into an automatic technical law. Indirect production is a possibility made possible by the human capacity to anticipate, save and invest; it is not a mechanical guarantee. Its success depends on the entrepreneurial function, the coherence of the capital structure, the complementarity of the means, and the future valuation of the product.

5.4. *Original interest and intertemporal coordination*

Original interest expresses the difference between the valuation of present goods and future goods. It does not arise primarily from money, from lending, or from the physical productivity of capital. These phenomena may alter its concrete manifestations, but not its root. The root lies in time preference: a good available now allows one to act now, whilst a future good requires waiting and exposure to uncertainty.

When an agent forgoes present goods to obtain future goods, they must consider whether future satisfaction compensates for the wait. This difference in valuation forms the basis of interest. In a monetary economy with a credit market, this relationship is expressed through monetary rates; yet the underlying concept predates the credit market. Even Robinson Crusoe, in the classic example, faces the choice between consuming today or investing time and resources to obtain more tomorrow (Rothbard, 1962; Huerta de Soto, 1998).

Interest fulfils a function of intertemporal coordination. It links saving, investment and the productive structure. A lower time preference allows present resources to be freed up for longer-term processes; a higher time preference reduces the willingness to wait and shortens the investment horizon. In the market, interest rates convey information about the relative availability of present goods and about society's willingness to postpone consumption.

The theory of temporal imputation interprets interest as a specific manifestation of the general relationship between present means and future ends. Where an agent values the future but must forgo the present to attain it, a temporal difference in valuation arises. Interest is neither an anomaly nor exploitation, but rather the economic expression of the temporal structure of action.

6. Price, exchange and temporal coordination

6.1. *Exchange as a relationship between temporal valuations*

Voluntary exchange presupposes differing subjective valuations. Each party gives up what they value less in order to obtain what they value more, given their circumstances, ends and time horizons. This classical explanation can be enriched by considering that valuations are not merely subjective, but temporally structured. Each agent compares present means, future ends, urgencies, expectations and hopes.

When two people exchange goods, it is not simply a matter of two objects coming into contact. Rather, two temporal plans meet. The seller may prefer present liquidity in order to pursue other

ends; the buyer may prefer the good in order to integrate it into their own project. The price emerges in the exchange where these temporal valuations become compatible. It does not express an objective substance of value, but rather a social relationship of coordination between plans.

Exchange is, therefore, a temporal phenomenon. The agent sells because the good received now—usually money—has, for them, a greater capacity to serve future ends than the good handed over. The buyer buys because the good acquired occupies a higher position on their scale of priorities than the money handed over. The monetary price allows these two structures to meet without the need for the ultimate ends to be shared.

This interpretation is linked to the Austrian theory of the market as a process. Prices are not equilibrium data that agents simply accept; they are the results of a process of discovery, correction and coordination. Through exchange, agents reveal and revise their allocations. The price records, in monetary terms, an encounter between temporal interpretations of value.

6.2. *Price as a monetary synthesis of heterogeneous plans*

Price can be defined as the monetary expression of a momentary coordination between subjectively oriented valuations. It is momentary because plans change; it is subjective because it depends on individual valuations; it is temporal because each valuation refers to the capacity of resources to serve future ends. Price does not measure value in a cardinal sense, but it allows for the coordination of actions between agents who do not share the same scale of ends.

The role of money intensifies this coordinating capacity. In a barter economy, every exchange requires a direct match of needs. In a monetary economy, money acts as a generally accepted medium that allows the sale and purchase to be temporarily separated. An agent may sell today in order to buy tomorrow; they may retain liquidity for as yet undetermined purposes; they may compare projects by means of monetary prices. Money thus extends the temporal dimension of coordination.

Price summarises dispersed information, but it does not do so as a mechanical quantity. In line with Hayek's thinking, prices convey knowledge that no single agent possesses in its entirety (Hayek, 1945). Through temporal allocation, they also convey signals regarding the coordination of plans oriented towards different time horizons. A price increase may indicate present scarcity, future expectations, a change in demand or a reordering of priorities. Price alone does not explain the entire process; it is a signal that entrepreneurs interpret.

For this reason, price theory cannot be separated from uncertainty. Past prices provide information, but do not guarantee the future. The entrepreneur must interpret whether a price reflects a lasting opportunity, a temporary scarcity, a market error or a bubble. Temporal imputation comes into play once again: the actor attributes present significance to market signals in light of future goals and expectations.

6.3. *The Market, Discovery and Revision of Imputations*

The market is a process of confrontation between temporal attributions. Each actor assigns value to means and ends according to their own plan. But these plans do not exist in isolation: they meet, complement one another, clash and are corrected through exchange. Social coordination does not consist of everyone sharing the same end, but rather of means being continuously reallocated towards more highly valued uses.

Gain and loss play an essential role in this process. Gain indicates that a business allocation has coordinated means in a manner compatible with the future valuations of other actors. Loss indicates that the allocation has failed: the means were directed towards ends that did not receive sufficient validation in the market. The price system does not eliminate error, but it allows it to be detected and corrected.

In this sense, the market is not a state of equilibrium, but a temporary learning process. Market participants act on the basis of incomplete information; they interpret prices, anticipate demand, invest, wait and reassess. Market order emerges from the decentralised, coordination of these actions. The theory of temporal

imputation enables us to understand this order as a constantly reconfigured network of relationships between future ends and present means.

The temporal structure of price is particularly evident in capital, credit and durable goods markets, but is not limited to them. Even the price of a consumer good for immediate consumption reflects expectations, replacement costs, availability of resources, time preferences and alternatives. Every price contains a temporal dimension because every valuation does. The monetary economy makes this dimension visible in the form of exchange relations.

7. Temporal trust and radical uncertainty

7.1. Action in an open future

Action presupposes an open future. The agent acts because they consider it possible to alter the course of events through present means. If the future were completely determined and known, action would lose its problematic nature. If the future were completely inaccessible to any orientation, there would be no rational action either, but merely blind movement. Action exists in an intermediate position: the future is not given, but the agent believes they can influence it.

Radical uncertainty does not mean a total absence of guidance. It means that the human future cannot be reduced to a closed set of possible states with objective probabilities. Many economic actions are undertaken in situations where agents do not fully know the alternatives, the outcomes or the actions of other agents. Business planning, innovation, credit, saving and investment all take place within this context.

Praxeological theory does not need to convert uncertainty into probabilistic calculation in order to understand it. It is sufficient to recognise that every action is directed towards an outcome that is not guaranteed. The agent can learn, estimate, compare and draw on past experience; but they cannot eliminate the openness of the future. The temporality of action always includes the possibility of error.

This point is crucial to the theory of imputation. Imputing value from a future end means attributing present relevance to something that does not yet exist and may not come to pass. Imputation is not a technical deduction from complete data; it is a business-orientation under uncertainty. Therefore, economics cannot be reduced to comparative statics without losing sight of the central phenomenon of action.

7.2. Temporal Confidence and Entrepreneurship

Temporal confidence may be defined as the minimum condition under which an agent considers that their present resources can contribute to a preferable future. This confidence is not psychological optimism, nor irrational faith, nor a guarantee of success. It is the practical presupposition without which action would not be undertaken. Those who act assume, at least at the moment of acting, that there is a possible connection between what they are doing now and the end they hope to achieve.

Temporal confidence is distinct from certainty. The agent need not be certain that they will achieve the end; they need only consider that the course of action makes sense. An entrepreneur who invests, a worker who learns a trade, a saver who defers consumption, or a buyer who acquires an asset act because they attribute a future capacity to their resources. That attribution may fail, but without it there would be no action.

Entrepreneurship is the most visible form of this temporal confidence. The entrepreneur organises present resources based on an interpretation of the future. They do not passively wait for the future to arrive; they seek to shape it through planning, investment and coordination. Entrepreneurship does not eliminate uncertainty, but operates within it. Its function consists precisely in transforming the openness of the future into opportunities for action.

Temporal confidence, understood in this way, does not introduce a new, autonomous psychological category. It is an implication of action under uncertainty. If the agent directs means towards ends, they must consider that such direction is not

absurd. Temporal confidence denotes that minimal practical belief in the possible efficacy of action. That is why it can be incorporated into the theory without undermining its praxeological character.

7.3. Limits of probability in human action

Probability plays a legitimate role in many economic fields. Actuarial calculation, business statistics, financial diversification and contingency management all utilise past frequencies and probabilistic models. However, not all human uncertainty can be reduced to probability. Where the agent faces innovation, institutional change, entrepreneurial creativity or the strategic reactions of other agents, the set of possibilities is not fully given.

Mises distinguished between class probability and the specific understanding of singular cases (Mises, 1949). This distinction is useful for avoiding the illusion that any economic future can be treated as a statistical repetition. In many market problems, the entrepreneur does not merely calculate frequencies; he interprets unique situations. He must understand ends, expectations, institutions, habits and technological changes that cannot be reduced to a known distribution.

Kay and King have shown, in contemporary terms, that radical uncertainty demands narratives, judgement and practical reasoning, not merely probabilistic calculation (Kay & King, 2020). The theory of temporal imputation converges with this idea: the agent builds a bridge between present means and future ends through interpretation. That bridge is not a probability equation, although it may make use of quantitative information.

The implication for economic theory is that the future cannot be treated simply as discounted data. Financial discounting, interest rates and quantitative expectations are important tools, but they presuppose a more fundamental structure: the action of an agent who assigns value to the future and decides to act under uncertainty. Before calculation comes orientation; before the model comes attribution.

8. Discussion: contribution, objections and limitations

8.1. *Relationship with O'Driscoll and Rizzo*

O'Driscoll and Rizzo proposed an economics of time and ignorance centred on the market process, real change and the impossibility of reducing economic coordination to a timeless equilibrium (O'Driscoll & Rizzo, 1985). Their contribution lies in showing that the time relevant to economics is not merely a variable in dynamic models, but a realm of creativity, ignorance and learning. The theory of temporal imputation shares this approach.

The main difference lies in the level of analysis. O'Driscoll and Rizzo emphasise the implications of real-time for the market process and coordination. The theory developed here attempts to formulate the aforementioned categorical principle: before the market coordinates plans, each agent imputes value from future ends to present means. The market process is the social interaction of these individual temporal imputations.

The relationship between the two approaches is complementary. The economics of time and ignorance shows why markets are open processes of discovery. The temporal imputation shows why every economic action already possesses an open, future-oriented structure. The former emphasises the social process; the latter emphasises the praxeological link that makes it possible.

This distinction allows us to respond to the accusation that the theory of time has already been dealt with sufficiently. Indeed, it has been dealt with; but it can be reorganised from a more fundamental principle. It is not enough to say that the market occurs over time. We must show that value, cost, capital, interest and price are comprehensible only because action itself is a temporal imputation.

8.2. *Relationship with Kay and King*

Kay and King have popularised the concept of radical uncertainty to criticise the tendency to treat all action as if it were a problem of probabilistic calculation (Kay & King, 2020). Their approach lies

outside the Austrian praxeological core, but it is useful for demonstrating the inadequacy of models that reduce human action to maximisation under known conditions. The real economy contains situations in which agents do not have full knowledge of the space of possibilities.

The theory of temporal imputation incorporates this intuition, but integrates it into a different framework. Radical uncertainty is not merely an epistemological problem; it is a condition of action. The agent acts because the future is not fixed and because they believe they can shape it. The openness of the future is what makes entrepreneurship, profit, loss and the revision of plans possible.

In this sense, radical uncertainty does not destroy economic rationality. It shifts it from mechanical calculation towards the interpretative coordination of means and ends. The rational agent is not one who knows the future, but one who organises present means in accordance with valued ends and corrects their allocations as reality responds. Praxeological rationality is a rationality of action under open-ended time.

The connection with Kay and King also helps to clarify that the proposed theory does not seek to turn economics into a psychology of expectations. The core is not the psychological description of how individuals envisage the future, but the logical structure whereby any action requires anticipating an end, assigning value to means, and accepting uncertainty. Radical uncertainty is relevant because it makes this assignment an entrepreneurial act rather than a closed calculation.

8.3. *Blaug's Critique and Indirect Productivity*

A significant objection is levelled against the idea that more indirect methods of production are necessarily more productive. Put simply, this thesis may appear to be an unjustified technical generalisation. Blaug criticised interpretations of the theory of capital that seemed to assume an automatic link between greater productive detours and higher productivity (Blaug, 1997). This criticism necessitates a careful clarification of the Austrian proposition.

The theory of temporal imputation does not maintain that all accumulation of indirect means is productive. It maintains that indirect production broadens the range of productive possibilities when the means are correctly ordered towards valued future ends. The difference is decisive. Productivity does not arise from the mere quantity of capital, but from the structure of temporal complementarity that enables the means to contribute effectively to the end.

A longer process may be worse than a shorter one if it introduces useless stages, if it ties up resources without coordination, if it depends on erroneous expectations, or if it produces goods that consumers do not value. A shorter process may be superior if it responds better to urgent ends or if it avoids unnecessary waiting costs. Economic temporality is not measured by abstract length, but by praxeological adequacy.

Blaug's critique, therefore, does not refute the temporal theory of capital; it refutes a mechanistic version of it. The appropriate Austrian response consists of emphasising the heterogeneity of capital, the entrepreneurial function and the coordination of plans. This is precisely why temporal imputation is useful: it shows that capital goods are not productive in themselves, but rather because of the place they occupy within a structure of ends and means.

Temporal productivity must be defined as the capacity of a structure of means to realise future ends of greater value, given the technical conditions, entrepreneurial expectations and the coordination of plans. This definition preserves Böhm-Bawerk's intuition without resorting to mechanistic assumptions. Indirect production is a possibility for greater productivity, not a guarantee independent of entrepreneurial allocation.

8.4. *Scope of the theory of temporal imputation*

The theory of temporal imputation has a categorical scope. It does not, on its own, provide an empirical measure of the interest rate, a pricing formula or a technical criterion for selecting investments. Its function is more fundamental: to show the common root of the economic categories in the temporal structure of action. Empirical

applications require additional historical, institutional and business knowledge.

This limitation is not a weakness, but a methodological demarcation. Praxeology does not replace economic history, accounting, business administration or institutional analysis. It offers them a categorical framework. Just as the axiom of action does not predict what ends each individual will pursue, temporal imputation does not predict which capital structure will prevail. It explains what it means to act, invest, wait, value and coordinate under uncertainty.

The theory must also avoid overly absolute language. To say that value flows from the future to the present does not mean that past events are irrelevant. Experience, past production, existing institutions and inherited resources condition action. But their present economic significance depends on future-oriented valuation. The past provides means and constraints; the valued future determines their use.

Finally, the theory does not elevate temporal confidence to the status of an independent psychological law. Temporal confidence is merely the minimum practical condition for action under uncertainty. The agent need not be optimistic; they need only consider that their means may have some efficacy. This formulation maintains praxeological coherence and avoids transforming the argument into a sociology of emotions.

9. Conclusions

This article has proposed a praxeological reconstruction of economic theory based on temporal imputation. The central thesis is that economic value arises when the agent imputes meaning to present means in terms of future ends. The future does not physically cause the present, but it orders it praxeologically. This distinction allows us to understand why value does not reside in things, nor in past labour, nor in objective properties, but in the temporal relationship between ends and means.

The distinction between physical time and praxeological time has made it possible to clarify the basis of the argument. Physical time is homogeneous and measurable; praxeological

time is teleological, qualitative and action-oriented. Economics does not study clock time, but rather the time of the agent who waits, forgoes, invests, anticipates and coordinates. Action exists because there is a 'not yet' between the present situation and the desired end.

Building on this structure, fundamental categories have been reinterpreted. Cost is the temporal sacrifice of incompatible alternatives. Time preference expresses the value difference between present and future availability. Capital is a temporal order of heterogeneous means. Original interest manifests the relationship between present and future goods. Price is a monetary coordination of subjective temporal valuations. Temporal trust is the minimum practical condition for action under radical uncertainty.

The analysis has also incorporated a necessary clarification regarding temporal productivity. Indirect production does not increase productivity through the mere accumulation of means or by simply lengthening the process. It can only do so when the structure of means is correctly coordinated by the entrepreneurial function towards valued future ends. This clarification allows Blaug's critique to be integrated without abandoning the core of the Austrian theory of capital.

The contribution of this work consists, ultimately, in presenting economics as the science of purpose-oriented human time. It is not a question of replacing existing Austrian theory, but of making its temporal unity explicit. Menger, Böhm-Bawerk, Mises, Hayek, Lachmann, Kirzner and Huerta de Soto provide decisive elements for this reconstruction; the theory of temporal imputation seeks to demonstrate the common principle that links them. Where there is action, there is time; where there is praxeological time, there is imputation; and where there is imputation, the fundamental economic categories arise.

Declaration of conflict of interest

The author declares that there is no conflict of interest relating to the drafting, evaluation or possible publication of this article.

References

- Blaug, M. (1997). *Economic Theory in Retrospect*. Cambridge: Cambridge University Press.
- Böhm-Bawerk, E. von (1884 [1959]). *Capital and Interest*. South Holland: Libertarian Press.
- Böhm-Bawerk, E. von (1889 [1959]). *The Positive Theory of Capital*. South Holland: Libertarian Press.
- Hayek, F. A. (1937). "Economics and knowledge". *Economica*, 4(13), 33–54.
- Hayek, F. A. (1941). *The Pure Theory of Capital*. London: Macmillan.
- Hayek, F. A. (1945). "The use of knowledge in society". *American Economic Review*, 35(4), 519–530.
- Huerta de Soto, J. (1992 [2010]). *Socialism, Economic Calculation and Entrepreneurship*. Cheltenham: Edward Elgar.
- Huerta de Soto, J. (1998 [2006]). *Money, Bank Credit, and Economic Cycles*. Auburn: Ludwig von Mises Institute.
- Kay, J., & King, M. (2020). *Radical Uncertainty: Decision-making for an Unknowable Future*. London: The Bridge Street Press.
- Kirzner, I. M. (1973). *Competition and Entrepreneurship*. Chicago: University of Chicago Press.
- Lachmann, L. M. (1956). *Capital and Its Structure*. London: London School of Economics and Political Science.
- Menger, C. (1871 [2007]). *Principles of Economics*. Auburn: Ludwig von Mises Institute.
- Mises, L. von (1949 [1998]). *Human Action: A Treatise on Economics*. Auburn: Ludwig von Mises Institute.
- O'Driscoll, G. P., Jr., & Rizzo, M. J. (1985). *The Economics of Time and Ignorance*. Oxford: Basil Blackwell.
- Rothbard, M. N. (1962 [2009]). *Man, Economy, and State: A Treatise on Economic Principles*. Auburn: Ludwig von Mises Institute.