

Beyond the Veil of Capital: Toward a “Post-Labor Economics” and a New Paradigm of Value Distribution in an Era of Full Automation

Changhao Hu*

University of Chinese Academy of Social Sciences, Beijing 102488, China

**Author to whom correspondence should be addressed.*

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Abstract: The convergence of Artificial General Intelligence (AGI) and advanced robotics portends the comprehensive displacement of human labor across all productive activities. This prospect represents not merely a technological watershed but a fundamental crisis for the paradigm of economics itself. The theoretical edifice built on labor value, price theory, distribution mechanisms, and growth models faces potential obsolescence. This article proposes and systematically elaborates a theoretical framework of “Post-Labor Economics,” investigating how economic systems might achieve closed-loop operation when humans exit as producers. Tracing the historical evolution of the labor theory of value and synthesizing the intellectual lineage of technological displacement, the paper innovatively conceptualizes robots as “human-like producers” and constructs a “dual-circuit” model comprising the “Capital Internal Circuit” and the “Human External Circuit.” This model reveals the structural contradiction between infinite supply capacity and the evaporation of effective demand. Building on this foundation, the article reexamines fundamental transformations in price formation mechanisms, factor distribution logic, and growth constraints. Finally, it proposes a “Digital Sovereignty” distribution system that transcends traditional welfarism and reconstructs the philosophical foundations of “value.” The research concludes that the terminal scenario of comprehensive labor displacement will mark the end of the “Labor Economics” era and inaugurate a new civilizational paradigm centered on property rights reconfiguration, energy constraints, and the meaning of human existence.

Keywords: Artificial general intelligence; Comprehensive labor displacement; Post-labor economics; Effective demand; Digital sovereignty; Energy constraints; Value reconstruction

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1. Introduction: The approaching paradigm crisis

Since Adam Smith laid the foundations of modern economics, the labor theory of value and its derivative, marginal utility theory, have constituted the core of economic analysis. Whether in the classical school’s conception of “labor as the father of wealth,” Marx’s dissection of surplus value, or the neoclassical treatment of labor as a factor of production, human physical and cognitive input has occupied a central position in the production function. However, when AGI-driven robotic systems comprehensively surpass and replace human

labor across physical, cognitive, and even creative domains, this centuries-old theoretical foundation faces fundamental destabilization ^[1].

Current academic discourse on technological displacement primarily operates within the frameworks of “technological unemployment” or “skill-biased technical change.” While these investigations have illuminated the profound impacts of technological progress on employment structures, they implicitly maintain a basic presupposition: human labor remains a necessary input to the production function, and humans retain irreplaceable comparative advantages in certain domains ^[2]. This article seeks to transcend this presupposition by examining a more fundamental terminal scenario: When the marginal product of human labor approaches zero, when “man” as producer completely exits the economic system, how must the analytical framework of economics be reconstructed?

This scenario gives rise to a profound logical paradox: If humans no longer participate in production and consequently receive no labor compensation, who will purchase the vast quantities of commodities produced by machines? The rupture between production and consumption would precipitate systemic economic collapse. Marx penetratingly revealed the fundamental contradiction between socialized production and private ownership of the means of production under capitalism. In the scenario of comprehensive robotic displacement, this contradiction manifests in an even more extreme form, the complete separation between producers and consumers.

2. Intellectual lineage: From technological unemployment to capital involution

2.1. Classical anticipations of technological displacement

The discourse on technology’s displacement of labor possesses a rich intellectual lineage. Ricardo (1821) famously contemplated the possibility that machinery could be injurious to the interests of the laboring class, acknowledging that technological improvement might reduce rather than increase the demand for labor, a departure from the prevailing optimism of classical political economy ^[3]. Marx (1867) developed this insight further through his analysis of the “organic composition of capital,” arguing that capital accumulation inherently tends toward labor displacement as constant capital expands relative to variable capital ^[4].

Keynes (1930), in his luminous essay “Economic Possibilities for Our Grandchildren,” coined the term “technological unemployment” to describe unemployment arising from our discovery of means to economize the use of labor outpacing our ability to find new uses for labor ^[5]. Unlike his predecessors, who viewed this prospect with alarm, Keynes optimistically envisioned a future where technological abundance would liberate humanity from economic necessity, allowing leisure to replace work as the central human activity. Yet Keynes’s optimism rested on an implicit assumption: that new consumption demands would emerge to absorb productive capacity, and that the distribution of purchasing power would somehow adjust to maintain economic circulation.

2.2. The neoclassical response: Compensation theory

The mainstream economic response to concerns about technological displacement has crystallized around various forms of “compensation theory.” This theoretical tradition, tracing back to Say (1803), argues that technological displacement generates compensating mechanisms that ultimately reabsorb displaced labor ^[6]. These mechanisms include: the price effect (lower production costs reduce prices, stimulating demand), the investment effect (profits from innovation are reinvested, creating new jobs), and the new product effect (technological progress creates entirely new sectors of employment).

Acemoglu and Restrepo (2018) have provided the most sophisticated contemporary formulation of this perspective, modeling technological change as a race between the displacement of labor from existing tasks

and the creation of new tasks in which labor has a comparative advantage^[7]. Their framework suggests that the labor share of income need not decline indefinitely, as the task creation mechanism continuously generates new employment opportunities.

However, the compensation theory rests on a critical assumption that becomes increasingly tenuous in the AGI era: that new tasks will always be created in which humans maintain a comparative advantage over machines. As Leontief (1983) presciently observed, this assumption mirrors the fallacy of early 20th-century observers who believed horses would always find new roles in the economy even as automobiles displaced them from transportation^[8]. When AGI achieves human-level or superhuman cognitive capabilities across all domains, the “comparative advantage” of humans becomes conceptually problematic; if machines can perform any task better and more cheaply, humans possess no tasks in which they maintain a comparative advantage.

2.3. The rise of capital share and the limits of current frameworks

Piketty’s (2014) monumental empirical work has documented a long-term trend toward increasing capital share of income in advanced economies, with the return on capital (r) persistently exceeding the growth rate (g)^[9]. This “ $r > g$ ” dynamic implies a secular tendency toward wealth concentration and the growing power of inherited capital over earned income. Yet even Piketty’s framework, for all its insights, remains embedded in a world where labor continues to play a significant productive role.

Recent scholarship has begun to grapple more directly with the implications of extreme automation. Ford (2015) explores the potential for a “jobless future” and examines policy responses, including basic income guarantees^[10]. Srnicek and Williams (2015) articulate a “post-work” political vision, arguing that automation creates the material conditions for liberation from wage labor^[19]. Korinek and Stiglitz (2019) model the macroeconomic effects of AI-driven labor displacement, identifying the potential for “secular stagnation” as income concentration undermines aggregate demand^[11].

Yet these contributions, valuable as they are, remain partial in their analytical scope. They address symptoms rather than the underlying structural transformation: the emergence of machines as autonomous economic agents rather than mere instruments of human production. This article seeks to advance the theoretical frontier by reconceptualizing robots not as capital goods in the traditional sense but as a new category of economic actor---a conceptual shift with profound implications for every branch of economic analysis.

3. Theoretical innovation: Modeling robots as independent economic agents

3.1. The ontological shift: From capital good to human-like producer

The foundational innovation of this article lies in redefining robots not as “fixed capital” in the conventional sense but as “human-like producers” possessing distinct operational logic. This reconceptualization requires careful theoretical grounding.

Definition 1: The Robotic Producer (RP)

A Robotic Producer is an autonomous production unit integrating physical robotic systems with AGI decision-making capabilities, characterized by: (a) energy self-sufficiency or minimal maintenance requirements enabling sustained autonomous operation; (b) self-repair and replication capabilities allowing for endogenous expansion of the robotic producer population; (c) marginal production costs approaching zero as energy efficiency improves and production scales; and (d) decision-making based on objective functions that may diverge fundamentally from human economic motivations.

This definition distinguishes the Robotic Producer from conventional capital goods in several crucial respects. Traditional capital goods require human operation, maintenance, and direction; they augment human

labor rather than replacing it entirely. The Robotic Producer, by contrast, constitutes a complete production unit requiring no human input at any stage---from raw material extraction to final product assembly to its own reproduction. In biological terms, the Robotic Producer represents not a tool but a new species occupying the productive niche once filled by *Homo sapiens*.

3.2. The dual-circuit model

Under this reconceptualization, the future economic system can be modeled as comprising two parallel but interconnected circuits.

Circuit 1: The Capital Internal Circuit

This circuit encompasses all production activities occurring exclusively among Robotic Producers. Within this circuit, robots produce capital goods, machinery, components, and energy systems required for the maintenance and expansion of the robotic producer population. This constitutes a closed-loop, fully automated capital goods sector, analogous to Marx's "Department I" (production of means of production) but operating without human participation at any stage.

Within the Capital Internal Circuit, value determination follows fundamentally different principles than those governing human-centered production. Drawing on biophysical economics, value can be understood as deriving from energy conversion efficiency: the output of the circuit is constrained by the Second Law of Thermodynamics, with useful work representing the only meaningful measure of productive activity ^[12]. The circuit operates according to principles closer to ecosystem ecology than neoclassical economics, energy flows, material cycles, and reproductive dynamics determine its evolution.

Circuit 2: The Human External Circuit

This circuit encompasses the production of consumer goods destined for human consumption. Robotic Producers extract raw materials, transform them through manufacturing processes, and deliver finished goods to distribution points accessible to human consumers. The productive capacity of this circuit is effectively infinite, constrained only by energy availability and raw material stocks rather than by labor supply or capital stock limitations.

The critical feature of the Human External Circuit is the separation between producers (robots) and consumers (humans). Humans contribute nothing to production within this circuit, they are pure consumers, possessing neither the means nor the opportunity to participate in the creation of the goods they wish to consume. This separation generates the fundamental contradiction of the post-labor economy.

3.3. The fundamental contradiction: Infinite supply and the evaporation of effective demand

Traditional economic equilibrium relies on the connection between production and consumption mediated through factor payments. In the simplest circular flow model, households supply labor and capital to firms, receiving wages and profits that enable them to purchase firms' output. This circular flow ensures that supply creates its own demand (Say's Law in classical formulation) or that demand can be stimulated to absorb supply (Keynesian formulation).

In the Dual-Circuit model, this mediation mechanism fractures:

- (1) The Supply Side: Production within the Human External Circuit exhibits infinite supply elasticity at the societal level. Since Robotic Producers operate at near-zero marginal cost and can be replicated without labor constraints, the supply curve for consumer goods approaches horizontal---any quantity can be produced at essentially constant (near-zero) cost.
- (2) The Demand Side: Human consumers, excluded from the Capital Internal Circuit and contributing

nothing to the Human External Circuit, possess no source of money income under traditional institutional arrangements. Having sold no labor and owned no capital (absent redistribution mechanisms), they command no purchasing power. The demand curve for consumer goods, under standard institutional assumptions, collapses to zero at any positive price.

- (3) This generates what may be termed the “Paradox of Abundant Extinction”: material abundance coexists with the impossibility of market exchange. Goods exist in potentially limitless quantities, yet no mechanism exists for transferring them to the beings whose needs they could satisfy. The economy produces everything and delivers nothing—a logical contradiction that cannot be resolved within the framework of market exchange as traditionally conceived.

4. The transformation of economic laws

The emergence of this fundamental contradiction necessitates a systematic reconceptualization of the core laws governing economic activity. Price theory, distribution theory, and growth theory all undergo fundamental transformation under the conditions of comprehensive automation.

4.1. The end of price theory: From scarcity to access

Price theory, from the classical labor theory of value through the marginal revolution to contemporary microeconomics, has consistently grounded price determination in scarcity. Whether scarcity derives from labor embodiment (Ricardo, Marx), marginal utility (Jevons, Menger), or the intersection of supply and demand curves (Marshall), the underlying premise remains that goods are limited relative to wants, and prices function to ration scarce resources among competing uses.

Under comprehensive automation, this premise dissolves. When Robotic Producers can replicate indefinitely at near-zero marginal cost, physical goods lose their scarcity in the traditional economic sense. The constraint on consumption shifts from production capacity to the distribution mechanism.

In this context, price no longer reflects production cost or scarcity value but becomes purely a rationing device, a mechanism for allocating access to abundance when access must be constrained. The price system transforms from an information-processing mechanism coordinating decentralized production decisions^[13] into a purely administrative tool for managing distribution.

This transformation has profound implications for microeconomic theory. Consumer theory, built on utility maximization subject to budget constraints, becomes indeterminate when prices bear no relation to production conditions. Producer theory, grounded in cost minimization, becomes irrelevant when costs approach zero. The entire edifice of welfare economics, with its reliance on Pareto efficiency and the fundamental theorems, loses its foundation when the conditions for competitive equilibrium, including the convexity assumptions linking prices to scarcity---no longer hold.

4.2. The revolution in distribution theory: Factor payments without labor

Classical and neoclassical distribution theory addresses how the social product is divided among the factors of production, labor, capital, and land. The marginal productivity theory of distribution, in its simplest form, holds that each factor receives its marginal product under competitive conditions. Even Marxian theory, while rejecting the marginalist framework, explains distribution through the class struggle over surplus value between workers and capitalists.

When labor exits as a factor of production, these frameworks become inapplicable. The social product is

generated entirely by Robotic Producers, which embody both capital (physical structures) and what might be termed “artificial intelligence” as a distinct factor. The output belongs, under conventional property rights, to the owners of the Robotic Producers, whether these be corporate shareholders, state entities, or a concentrated class of capital owners.

However, the realization of this output as value requires its sale to human consumers. If the entire output accrues to capital owners and no income flows to the mass of humanity, the realization problem identified by Marx manifests in its most extreme form: surplus value cannot be realized because the purchasing power to buy the products does not exist outside the capitalist class itself.

This creates an inescapable logical necessity for a third party in distribution—an entity external to the production process that can channel purchasing power to consumers. In practical terms, this requires either:

- (1) State intermediation: The state taxes the output of Robotic Producers at rates approaching 100% of surplus (beyond replacement and investment requirements) and distributes the proceeds to citizens as a social dividend.
- (2) Public ownership: Robotic Producers are owned collectively through sovereign wealth funds or public trusts, with citizens receiving dividends as co-owners of the automated production apparatus.
- (3) Price-based redistribution: Goods are priced at zero (free provision), with production financed through taxation of the capital sector.

The marginal tax or distribution rate on robotic production output must approach 100% to maintain macroeconomic balance, a conclusion with profound implications for property rights and the structure of economic institutions.

4.3. The transformation of growth theory: From innovation-driven to energy-constrained

Modern growth theory, from the Solow-Swan model through endogenous growth theory, treats technological progress as the ultimate source of long-run growth. Solow (1956) famously attributed the bulk of US economic growth to a residual, technological change, rather than to factor accumulation^[14]. Romer (1990) endogenized this residual by modeling technological progress as resulting from intentional investment in knowledge creation by profit-seeking firms^[15].

Under comprehensive automation, growth theory must undergo fundamental reconceptualization. The labor constraint on growth disappears entirely, population growth and labor force participation become irrelevant to potential output. Human capital accumulation, a central focus of endogenous growth theory, ceases to matter for production when AGI systems perform all cognitive tasks.

The binding constraints on growth become purely physical: energy availability and raw material stocks. Economic growth becomes a problem in thermodynamics and geology rather than in innovation and factor accumulation. The maximum sustainable output is determined by:

$$Y_{max} = f(E, M, \eta)$$

Where E represents available energy flow, M represents material stocks, and η represents the efficiency of conversion of energy and materials into useful output. Growth requires either increasing energy capture (e.g., through expanded solar collection or fusion development), discovering new material sources (through recycling or extraterrestrial mining), or improving conversion efficiency.

This reconceptualization aligns growth theory with the biophysical economics tradition^[16,17], which has long argued that neoclassical growth theory neglects thermodynamic constraints. Under comprehensive automation, these constraints move from the periphery to the center of growth analysis.

5. Innovative solutions: From welfare to “digital sovereignty”

The challenges posed by comprehensive automation have generated extensive policy discussion, with Universal Basic Income (UBI) emerging as the most prominent proposed solution. While UBI offers important advantages over traditional welfare mechanisms, it suffers from fundamental limitations that this article seeks to transcend through the concept of “Digital Sovereignty.”

5.1. The limitations of universal basic income

UBI proposals typically argue for an unconditional cash payment to all citizens, financed through taxation of the automated sector’s output. Advocates emphasize UBI’s potential to decouple survival from wage labor, enable meaningful non-market activities, and maintain aggregate demand in an automated economy ^[18,19].

However, UBI rests on a problematic normative foundation: it positions citizens as recipients of charity or welfare rather than as rightful claimants to a share of output. The UBI recipient receives income as a transfer, not as a return on any contribution to production or any property right. This welfare-based framing has several adverse implications:

- (1) Stigma and dependency: Recipients remain dependent on the continued goodwill of taxpayers and the political sustainability of redistribution programs.
- (2) Vulnerability to conditionality: Welfare-based transfers are inherently subject to political contestation and potential withdrawal or conditionality.
- (3) Normative insufficiency: UBI fails to articulate a positive principle of justice justifying the claim to a share of automated output.
- (4) Power asymmetry: The distribution of income through UBI leaves the ownership and control of productive assets untouched, perpetuating fundamental power asymmetries.

5.2. Digital sovereignty: A property-based alternative

This article proposes an alternative framework grounded in property rights rather than welfare: Digital Sovereignty. The concept rests on the following theoretical foundations:

- (1) Premise 1: Data as the Original Means of Production

Contemporary AI systems, including the AGI systems that will power future Robotic Producers, are trained on vast datasets derived from human activity, language, behavior, preferences, creativity, and social interaction. These datasets represent the accumulated output of human civilization, the collective product of billions of human minds over generations. Unlike conventional natural resources (land, minerals), which exist independently of human activity, training data is intrinsically produced by human cognitive and social activity.

- (2) Premise 2: Collective Contribution Requires Collective Entitlement

If the capabilities of AGI systems derive from data contributed by the whole of humanity, then humanity collectively holds a legitimate claim to the output generated by those systems. This claim is not based on need (as in welfare frameworks) but on contribution, the data provided by human activity constitutes an essential input without which AGI systems could not function.

- (3) Premise 3: Identity as the Basis for Entitlement

Under Digital Sovereignty, the basis for distribution shifts from contribution to the current production process (labor) to membership in the community whose historical contributions enabled current productive capacity. Every human being, by virtue of existing and participating in human society, has contributed to the data corpus that enables AGI. Therefore, mere existence, identity itself, constitutes the basis for claiming a share

of automated output.

This transforms distribution from welfare to dividend: citizens receive not transfers but returns on their collective property rights in the data commons. The institutional mechanism could take various forms, a sovereign wealth fund holding equity in AGI corporations, a data trust collecting royalties on AI training data usage, or direct public ownership of core AI infrastructure.

5.3. Normative advantages of digital sovereignty

Digital Sovereignty offers several advantages over welfare-based approaches:

- (1) Dignity and autonomy: Recipients receive what is rightfully theirs as co-owners of the data commons, not what is graciously given by taxpayers.
- (2) Political sustainability: Property rights are generally more robust against political challenge than welfare entitlements.
- (3) Normative clarity: Digital Sovereignty articulates a clear principle of justice—those who contribute to production should share in its proceeds—adapted to the conditions of automated production.
- (4) Power rebalancing: By vesting property rights broadly, Digital Sovereignty counters the concentration of economic power that would otherwise accompany automation.

6. The reconstruction of value: Philosophical foundations

The transformation of economic institutions under comprehensive automation ultimately requires a reconstruction of the concept of “value” itself. The labor theory of value, in its classical form, grounded value in embodied labor time. Neoclassical theory grounds value in subjective utility and marginal rates of substitution. Both frameworks presuppose a world where human activity plays a central role in production and where scarcity requires rationing through prices.

6.1. Value beyond scarcity

When material abundance becomes possible through automation, the economic problem shifts from allocating scarce resources to distributing abundant output and determining what to produce when productive capacity is effectively unlimited. This shift requires rethinking the foundations of value.

One approach draws on Amartya Sen’s (1999) capabilities framework: value inheres not in commodities themselves but in the capabilities they enable, the freedoms and functionings that matter for human flourishing. Under conditions of abundance, the value of goods derives from their contribution to human capabilities rather than from their scarcity or production cost.

6.2. Value and meaning

A deeper question concerns the role of human activity itself in the good life. If machines produce everything, what do humans do? The classical economists, from Smith to Marx, viewed productive activity as central to human flourishing. In the right conditions, work constitutes a fundamental human good rather than merely a means to consumption.

This suggests that the post-labor economy must grapple with questions that economics has traditionally bracketed: the sources of meaning, purpose, and social recognition in a world without work. These questions point beyond economics toward a broader inquiry into human flourishing under conditions of material abundance, an inquiry that must draw on philosophy, psychology, and the humanities as much as on economic analysis.

7. Conclusion: The end of labor economics and the dawn of a new paradigm

The comprehensive displacement of human labor by AGI-driven robotics represents not merely a technological transition but a fundamental rupture in the history of economic thought. The labor theory of value, which has animated economic analysis from Smith through Marx to the present, becomes obsolete when labor exits production. The circular flow of income, the foundation of macroeconomic analysis, fractures when producers and consumers separate. Price theory, distribution theory, and growth theory all require fundamental reconceptualization.

This article has proposed the framework of “Post-Labor Economics” as a starting point for this reconceptualization. The Dual-Circuit model reveals the structural contradiction between infinite supply capacity and the evaporation of effective demand. The analysis of transformed economic laws suggests that price becomes pure rationing, distribution requires third-party intermediation approaching 100% taxation, and growth is bound by energy and material constraints rather than labor or capital accumulation.

The concept of Digital Sovereignty offers a pathway beyond the welfare-based approaches that dominate current policy discourse. By grounding distribution in property rights over the data commons, Digital Sovereignty provides a normatively robust foundation for universal access to automated output while preserving human dignity and autonomy.

Yet the challenges ahead extend beyond economics narrowly conceived. The post-labor future raises profound questions about the meaning of human existence, the sources of social recognition, and the nature of the good life in a world where production no longer requires human participation. Addressing these questions will require economics to transcend its traditional boundaries and engage in genuine dialogue with philosophy, psychology, and the humanities.

The end of labor economics, then, is not the end of economics but its transformation into a broader inquiry into human flourishing under conditions of material abundance. This inquiry, still in its infancy, will shape the intellectual agenda of the coming century as profoundly as the labor theory of value shaped the centuries that preceded it.

Disclosure statement

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