



The Political Economy of Artificial Intelligence: Energy, Human Dignity, and Social Contract Theory

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Abstract: This article investigates the political economy of artificial intelligence by examining the relationships among technological development, energy availability, and financial dynamics. Drawing on social contract theory, it considers how these transformations may affect human dignity, social cooperation, and the institutional distribution of opportunities, resources, and responsibilities, while distinguishing observable consequences from hypotheses that require empirical verification. The analysis argues that energy constraints, computing capacity, financial expectations, and the displacement of professional and managerial work should be assessed within an integrated framework that neither attributes autonomous agency to AI systems nor regards their social effects as technologically predetermined. On this basis, the article proposes a governance framework that combines technical oversight, labor protection, redistributive measures, and international cooperation. The adequacy of this framework should be evaluated in terms of measurable effects on employment, wages, productivity, public finances, and the distribution of the benefits of innovation. At a time when the accelerated deployment of artificial intelligence is concentrating technological and financial power, increasing pressure on energy systems, and exposing labor markets and democratic institutions to disruptive change, the article argues that the central issue is no longer whether AI will transform society, but who will govern that transformation, bear its costs, and appropriate its benefits; without effective public oversight and distributive safeguards, technological progress risks deepening inequality, weakening social cohesion, and undermining the material foundations of human dignity.

Keywords: market dynamics, speculative waves, technological innovation, artificial intelligence, collective development

INTRODUCTION

Can there be an economic policy of artificial intelligence? The question is not only about technological innovation, but about the way in which a society distributes opportunities, income and responsibilities. Contemporary institutions still live with strong inequalities and with the risk that economic decisions are subordinated to political or financial interests. It is implausible to attribute to AI the task of directly correcting these imbalances or preventing harmful human conduct. Instead, it is possible to wonder whether its spread is changing the traditional mechanisms of economic and social rebalancing. The hypothesis developed in this article is that the relationship between AI, energy availability and finance may affect the economic policy of states and, in the future, the conditions of the social contract. In this sense, the increase in the valuation attributed to SpaceX ¹ makes us think.

¹ The so-called "SpaceX case", according to the sources cited, concerns the strong financial fluctuations following the company's listing in June 2026. After a particularly high initial valuation and a temporary rise in the stock, the market would have experienced a marked correction, also favored by the expiration of the constraints on

The phenomenon could represent something more than a favorable market event, especially for the concentration of wealth associated with the value of the company. However, it is necessary to distinguish the financial valuation of an unlisted company from the performance of shares traded on the stock exchange. More prudently, the case can be considered an example of the expectations that finance focuses on technology companies and the possible influence of these expectations on economic policy choices. In the near future, the growing interaction between innovation and financial markets may in fact make it necessary to adapt public regulatory instruments.

As mentioned above, over the last fifty years, finance has helped to support the transition from the mechanical industry to digital technologies and, more recently, to artificial intelligence. It is possible that, even in the current phase, it will play a similar role, accompanying the investments necessary for the development of AI. The case of SpaceX shows how markets can attribute a high value to companies located at the technological frontier. Before interpreting this assessment as the result of a convergence between space exploration and artificial intelligence, however, it is necessary to specify which activities, shareholdings or projects make this link concrete. In the absence of such clarification, the financial figure can only be taken as an indicator of the expectations associated with technological innovation.

In my view, the rise in valuations of technology companies can be interpreted as a sign of the expectations – and perhaps concerns – with which finance views the acceleration of innovation. Such assessments do not prove that AI is already transforming economic and social balances, but they can influence the allocation of resources, directing capital and investment towards certain technologies. AI, in turn, does not necessarily reduce the function of money or automatically produce social recomposition. Its economic effects can manifest themselves primarily directly, through the automation of certain activities, productivity growth, the reduction or transformation of production costs, and changes in the demand for labor and the skills required. These changes can also have indirect effects on income distribution. The benefits may be concentrated in companies and those that control capital, data, and infrastructure, while some workers may lose job opportunities or bargaining power. The result, however, depends on the choices of institutions, which can distribute the costs and benefits of innovation through labor policies, training, taxation, social protection and adequate rules. From the encounter between technology, finance and public decisions, new economic and social balances can therefore be born. This remains a hypothesis to be verified with concrete data, not an inevitable result.

FROM FINANCE TO TECHNOLOGICAL AND ENERGY CONSTRAINTS

Innovations develop through successive cycles: from the dominance of the mechanical industry, progressively transferred from the West to new production areas, to the current expansion of artificial intelligence. The specificity of AI does not consist in autonomous growth, but in the possibility that complex systems produce results not specifically

the sale of shares held by internal investors and the increase in short transactions. Added to these tensions are questions about the economic sustainability of the company, related to operating losses, large technological investments – including those related to artificial intelligence – and still very high market multiples. Overall, the case can be taken with caution as an example of the distance that can be created between financial expectations, innovative capacity and actual economic results.

predicted by designers when they are trained and employed in changing contexts. This distinction is essential: emerging capabilities and unexpected behaviors pose problems of verification and control, but they do not demonstrate that the system can autonomously define its own goals or development.

In other words, the amount of energy available affects the computing capacity that can be used to train and use artificial intelligence systems. Larger systems may require more energy resources, while a more abundant supply may reduce some material limits to their deployment. However, this relationship does not imply that AI will grow on its own: development also depends on infrastructure, investment, data, design and human decisions. If fusion energy becomes technically and economically available on a large scale in the future, it could expand the energy supply that can also be used for digital infrastructure. This would make it even more important to establish access criteria, use priorities and environmental and social limits.

The timing of the two transformations does not coincide. The development of AI and the infrastructure needed to power it is proceeding at different paces and encounters technical, economic and political constraints. The expansion of artificial intelligence depends not only on the amount of energy available, but also on the way in which it is produced. Prolonged use of oil and natural gas could support an increase in computing capacity in the short term, but increase its environmental costs; a transition to lower-impact sources could reduce these costs, while requiring investment and adaptation time. The relationship between digital innovation and energy policy will therefore help determine the sustainability of future development.

The appeals by some industry leaders to keep AI development within controllable limits may reflect different concerns. One concerns the environmental impact of the energy required to train and deploy these systems; another concerns the possibility that capabilities developed without adequate testing may produce consequences that are difficult to govern. The two issues are related, but they are not the same: the first depends on the amount and composition of the energy used, while the second depends on the characteristics of the systems and the ways in which they are deployed. It is therefore necessary to assess separately whether, and to what extent, each risk is already present under current technological and energy conditions.

The relationship between technological development, energy availability and control capacity is therefore the point of transition from the general framework to the economic and institutional analysis of artificial intelligence.

The energy problem of artificial intelligence is not only about the share of energy produced from non-renewable sources, but also about the way in which the availability of energy affects computing capacity and, consequently, the expansion of AI systems. Energy is indeed a material constraint: without adequate infrastructure and resources, it is not possible to increase the training and use of models indefinitely. This does not mean, however, that more advanced systems can independently procure or use the energy necessary for their operation. Such a possibility should only be considered on the basis of concrete evidence. The current problem therefore lies in defining technical, organizational and regulatory conditions that regulate access to energy resources and clearly assign the relevant decision-making responsibilities to human and institutional actors.



Figure 1: Energy, computing capacity and decision-making responsibility.

The concerns of the managers of large companies in the sector seem to focus above all on the speed with which models and capabilities are replicated and enhanced. An acceleration of the transition from one configuration to the next could reduce the time available to verify results, correct errors and define appropriate limits. The problem therefore does not lie in the speed of development itself, but in the possible gap between the pace of technological innovation and the ability of researchers, companies and institutions to assess its consequences and to prepare adequate tools to govern them.

The growing capacity of AI systems can change the economic and geopolitical scenario, especially through the partial replacement of administrative and professional activities. The extent of the effect on employment remains uncertain and depends on sectors, the timing of adoption and the creation of new jobs. If the reduction in skilled and well-paid jobs is not compensated, labor incomes and aggregate demand could fall, with possible consequences on economic growth and social balances. The central issue is therefore not to establish a single percentage of jobs destined to disappear, but to assess the speed of the transition and the ability of institutions (Governments, syndicates and Companies) to distribute costs and benefits.

AI Governance, Labor, and Institutional Accountability

This perspective makes it necessary to distinguish between different phenomena. Systems called upon to perform complex tasks with large operating margins may produce results that are not expected or not fully compliant with the instructions received. Such behaviors may result from data limitations, design errors, unforeseen conditions of use or emerging capabilities; they do not demonstrate, on their own, a genuine autonomy of the system. Each incident should therefore be investigated in a timely manner, avoiding confusing non-compliance with an instruction with the ability to set its own goals or to develop without human intervention. The supervision of AI systems should be continuous and proportionate to the risks, especially when they are deployed in complex tasks or may have significant

effects. If the controls are insufficient, the autonomous execution of the function concerned should be suspended and, in cases of the most serious risk, the system should be shut down.

At the current stage, AI-driven job replacement has some similarities with that produced by automation in post-World War II Western industrial economies. However, the greater speed of change and its extension to professional and managerial tasks require verification of whether the tools used then are still adequate. Possible resistance to the use of machines in the workplace and caution in adoption should also be assessed in the light of the effects of transitions already underway, rather than assumed in general. Discussion between companies, trade unions and governments can provide a forum for addressing the social consequences of AI, provided that it is supported by tools capable of affecting the distribution of costs and benefits. The experience of the United States, where the development of AI is accompanied by incentives for public and private investment and competition with China, should therefore be examined on the basis of data on employment, wages and the distribution of benefits.

The different positions of China and Europe in the development of AI should be assessed by means of comparable indicators, such as investment, technological capacity, productive diffusion and scientific achievements, and should not be reduced to a generic economic and social backwardness. Recovery policies may include forms of international cooperation in research and sharing of the benefits of innovation, without excluding competition or presupposing that scientific advances are automatically distributed among the citizens of different continents. The institutional conditions necessary for such distribution to be effective are a broader policy issue, which goes beyond the scope of this Article.

HUMANOID ROBOTS, JOB REPLACEMENT AND ECONOMIC SUSTAINABILITY

Having overcome the technological and energy constraints examined so far, it remains difficult to formulate reliable forecasts beyond a horizon of a few years, since not even artificial intelligence allows us to anticipate future developments with certainty. However, it is possible to analyze the trends already underway. After considering the relationship between energy and AI, it is therefore necessary to examine the possible spread of systems incorporated in robots with humanoid characteristics and their effects on work. The replacement of humans is not yet a generalized reality, but its progressive approach makes it necessary to evaluate the economic, business and social conditions that may favor or limit it.

The approach of a possible replacement of human labor by robots with humanoid characteristics shifts the analysis from technological developments to the concrete conditions for their adoption. At an early stage, the decisions of companies will depend not only on efficiency and costs, but also on the judgment of managers on the inclusion of these systems among employees, workers and technicians. Their presence in offices, research centers and factories could generate acceptance, mistrust or resistance depending on their perceived reliability, the predictability of behavior, the possibility of maintaining effective human control and the consequences on the organisation of tasks, especially in activities that require high levels of safety and daily interaction with workers.

Political assessments will be complemented by business assessments: as they depend on public consensus, governments will have to consider the effects of replacing human labor with robots on employment, income distribution and social cohesion. Such assessments may influence the choice of whether to accelerate, slow down or make the adoption of these systems conditional on them, through safety and liability regulations, human supervision obligations, incentives for retraining, and fiscal or redistributive measures. Public decisions will therefore depend not only on the economic efficiency of robots, but also on the ability of institutions to prevent a concentration of benefits and offset the social costs of the transition.



Figure 2: Relationship between humanoid robots, work transformation, institutions and economic and social sustainability.

The future cannot be designed entirely at the drawing board: we need to observe the evolution of innovations and progressively evaluate their effects. After an initial phase of wonder, citizens could appreciate the new applications of AI without reserving them the same enthusiasm aroused by smartphones, whose use by minors is now the subject of discussion. The main difference between disembodied AI and that incorporated in a humanoid robot concerns physical presence and mobility, not self-awareness. Existing robots, like intangible AI systems, do not possess autonomous consciousness; however, mobility can allow them to operate directly in offices, companies and home environments. A robot could even be perceived by a child as a playmate, but the most economically relevant issue remains the replacement of specific human tasks. Today, it takes place mainly through immaterial and connected systems, capable of automating cognitive, administrative and professional tasks; the spread of humanoid robots could extend it to tasks that require physical presence, mobility and direct interaction with people and environments.

However, the conditions for adoption just examined do not exhaust the problem: in addition to the reactions of companies, workers and governments, it is necessary to assess how job replacement can affect the overall functioning of the economy.

It remains uncertain what role the humanoid aspect of future robots will play in the replacement of human labor. Such a replacement could meet the objectives of manufacturers, but not necessarily those of boards of directors, called upon to reconcile production efficiency with economic and social sustainability. At least in an initial phase, human ductility and intelligence will hardly be fully reproducible; this could slow down the adoption of robots in many activities, without however excluding partial replacements. If the latter were to permanently reduce employment and labor income, an economic system based on solvency and monetary demand could be subjected to increasing tensions. This would not necessarily result in the loss of money, but it could become necessary to redefine redistributive tools and institutions capable of guaranteeing a more balanced distribution of resources and opportunities.

In other words, the problem would not consist in the disappearance of money as a medium of exchange, a unit of account or a store of value. If automation were to permanently reduce the share of income distributed through work, the mechanism by which most people acquire the purchasing power necessary to participate in demand could be weakened. The redefinition referred to would therefore mainly concern the methods of income distribution and access to goods and services: public transfers, taxation, universal services, participation in productivity gains or other institutional instruments should compensate, in forms to be evaluated, for the lower centrality of wages. As if to say that compensatory manoeuvres on the wage and wage front should be identified by companies and trade unions with the mediation of governments to avoid a controlled decline in gross product, demand and finally the well-being of citizens.

CONCLUSION

We are considering a future that is not immediate, with respect to which the conjectures formulated today could be disproved or profoundly modified by new discoveries and as yet unpredictable social transformations. It is therefore appropriate to bring the analysis back to the currently observable trends. The generalized replacement of professional activities by robots also does not seem imminent. However, the absence of consciousness does not exclude that AI systems or robots without subjective autonomy can perform specific tasks and replace, at least in part, human labor. The economic significance of this transformation will depend above all on the operational capacities achieved, the costs of adoption and the decisions of companies and institutions.

Under current conditions, these developments do not yet seem sufficient to undermine the principle of solvency and the dominant role of money; however, they could progressively change some of its assumptions, if they significantly affect employment, income and demand. It follows that an economic policy of artificial intelligence cannot be limited to promoting innovation or containing its technical risks. It should also provide tools capable of observing the effects on employment, incomes, demand and public finances, assessing the opportunity to intervene if the benefits deriving from productivity gains are excessively concentrated. The continuity of the institutional balance between rights, responsibilities, income distribution and access to opportunities will therefore depend not on the awareness of machines, but on the ability of institutions to govern their use and to distribute the benefits and costs of transformation in a sustainable way.

We are not yet faced with a sudden change on the social horizon; however, this does not justify either indifference to the transformations underway or the idea of letting the future take shape without conscious guidance. Economic policy tends to intervene when innovations are already consolidated, rather than trying, as far as possible, to anticipate their effects. While human creativity and the adoption of novelties are advancing rapidly, institutions often adapt their instruments only after the economic and social scenario has changed.



Figure 3: J. M. W. Turner, Rain, Steam and Speed - The Great Western Railway (1844).

This gap constitutes the central political knot: when the institutional response reaches the transformation, the delay is no longer merely regulatory but becomes a substantial renunciation of the ability to direct. If this dynamic is consolidated, the institutions do not govern the change; they limit themselves to regulating its outcomes, after the economic and social arrangements have been defined by the interaction between human creativity, technological innovation, finance and the market. Economic policy thus assumes a predominantly reactive function, called upon to correct consequences that it has not contributed to preventing or directing in a timely manner. The final thesis of the article is therefore precise: technology does not inevitably determine the future, but the absence of anticipatory public action effectively transfers the power to shape it to the actors who control capital, infrastructure, computing capacity and technological knowledge. In this sense, not governing the transformation in time is equivalent to allowing private interests and existing power relations to define its goals, costs and collective benefits.

Perhaps this formulation deliberately accentuates the risk described, but it does not differ much from the reality we see.

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