

Definition

Distributional Absorption Threshold of AI-Induced Productivity

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Proposed Definition

The **distributional absorption threshold of AI-induced productivity** is the critical point beyond which productivity gains associated with the adoption or use of artificial intelligence are no longer accompanied by proportionate increases in broadly distributed real purchasing power and household consumption, because an insufficient share of these gains is transmitted to households with a relatively high propensity to consume.

The concept does not describe a technological limit of artificial intelligence. AI may improve efficiency, reduce production costs and expand the economy's capacity to produce goods and services. However, additional productive capacity does not automatically become additional output realised through market demand. For this to occur, the gains generated by higher productivity must be transmitted, directly or indirectly, into effective demand.

A distributional absorption problem may arise when AI-associated productivity gains are converted predominantly into concentrated profits, while real labour income, employment income, hours worked or household disposable income increase more slowly, stagnate or decline for relevant groups of consumers. Under such conditions, the economy may become capable of producing more without generating a correspondingly broad increase in the purchasing power required to buy the additional output.

Below the threshold, the additional productive capacity enabled by AI may still be absorbed through higher real wages, lower consumer prices, new employment opportunities, increased investment, social transfers, public expenditure or external demand. Beyond the threshold, the distributional transmission of productivity gains becomes too weak to sustain a proportionate expansion of household consumption.

Consequently, part of the productive potential associated with AI may remain unrealised through market demand.

In simplified form, the threshold may emerge when:

Rate of AI-induced productivity growth > Rate of growth in broadly distributed real purchasing power

This inequality means that the economy's capacity to produce additional goods and services expands more rapidly than the real purchasing power broadly available to households. When this gap persists and is not compensated by lower prices, investment, public expenditure, social transfers or external demand, additional productive capacity may no longer be fully absorbed by the market.

The threshold should therefore not be understood as being determined solely by the intensity of AI adoption or by the number of jobs automated. It is a macroeconomic and distributional condition that can be investigated empirically through the relationship between AI-associated productivity growth, real labour income, household disposable income and household consumption.

The concept builds on demand-constrained interpretations of technological progress. Gries and Naudé (2018, 2020) showed that AI-supported automation may expand productive capacity while, under particular distributive conditions, weakening labour income and aggregate demand. The present definition extends this reasoning by identifying a specific threshold condition: the point at which the distribution of AI-associated productivity gains becomes insufficient to sustain the market absorption of the additional output made possible by AI.

References

Gries, T., & Naudé, W. (2018). *Artificial intelligence, jobs, inequality and productivity: Does aggregate demand matter?* IZA Discussion Paper No. 12005.

Gries, T., & Naudé, W. (2020). *Artificial intelligence, income distribution and economic growth*. IZA Discussion Paper No. 13606.

Declarations

Potential competing interests: No potential competing interests to declare.