ABIE — The AI Behavioral Industrial Economy

A Unified Micro–Macro Framework for Labour, AI, and Growth

Prasoon Jadon (Age 16)
Founder of ABIE Theory

Abstract

The acceleration of artificial intelligence (AI) adoption is reshaping labour markets and production. Traditional economic laws—such as diminishing marginal returns, substitution, and creative destruction—are insufficient to fully capture these dynamics. This paper develops the ABIE framework (AI Behavioral Industrial Economy), which integrates new AI-specific laws with established microeconomic and macroeconomic principles. Using manufacturing data and AI adoption trends, we test and refine ABIE's proposed laws: the Law of Diminishing Labour, the Law of Substitution, the Law of Complementary Labour, the Law of Utilization, and the

Conditional Law of Job Equilibrium. Results confirm that AI-labour dynamics follow predictable curves, and that equilibrium depends on complementary job creation, reskilling rates, and diffusion speed. ABIE provides a unified theoretical foundation for analyzing AI's economic impact at both micro and macro scales.

1. Introduction

The industrial revolutions of the past introduced mechanization, electricity, and computing, each disrupting labour markets while expanding productivity. The ongoing "AI Revolution" is distinct: AI substitutes cognitive as well as physical tasks, creating a new behavioural economy where firms, workers, and states interact under novel dynamics.

ABIE (AI Behavioral Industrial Economy) seeks to provide a systematic framework—parallel to Smith's Invisible Hand or Keynes' multiplier—anchored in both **microeconomic decision-making** and **macroeconomic outcomes**.

2. Core Laws of ABIE

2.1 Law of Diminishing Labour (Micro)

- As AI adoption (A) rises, the marginal productivity of human labour (MP_L) declines.

- Aligned with the **Law of Diminishing Marginal Returns**.

$$MP_L \downarrow \quad \text{as A increases, holding capital constant}$$

2.2 Law of Substitution (Micro)

- Firms substitute labour with AI when:

$$\frac{MC_A}{MP_A} < \frac{MC_L}{MP_L}$$

- Mirrors the **substitution effect** in production theory.

2.3 Law of Complementary Labour (Micro)

- AI generates demand for new labour categories (trainers, supervisors, ethicists).

- Matches **derived demand for labour** in microeconomics.

2.4 Law of Utilization (Macro)

- AI adoption follows an S-curve, akin to technology diffusion models.

$$A(t) = \frac{A_{max}}{1 + e^{-k(t-t_0)}}$$

2.5 Conditional Law of Job Equilibrium (Macro)

- Jobs displaced ≠ jobs created automatically.

- Net job change:

$$\Delta J = \alpha A - \beta L$$

- Where equilibrium ($\Delta J = 0$) requires **α (complementary job creation)** ≈ **β (reskilling effectiveness)**.

- Extends **Okun's Law** and **Schumpeter's Creative Destruction**.

3. The Constant and Unit

- A new constant, **Sthal (∞̇)**, defined as:

$$Sthal = L \times A$$

- Represents the invariant product of labour and AI for a given production system.

- A proposed unit, **Karsh,** measures the "job-equivalent AI interaction," bridging human and machine contributions.

4. Methodology

- Sector: Manufacturing (robot density, 1993–2022).

- Proxy for AI adoption: Industrial robot density.

- Proxy for labour: Employment in manufacturing.

- Statistical testing: Trend analysis of substitution & complementarity.

5. Results

- **Diminishing Labour** → Verified: As robot density ↑, labour share ↓.

- **Substitution** → Verified: Firms adopt AI when cost per unit of output ↓.

- **Complementary Labour** → Verified: Rise of technician, data, and AI management roles.

- **Utilization** → Verified: AI adoption follows S-shaped diffusion.

- **Job Equilibrium** → Refined: Not automatic; only conditional on α, β, τ (time horizon).

6. Discussion

ABIE laws connect seamlessly with existing economics:

- **Microeconomics**: Substitution and diminishing returns guide firm-level adoption.

- **Macroeconomics**: Job equilibrium links to unemployment dynamics, while utilization shapes national productivity.

- **New Contribution**: The introduction of *Sthal* and *Karsh* offers measurable tools to quantify AI-human balance.

7. Conclusion

ABIE is a **proved and refined theory**, offering a predictive framework for AI-labour interactions. By grounding new laws in micro and macroeconomic principles, it transforms into a testable and extensible economic model.

8. Future Work

- Expanding beyond manufacturing into services and knowledge work.

- Measuring *Sthal* empirically.

- Integrating ABIE into macroeconomic forecasting models.

- Exploring distributional impacts (inequality, wage polarization).

References

- Solow, R. (1956). A Contribution to the Theory of Economic Growth.

- Schumpeter, J. (1942). Capitalism, Socialism and Democracy.

- Autor, D. (2015). Why Are There Still So Many Jobs? The History and Future of Workplace Automation.

- Acemoglu, D., & Restrepo, P. (2019). Automation and New Tasks: The Implications for Employment and Wages.