Philippe Aghion and Peter Howitt: Creative Destruction and the Dynamics of Innovation

Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2025

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1. Introduction — The 1992 Breakthrough

When Philippe Aghion and Peter Howitt published *"A Model of Growth Through Creative Destruction"* in the *Review of Economic Studies* in 1992, they revived and formalized an idea first articulated by Joseph Schumpeter half a century earlier: that capitalism advances by continuously destroying its own past.

Their model showed, with mathematical precision, how **innovation originates within the economy itself** rather than arriving as an external shock. By doing so, Aghion and Howitt inaugurated the modern field of *endogenous growth theory*—the study of how incentives, institutions, and knowledge creation jointly generate sustained economic progress.

The Royal Swedish Academy's 2025 decision to honour them (together with Joel Mokyr) recognizes that understanding growth requires both historical insight and theoretical rigour. If Mokyr explained why societies became capable of sustained innovation, Aghion and Howitt demonstrated *how* that innovation propagates through the economic system.

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2. The Core Model of Creative Destruction

In the Aghion–Howitt framework, growth arises from a sequence of **innovation races**. Entrepreneurs devote resources to research in hopes of discovering technologies that make existing ones obsolete.

1. **Innovation as a Poisson process:** At any moment, a new idea may arrive, increasing productivity by a certain factor.
2. **Creative destruction:** When that happens, the old technology disappears; firms using it lose their value.
3. **Endogeneity:** The rate of innovation depends on the expected reward—profits from temporarily holding the technological frontier—balanced against

the cost of R&D.

This dynamic equilibrium yields **sustained but turbulent progress**. Growth is not smooth; it is punctuated by discontinuous leaps. Each leap enhances overall productivity but simultaneously wipes out part of the old capital stock.

Mathematically, the model links the average growth rate to the intensity of research effort, itself determined by market incentives. Conceptually, it captures the dual nature of capitalism: simultaneously *creative* (generating new wealth) and *destructive* (rendering existing assets obsolete).

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3. From Schumpeter to Endogenous Growth

Earlier growth theories—Solow (1956) and its descendants—treated technological progress as **exogenous**: an unexplained factor that increased output over time. This approach could measure growth but not explain its origin.

Aghion and Howitt shifted the paradigm. Innovation became the *outcome of purposeful activity*, shaped by competition, education, finance, and policy. Their model unified micro-level behaviour with macro-level outcomes: individual decisions to innovate collectively determine the long-run growth path.

This insight bridged the gap between Schumpeter's qualitative vision of capitalist dynamism and modern quantitative analysis. It allowed economists to study how parameters—tax rates, patent length, market structure—affect the economy's innovation rate and welfare.

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4. Innovation, Competition, and Policy

One of Aghion and Howitt's most influential results concerns the **relationship between competition and innovation**. Contrary to simplistic views, the link is *inverted-U shaped*:

- When competition is weak, monopolists have little incentive to innovate because they already enjoy high profits.
- When competition is extreme, profits are too low to justify risky R&D.
- Maximum innovation occurs at an intermediate level, where firms are motivated to "escape competition" by innovating faster than rivals.

This framework profoundly influenced **industrial and competition policy**. It

suggests that markets must be open enough to allow entry and challenge incumbents, yet stable enough to reward success. The implication is subtle: policy should promote *contestability*, not necessarily fragmentation.

Aghion and Howitt's subsequent research explored related themes:

- The role of **financial development** in funding innovation.
- **Human capital** as the foundation of absorptive capacity.
- **Institutional quality** as a determinant of how well societies convert ideas into productivity.

Their empirical work, using firm- and sector-level data, confirmed that environments with moderate competition, flexible labour markets, and strong educational systems tend to innovate more rapidly.

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5. Extensions and Empirical Evidence

Over three decades, the original 1992 model expanded into a **comprehensive Schumpeterian growth paradigm**. Major extensions include:

1. **Variety and step-size models:** Innovations may create new sectors (horizontal differentiation) or improve existing technologies (vertical progress).
2. **Directed technological change:** Innovation can be steered toward specific goals—green technologies, digital infrastructure, or health—through incentives.
3. **Inequality and growth:** Technological revolutions often widen income gaps between innovators and laggards; the challenge is to maintain inclusivity without stifling progress.
4. **Political economy of innovation:** Incumbents may lobby for regulation or protectionism to prevent displacement. Managing this tension is essential to sustain creative destruction.

Empirically, Aghion and co-authors tested these theories across dozens of countries. Findings consistently show that **innovation explains cross-country differences in productivity growth**, and that institutional settings—property rights, competition law, education policy—account for much of this variation.

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6. Creative Destruction and Society

Creative destruction carries social costs. When new firms or technologies triumph, others vanish, leading to job losses, regional decline, and social resistance. Aghion and Howitt recognized that sustaining innovation requires a **social contract** that cushions these shocks.

Their work on "Schumpeterian welfare states" argues that efficient redistribution can *complement* innovation rather than impede it. By providing insurance against short-term losses, societies make citizens more willing to accept long-term structural change.

This reasoning reframes traditional debates between growth and equality. Innovation policy and social policy, in their model, are **jointly optimal**: societies that combine openness to change with protection against insecurity achieve faster and more sustainable growth.

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7. Modern Relevance

The Aghion–Howitt framework remains the cornerstone of contemporary analysis of **technological transitions**. Its logic applies directly to the pressing challenges of the twenty-first century:

a. The Digital Revolution

Rapid advances in artificial intelligence, automation, and data analytics exhibit the same pattern of creative destruction. New firms and occupations emerge as others disappear. Policymakers must ensure that regulatory regimes foster experimentation while managing dislocation.

b. The Green Transition

Aghion's later work on *directed technological change* highlights how carbon pricing, subsidies, and standards can redirect innovation toward cleaner production without sacrificing growth. Environmental progress, in this view, is an innovation problem, not merely a constraint.

c. The Productivity Puzzle

Despite waves of new technology, productivity growth has slowed in many advanced economies. The model suggests potential explanations: market concentration reducing competitive pressure, declining public investment in research, and barriers to diffusion from frontier to lagging firms.

d. Resilience and Institutions

The COVID-19 pandemic and geopolitical fragmentation reminded economists that innovation depends on open, resilient systems. Creative destruction can stall if trade, collaboration, or knowledge flows are disrupted. The model underscores the need for institutions that protect both competition and connectivity.

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8. Methodological and Intellectual Impact

Aghion and Howitt's contribution reshaped not only theory but also methodology. Their integration of **micro-foundations**—explicit modelling of firm behaviour—into macro growth equations provided a unifying analytical tool now standard in advanced economic research.

Moreover, their approach re-humanized growth economics. Rather than viewing the economy as a smooth production function, they portrayed it as a dynamic ecosystem of entrepreneurs, incumbents, and policymakers—each responding to incentives, expectations, and uncertainty. This perspective aligns economic theory with the realities of technological capitalism.

Their influence extends beyond academia. The Organisation for Economic Co-operation and Development (OECD), European Commission, and World Bank have adopted the Schumpeterian framework to design policies promoting innovation-led growth. Concepts such as "frontier firms," "diffusion gaps," and "innovation ecosystems" trace directly to Aghion and Howitt's lineage.

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9. Creative Destruction and Democracy

A subtle but profound aspect of their work concerns the **political sustainability of innovation**. Economic dynamism relies on pluralism and transparency—the very attributes of democratic governance. When incumbents capture policy or suppress competition, creative destruction slows.

Aghion, especially in his recent writings, warns that the concentration of economic power can translate into political resistance to change. To preserve growth, societies must balance entrepreneurial freedom with anti-monopoly vigilance and inclusive participation. In this sense, the Schumpeterian model is also a theory of **liberal resilience**: growth flourishes where democracy permits new entrants—political as well as economic.

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10. Integration with Joel Mokyr's Historical Perspective

While Aghion and Howitt built the formal architecture of innovation economics, Joel Mokyr supplied its historical foundation. Mokyr explains *why* the West entered a regime of cumulative innovation; Aghion and Howitt explain *how* that regime operates and endures.

Both perspectives revolve around **feedback loops**:

- In Mokyr's narrative, ideas generate cultural legitimacy for inquiry.
- In Aghion–Howitt's model, innovation generates economic incentives for further discovery.

Together they form a coherent account of growth as a self-propelling process rooted in knowledge, institutions, and openness to change.

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11. Policy Implications

Drawing on their framework, several guiding principles emerge for contemporary economic policy:

1. **Protect and promote competition.** Entry barriers and rent-seeking by incumbents must be contained to keep innovation incentives alive.
2. **Invest in education and research.** Human capital is the fuel of endogenous growth.
3. **Encourage risk-taking while managing failure.** Bankruptcy laws, venture capital markets, and safety nets should together support experimentation.
4. **Support diffusion.** Bridging productivity gaps between frontier and lagging firms spreads the benefits of innovation.
5. **Integrate sustainability goals.** Direct technological change through carbon pricing and targeted R&D support.
6. **Safeguard openness and democracy.** Innovation thrives where information flows freely and dissent is protected.

These lessons turn the theoretical model into a practical framework for *inclusive innovation policy*—one that fosters dynamism while maintaining cohesion.

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12. Conclusion

Philippe Aghion and Peter Howitt have given modern economics a language to describe what Schumpeter could only evoke metaphorically. Their model of **growth through creative destruction** shows that progress is not a steady accumulation of capital but a restless process of renewal.

Innovation drives prosperity, but it also generates displacement and conflict. The genius of the Aghion–Howitt framework lies in revealing how these forces can coexist within a stable system—provided that institutions preserve competition, reward discovery, and cushion transition costs.

In honouring them alongside Joel Mokyr, the 2025 Nobel Committee recognized a profound unity of vision: *economic growth is a cultural, institutional, and theoretical achievement*. To sustain it, societies must remain open to new ideas, resilient in the face of disruption, and confident that destruction, when guided by knowledge and policy, remains ultimately creative.

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APPENDIX Bio - Philippe Aghion

Philippe Aghion is a Professor at the **Collège de France** and **INSEAD**, and a Research Associate at the **London School of Economics**. Born in 1956 in France, Aghion is a leading economist in the field of growth theory, specializing in innovation, competition, and the economics of creative destruction. He has authored numerous influential books and articles, including *Endogenous Growth Theory* (with Peter Howitt) and *The Economics of Growth*. Aghion's research focuses on how innovation drives productivity, the role of market structure in fostering entrepreneurship, and the policy frameworks that sustain long-term economic growth. In 2025, he was awarded the **Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel**, jointly with Peter Howitt, for developing the theory of growth through creative destruction.

APPENDIX Bio - Peter Howitt

Peter Howitt is a Professor of Economics at **Brown University** in the United States. Born in 1946 in Canada, Howitt is a distinguished economist known for his work on endogenous growth theory and the economics of technological innovation. Together with Philippe Aghion, he developed the 1992 model of **growth through creative destruction**, formalizing Schumpeter's insights into a rigorous analytical framework. Howitt's research explores how innovation interacts with competition, market structure, and policy to generate sustained economic growth. In 2025, he was awarded the **Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel**, jointly with Philippe Aghion, for his foundational contributions to understanding innovation-driven growth.