Innovation in the history of economic thought

History of Economic Thought

Throughout this course, we will also provide a swift overview of the history of economic thought, offering a glimpse into the various perspectives on innovation.

- Many of the themes and issues to be covered in the course have their roots in some quite old ideas.

Classical economics: Smith, Ricardo, Marx

In the history of economic thought, innovation and technological change have occupied a growing importance:

- **Adam Smith** in Wealth of Nations of 1776 considers the relationship between technological change, **division of labor** and structural change of the economy. The incorporation of technological progress into capital favors the division and specialization of labor, which in turn reflects on productivity.

- **Ricardo** in the Principles of Political Economy of 1817 analyzes the effects of **technological change** on employment.

- **Marx** emphasizes the key role of technology in modern economies and stresses that innovation is a social rather than an individual process. The input for innovation comes from capitalist **competitive** pressure and the breadth of the markets.

Adam Smith, wrote upon aspects related to innovation:

- **Division of Labor:** he emphasized the importance of the division of labor in promoting economic efficiency. He argued that when workers specialize in specific tasks, it leads to increased productivity. This specialization can be seen as a form of innovation, as it allows individuals to focus on improving and refining their skills in a particular area.
- **Market Competition:** he believed in the power of market competition as a mechanism that drives innovation. In a competitive market, businesses are motivated to improve their products or services to attract customers and gain a competitive edge. This continuous striving for improvement can result in technological advancements and innovation.
- **Invisible Hand:** The concept of the invisible hand, often associated with Smith, suggests that individuals pursuing their self-interest unintentionally contribute to the overall good of society. In the context of innovation, this means that entrepreneurs seeking profits may end up introducing new technologies, products, or services that benefit society as a whole.
- **Role of Government:** While Smith was a proponent of free markets, he also recognized a role for government in certain areas. He acknowledged that the government has a responsibility to provide public goods, enforce contracts, and protect against externalities. In some cases, government intervention may be necessary to create a conducive environment for innovation.

Adam Smith and the principles of a market-driven economy

- It's important to note that while Adam Smith laid the groundwork for classical economics and the principles of a market-driven economy, the term "innovation" as we understand it today wasn't explicitly discussed in his writings. However, his ideas on the division of labor, market competition, and the role of individuals pursuing their self-interest have been influential in shaping economic systems that foster innovation and progress.

David Ricardo and the theory of comparative advantage

While Ricardo's work is not explicitly focused on innovation, some aspects of his theories have implications for understanding innovation in the context of international trade and economic development.

- **Comparative Advantage:** the theory argues that countries should specialize in the production of goods and services in which they have a **lower opportunity** cost compared to other nations. This specialization leads to **increased efficiency and overall economic gains through trade**. While not directly about innovation, the concept implies that nations may focus on areas where they have a relative advantage, potentially encouraging innovation in those specific sectors.
- **Technological Progress:** Ricardo acknowledged the role of technological progress in economic development. Although he did not extensively delve into the dynamics of technological change, his recognition of the importance of advances in technology suggests an implicit understanding of **innovation as a driving force behind economic growth**.
- **Labor and Capital Mobility:** Ricardo's work highlights the movement of resources, including labor and capital, across different sectors and regions. This mobility can facilitate the spread of knowledge, skills, and technologies, potentially contributing to innovation diffusion.

Ricardo's writings

While Ricardo's writings do not explicitly address innovation in the way modern economists might, his theories have indirect implications for understanding economic progress and development, including the role of specialization, trade, and technological change.

It's essential to recognize that the language and focus on innovation in economic theory evolved over time, with more explicit discussions on the topic emerging in later economic literature.

Marx's and the Capitalist Mode of Production

While do not explicitly focus on innovation, his ideas have implications for understanding the role of technological change, industrialization, and innovation within the context of capitalism:

- **Historical Materialism:** Marx's theory of historical materialism posits that the development of societies is fundamentally driven by changes in the means of production. Technological advancements and innovations play a crucial role in this process. Marx recognized the transformative power of technological progress and its impact on social structures.
- **Capitalist Mode of Production:** In Marx's analysis of capitalism, he highlighted the central role of the capitalist mode of production, which he argued was characterized by the constant pursuit of profit and the accumulation of capital. Technological innovation is seen as a means for capitalists to increase productivity, reduce labor costs, and enhance their competitive position in the market.
- **Alienation and Exploitation:** While Marx acknowledged the potential for technological progress to increase productivity, he also critiqued the alienating and exploitative aspects of capitalist industrialization. He argued that workers were alienated from the products of their labor and exploited in the process, with technological advancements often benefiting capitalists more than the workers.
- **Communism and Technological Freedom:** In Marx's vision of communism, he anticipated a society where technological advancements would be harnessed for the benefit of all, rather than serving the interests of a capitalist class. In a post-capitalist society, Marx envisioned a more equitable distribution of the benefits of technological progress.

Marx's analysis

- While Marx's analysis did not explicitly use the term "innovation" in the way it is commonly used today, his writings provide insights into the relationship between technological change, capitalism, and societal transformation. Scholars and thinkers have since expanded on Marx's ideas, incorporating discussions of innovation within the broader framework of political economy and social theory

Innovation in the history of economic thought

J. Schumpeter (1883-1950) was the first to discuss the role of innovation in modern industrial economies in a broad, systematic and in-depth way. The best known and most important contributions are:

- Innovation is the main determinant of industrial change;
- Innovation is a creative response of the company, distinct from the adaptive response;
- Innovation can take place both in small companies (entrepreneur) and in large companies (R&D), even if size is neither a necessary nor sufficient condition for innovation;
- Innovation determines a temporary profit, which lasts over time if the innovative activity remains sustained. On the contrary, the profit disappears following the reaction of other firms;
- Innovation is a continuous process of change and accumulation of knowledge.

The Schumpeterian approach

Schumpeter assigned the key role in economic growth to:

1. the **disruptive** activity of entrepreneurs,
2. to large corporations,

each of which fed a process of *creative destruction* by causing continuous disturbances in the economic system.

The source of these disturbances was innovation generated, as Schumpeter said:

> "competition from the new commodity, the new technology, the new source of supply, the new type of organisation, competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives".

Schumpeter's analysis was descriptive rather than formal, but later economists developed formal growth models based on his insights, placing innovation at the heart of growth.

There is recent empirical evidence, to suggest that the extent of creative destruction is linked to the rate of growth.

The concept of **creative destruction**

- The concept of creative destruction is one of the most important in the economics of innovation.
- The innovator creates something – competitive advantage probably and possibly wealth – but in doing so destroys something else, often the competitive position of a rival firm.
- So innovation creates and destroys at the same time, but with luck the value of creation will exceed the value of destruction.

An example of creative destruction

Innovation and growth

Innovation is an essential driver of economic progress that benefits consumers, businesses and the economy as a whole.

How does it play that role, how does it contribute to economic growth and what can be done to promote it?

New ideas and technologies are developed and applied, generating greater output with the same input. More goods and services are produced, stimulating wages and business profitability.

Innovation and growth

Innovation and productivity growth bring vast benefits for consumers and businesses:

As productivity rises →

the wages of workers increase →

they have more money in their pockets →

and so can buy more goods and services →

at the same time, businesses become more profitable, which enables them to invest and hire more employees.

Why do we need innovation?

One of the major benefits of innovation →

its contribution to economic growth.

Innovation can lead to higher productivity → the same input generates a greater output.

→As productivity rises, more goods and services are produced

→ the economy grows!

How does innovation take full effect?

Innovation usually starts on a small scale

- e.g. when a new technology is first applied in the company where it has been developed. However, for the full benefits of innovation it is necessary to spread it across the economy and equally benefit companies in different sectors and of different sizes.

Experts call this process the diffusion of innovation.

The central role of innovation in growth theory

Economics has a range of growth theories, but all give a central role to innovation as a driver of growth.

- Economists are widely held to disagree on more or less any topic.
- But they agree that **all long-term growth processes rest ultimately on innovation and technological change**.

This is especially important in advanced economies where innovation plays a key role in improving the quality of inputs and in how these are incorporated in the production process.

Neoclassical growth models

Robert Solow in the 1957 developed a formal neoclassical model of growth, based on the concepts of *production function* where output is a function of inputs (capital, labour, management services and materials), and reaches a *long run equilibrium*.

In the long run, growth in per capita output depends *only* on the rate of technological progress resulting from improvements in outputs or the efficiency with which inputs are transformed into outputs.

- However the theory offered no account of how this occurred: technological improvements emerged from outside the economic system, and were not shaped by decisions within it.

Empirical applications of the theory, showed that long-run economic growth derived from technological progress rather than increases in capital and labour inputs, a result which emphasised the importance of innovation.

Neoclassical growth models

Before the work of Robert Solow, traditional economics treated technical change as one of the exogenous factors influencing economic activity, but not necessarly a factor of huge importance.

→But Solow demonstrated otherwise.

→The general reaction of the economics profession to this result was one of great surprise.

→Before that, the general assumption would have been that increased use of capital would have been far more important than technical change.

The Evolutionary approach

The evolutionary approach to growth  **innovation mechanism of economic change.**

Evolutionary theories ➢ firms innovate by technological competition, they constantly introduce:

- new varieties of products,
- new production technologies.

Innovation drives growth, but is accompanied by significant change in either the structure of the economic system.

A central contribution of recent evolutionary approaches to previous theories is the **'innovation system'**: the set of institutions and organisations which contributes to the development and diffusion of new technologies, processes, and organisations.

A comparison between neoclassical and evolutionary approach

The thought of recent years has focused attention on the analysis of the characteristics, determinants and consequences of innovation and technological change, on which two schools, the **neoclassical** and the **evolutionary** one, are compared.

Both underline that:

- The **scientific and technological opportunities** of an industry affect the rate of technological progress
- Economic incentives and in particular the **appropriateness** of results greatly affect the innovative effort of companies
- **Demand** conditions affect the rate of innovation
- There is a relationship between **market structure** and **innovation**: a more (less) concentrated market structure generates a more (less) high rate of technological progress, which in turn significantly changes the market structure.

A comparison between neoclassical and evolutionary approach

But their approach differs in these aspects:

Neoclassical school

- Equilibrium and steady state
- Static and dynamic analysis
- Analytical solution of the models
- Substantive rationality and optimization.
- Exogenous preferences
- Heterogeneity in endowments
- Strategic behavior (game theory)
- Firm as a set of contracts
- Technology as information
- Codeable information
- Innovation as a response to incentives
- Independence from history
- Calculable uncertainty (risk)
- Invisible Hand / Pareto Efficiency Public intervention motivated by market failures and hampered by state failures

Evolutionary School

- Unbalance and transitions
- Dynamic analysis
- Numerical simulation of models
- Limited rationality and satisfactory behavior.
- Endogenous preferences
- Heterogeneity in decision making.
- Routine based behavior
- Business as a set of skills
- Technology as knowledge
- Codifiable and tacit information
- Innovation as problem solving
- Dependence on history (path dependence)
- Non-computable or radical uncertainty
- Public intervention that supports the creation of new markets and national innovation systems