

Economics and Policy of Innovation

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The Innovative Firm [in history]

(Chapter 2)

In Economics courses, you have almost only studied the orthodox (neo-classical) view of the firm...

... but the role of innovation and technology in the economic process can be studied according to two main approaches: the orthodox (or neo-classical) approach and the evolutionary one.

Main differences:

Neo-classical	Evolutionary
The equilibrium of the economic system	No equilibrium in the economic system
Technology as information	Technology as knowledge
Firms are studied out of history and context	Firms in history and in a specific context
Public intervention: only patent system and R&D subsidies	Innovation systems including public institutions and firms

The neo-classical theory of production

- Relationships between inputs and outputs in the productive unit → the firm as an abstract entity
- Assumptions about the firm:
 - it produces one homogeneous product
 - it has perfect information on inputs and outputs
 - it is a price-taker
 - it is owner-managed ('owner-entrepreneur')
 - demand and supply in the relevant market are in equilibrium
 - its production technique is a particular combination of inputs
 - its only objective is profit maximisation
- Analytical form of such assumptions:
 - the production function $Q = f(K, L)$

- Technological change (exogenous) = shifts in the production function
- Main limits of neoclassical theory in explaining technological change:
 - only (homogeneous) labour and capital considered as production factors
 - infinite number of techniques for a given technology unrealistic
 - substitutability of production factors limited
 - only change in process (and not in product) technology explained
 - only cost-reducing improvements described
 - nature of the firm, both in general and in relation to technology, unrealistic

The firm in the (evolutionary) theory of technical change

- Incorporation of technology: identifying links between technical change and firm behaviour
- Alternative to the orthodox view of firm objective as optimal choice → evolutionary theory of economic change and organisational capability
- Evolutionary framework: attention to the nature and the sources of continuity in the behavioural patterns of an individual organisation (the firm)
- Taken into account: bounded rationality, imperfect information, market and technical uncertainty, behaviour variety in different industries and over different periods
- The role of skills and tacit knowledge
- Where does knowledge reside? In the organisation's memory

- Not to innovate is to die. The survival and growth of the firm depend upon its capacity to adapt to a rapidly changing environment and to change it
- The test of successful entrepreneurship and good management is the capacity to link together technical and market possibilities
- The firm has a range of options and strategies when confronted with technical change, depending on its resources, history, management attitude, luck, etc.: resources and skills can be used in a variety of different combinations
- The requirements of successful innovation and the emergence of R&D establishments within firms have profoundly modify patterns of firm behaviour and strategy.

The innovative firm in **history (I)**

A model changing over time and space...



English industrial districts: at the end of XIX century, they are the “workshop of the world”

Readings

- Oxford Handbook: chapter 2.3 → Marshall (neo-classical, end of XIX Century),
- but also evidence from the previous century:
 - Eric Hobsbawm (historian): on industrial revolution
 - Adam Smith: on the division of labour

Schumpeter Mark I and Mark II

Joseph Schumpeter (1883-1950) can be considered as the main innovation scholar in economic history:

- For Schumpeter, innovation is the key driver of industrial change and economic development;
- He clearly distinguishes between **invention** and **innovation**;
- He changes his analytical view throughout his life, in parallel with the economic changes occurred between the end of the XIX and the first half of the XX century.

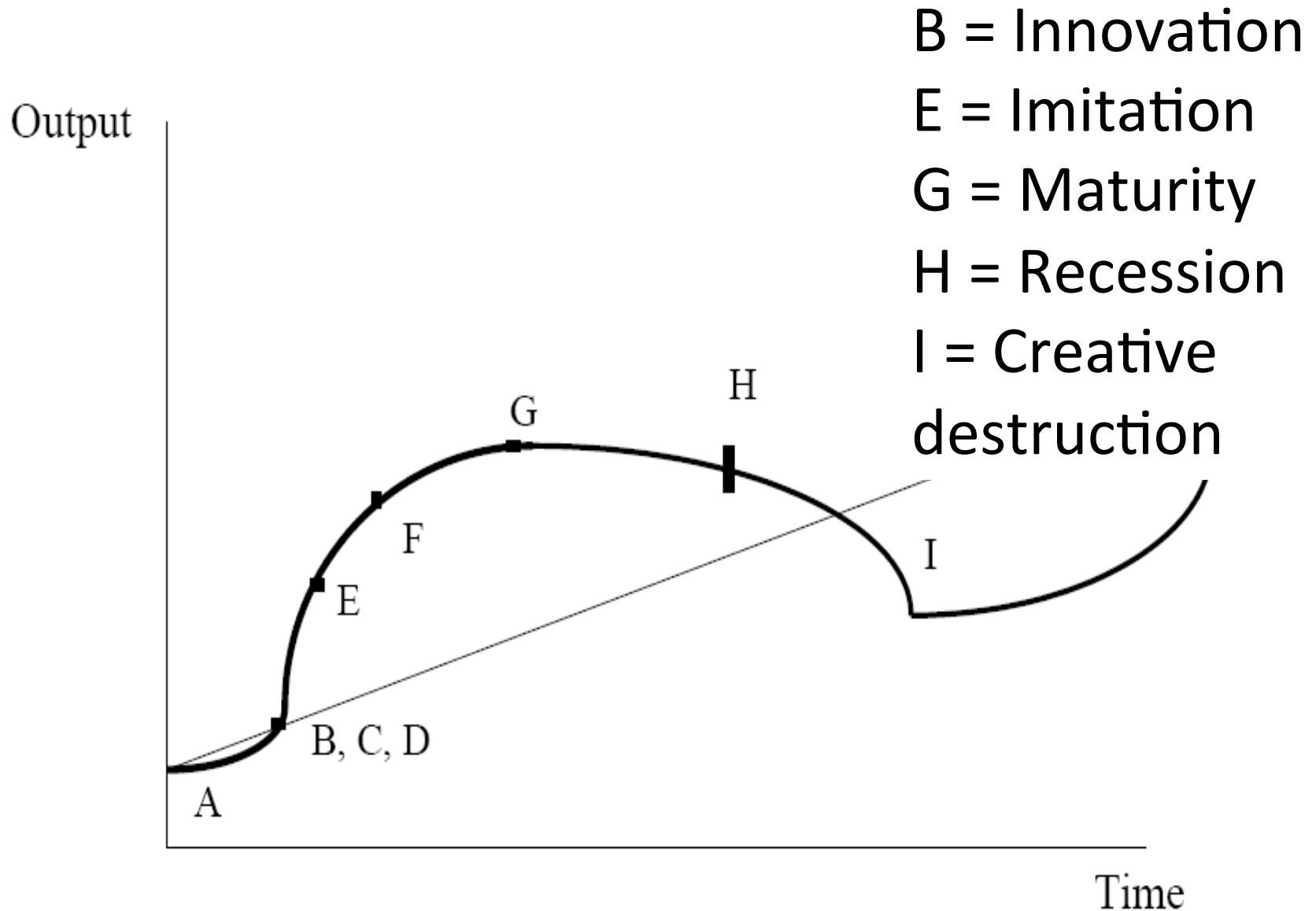
Schumpeter's first theoretical approach is also named *Schumpeter Mark I* and it is put forward in his first works, e.g. *The theory of economic development* (1911):

In it, Schumpeter analyses the European industrial structure at the end of the XIX century (same as from previous readings):

- It was dominated by many SMEs,
- It easily allowed new firms to enter the market,
- There were many entrepreneurs, with innovative ideas on products and processes, who started new ventures, challenging the existing ones and continuously changing the existing production, organisation and commercialisation process;
- It was very easy to destroy the “rent positions” associated to old innovations.

- The innovative entrepreneur creates new products which substitute old ones with a process of dynamic competition (named by Schumpeter: creative destruction);
- New products are usually produced in new SMEs;
- New products allow firms to have a temporary monopoly power in the market;
- The success of these entrepreneurs will be imitated by others, who will create even new and improved products;
- This process will lead to a lower profitability, thus to the progressive decline of the industry life cycle.

SCHUMPETER MARK I (1912)



The economic cycle

Innovation (exogenous factor) → Profit



Imitation → MARKET EXPANSION



Increased competition → ↓ Profits



MARKET CONTRACTION



New static equilibrium

The innovative firm in **history (II)**

A model changing over time and space...



English industrial districts: at the end of XIX century, they are the “workshop of the world”

Large managerial firm in the USA at the beginning of XX century:

Reading → Oxford Handbook 2.4



The second approach is instead named *Schumpeter Mark II* and is presented in *Business Cycles* (1939) and in *Capitalism, socialism and democracy* (1943):

- Here he analyses the US industry in the first half of the XX century;
- This industry is dominated by large firms;
- The innovation activity is characterised by:
 - High entry barriers,
 - Formalisation of the innovative process in the activities of large R&D laboratories,
 - Very high economic investment in large scale R&D projects.

- Large firms reinvest the high profits generated by innovation in new R&D investments;
- Innovation is no more an exogenous factor, but it is a precise strategy of large firms, aiming at a stable monopoly power;
- Their success, the high profits, the R&D lab projects and the monopoly power prevent other new firms from entering the market.

Profits → R&D → Innovation → Higher profits → R&D...

With a stable monopoly power

Both Schumpeter Mark I and II can be used to analyse specific stages of the *industry life cycle*:

- Initial stage: continuously changing technology, high uncertainty, low entry barriers and new firms (SMEs but not only) as main innovators.
- Maturity: technological changes follow very well defined trajectories, there are high economies of scale and entry barriers, financial investments become crucial → Large firms with a monopoly power are the main innovators.