

The George Boole Foundation Limited

Registered in England & Wales: 7131194
167-169 Great Portland Street, 5th Floor, London, W1W 5PF, United Kingdom
<https://www.boole.org.uk>



George Boole
1815-1864

The George Boole Foundation was established as a permanent memorial to the outstanding contribution of George Boole, a self-taught English logician, who created the mathematical logic to explain how we deduce, learn, take decisions, act and evolve in his 1854 book, "*The Laws of Thought*". Boolean Logic became the foundation of integrated circuit design optimization, computer programming, telecommunications and Artificial Intelligence (AI). The Foundation applies this logic in the development of economic theory and policy decision analysis.

Laws of growth - After Nicholas Kaldor (1966)

During his Inaugural Lecture¹ as Professor of Economics at Cambridge University in 1966 on the causes of the slow growth of the UK economy, Kaldor (1966) presented some "laws" to explain differences in growth rates between more developed countries. Kaldor subsequently modified some of them but the central message remained the same.

Our Foundation has reviewed these and we have added our own modifications in line with our now 50 years of development experience in growth and productivity development economics while emphasising that these do not alter Kaldor's original sense.

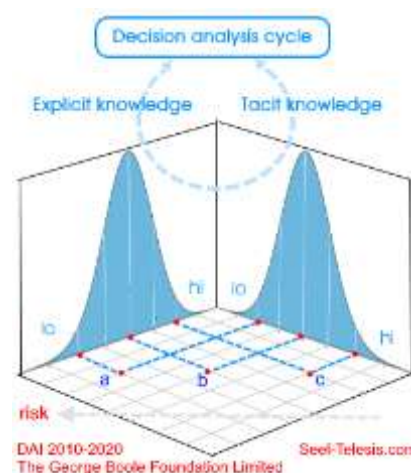
The basic laws, including adjustments are as follows:

1. The faster the rate of growth of the manufacturing sector, the faster will be the rate of growth of Gross Domestic Product (GDP) if the industrial output is a large component of the GDP connected to the induced productivity benefitting, not only the industrial sectors but also in the form of gadgets equipment benefitting the rest of the economy including manufacturers, services and households.

2. The more rapid the rate of growth of the manufacturing sector the higher will be the rate of growth in labour productivity linked to economies of scale and increasing returns as well as the accumulation of tacit knowledge arising from refinements in competence resulting from the completion of repetitive tasks (Learning Curve).

The complex feedback loop of production refinements being a function of historic cumulative throughput ties together the ability to progressively lower unit prices and make use of the income price elasticity of demand to project increasing quantities of output, as a function of price setting, reinforces the learning aspects associated with increasing throughput and therefore number of repetitive tasks. The combination of accumulated tacit knowledge (individual capabilities) and explicit knowledge analysis (performance data) progressively lowers risks associated with operational decisions (see right²).

The broad benefits are less mistakes, faster completions, less resources used per unit, lower unit costs of production and an increasing production system yield of output meeting minimum specifications³. Depending upon the technologies and decision preferences this trend can also result in lower unit output prices.



As a result of the Learning Curve intensified by the accumulation of tacit and explicit knowledge reduces the risks associated with operational decisions

¹ Kaldor, N., "Causes of the slow rate of economic growth of the UK", 1966 – 1967, Inaugural Lecture, Cambridge, 1966.

² McNeill, H. W., "The Learning Curve & Economic Growth", Decision Analysis Initiative, GBF, 2012.

³ McNeill, H. W., "The Bank of England: 1975-2025 – The Consequences for the People", George Boole Foundation, Amazon Editions, 2007

3. Clearly, a growth in this system of production opens up opportunities for employment based on transfers from lower productivity sectors thereby enhancing overall national growth. Increasing use of more productive devices and equipment in the sectors releasing labour will also result in an increased productivity in the non-manufacturing sector.

4. As transfers from lower productivity to higher productivity occupations slow up this process will tend to follow as a function of the rates on innovations achieved in the future resulting, in a general slowdown in growth. With no more reductions in the labour forces in primary production including mining, minerals and agriculture there are likely to be labour shortages but the overall rate of innovation might be stimulated through incentive schemes of some sort.

5. (of reduced relevance) Historically, beyond the early industrial revolution transfer of agricultural labour to industry later operations consisted of a complex expansion in demand arising from competitive production and exports as well as import substitution governed by their respective income price elasticities of demand. Thus, one projection is that the final rate of growth will be the approximately the rate of growth in exports divided by the income elasticity of demand for imports.

6. A rapid growth of exports and output will tend to set up a cumulative process, or virtuous circle of growth (see 2 above) between growth rates in output and productivity. This will create difficulties for countries starting to industrialise in those same production domains other than in cases of particularly distinct and unique innovation trajectories.

Policy for growth – After Hector McNeill (1975-2025)

To add to this growth logic, the development of the proposition for faster growth as the Real Incomes Objective Price Performance Policy⁴ (RIO-3P) is designed to be a productivity incentive-based policy with real incomes maintenance or increase being the policy objective. This provides a policy supporting Kaldor's logic and, indeed, extends it by adding specific policy instruments to stimulate productivity-based growth. RIO-3P exposes an extended list of the additional benefits of productivity, besides its impact on real incomes. These additional benefits all consequences of a productivity-based maintenance and increase in real incomes, such as that provided by RIO-3P and include:

- Decline or elimination of inflation
- Increased price accessibility of goods and services
- Rising real incomes across the board without changes in nominal incomes
- Rise in the purchasing power of:
 - Wages
 - Savings
 - Corporate cash flow
 - Corporate margins
 - The tax base
 - Government revenue
- Declining poverty
- Rise in the value of the currency and its purchasing power
- Rise in import substitution
- Rise in exports
- Rise in the balance of payments
- Reduction in the “borrowing requirement”
- Reduction in deficits
- Reduction in national debt

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⁴ McNeill, H. W., “The Value Theory of Money”, Note on RIO-3P, George Boole Foundation, 2025.