

The George Boole Foundation Limited

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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.

RIO-3P

REAL INCOMES OBJECTIVE PRICE PERFORMANCE POLICY

Real Incomes Objective Price Performance Policy is a productivity-based growth strategy to lower unit costs, counter inflation without limiting production or consumption, thereby avoiding austerity. Applicable to any sector or whole economy. A specific information management system aligns corporate allocation optimization responses with the growth policy objective of stabilizing or raising real incomes.

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RIO-Real Incomes Objective economics

RIO- Real Incomes Objective economics is a distinct development economics paradigm that establishes the maintenance or rise in real incomes as the principal macroeconomic objective.

3P-Price Performance Policy

3P-Price Performance Policy is the principal policy of RIO which deploys policy instruments to incentives productivity increases to reduce inflation while not restricting production or consumption thereby avoiding cyclic austerity brakes on growth.

RIO-3P Origins

This approach was developed by Hector W. McNeill¹ a British economist and systems engineer who sought to identify a solution to the stagflation crisis resulting from the OPEC petroleum price sanctions imposed in 1973. McNeill initiated his research and policy design in 1975 and produced the first drafts of RIO and 3P in 1976.

Subsequent development

A monograph on 3P was circulated amongst UK political, academic and management consultancy circles in 1981, feedback led to significant improvements in its general applicability². This also gave impetus for an enquiry into the design of information management systems³ to support the alignment of corporate performance responses to policy objectives and to facilitate an effective national deployment.

SEEL-Systems Engineering Economics Lab was established in 1983 to support this enquiry by monitoring the development of information technologies based on global networks. The evolution of information technologies has resulted in what was then considered to be a complex system, becoming a relatively easily designed and implemented system applying state of the art cloud processing/database systems with AI support.

In 2010 The George Boole Foundation Limited was established. All RIO and 3P development work is developed under the Foundation's auspices. SEEL became the development division of the Foundation specialising in decision analysis and digital logic.

Why is 3P a distinct paradigm?

3P focuses on a specific set of growth properties which support the underlying structural objectives⁴ of the policy. These include the known elements of learning and innovation arising from experience in production and the proactive design of products and production processes aiming to achieve falling unit costs of operations, reducing the rate of output price inflation or securing absolute price reductions and improvements in product and services quality.

More competitive or lower priced products and services are levered into higher levels of consumption by the income-price elasticities of demand. This accelerates the dissemination of more competitive and lower-priced

¹ Hector McNeill is a graduate of Cambridge University having read the Agricultural Tripos and economics as well as postgrad economics and systems engineering at Stanford University.

² Robin Matthews, Professor of Economics and Master of Clare College, Cambridge provided specific feedback that transformed 3P from a policy addressing the state of inflation to one able to address any state and thereby becoming a general macroeconomic policy supporting growth in productivity and suppression or avoidance of inflation.

³ Management at what was KMG (later KPMG 1987) and Richard Wainright, economic spokesman for the Liberal party, in realising the potential of 3P drew attention for the needs for adequate data management in order to deploy this policy nationwide.

⁴ The general definition of RIO-3P growth aligns with the "growth laws" elaborated by Nicholas Kaldor, first set out in his inaugural lecture as Professor of Economics at Cambridge in 1966. See: https://www.booleian.org.uk/library/Kaldorian_extended_growth_laws.pdf

products and services contributing to the rise in consumer (B2C & B2B) purchasing power promoting growth in real incomes.

The rise in real incomes of both producers and consumers is a function of the rise in technical productivity and the degree of success in setting prices on a stable or falling trajectory. This is quite distinct from conventional policies (Keynesianism, monetarism, supply side economics and modern monetary theory) which have no instruments to stimulate productivity, costs control or price reductions.

3P business rules

The 3P business rules guiding price setting entail the comparison of the trade-off options between output prices selected and the product of the volumes of potential sales volumes and prices. Therefore, price setting is guided by the comparison of potential total volume of sales and margins.

On the consumer side, depending on the range of options of output prices, there is a different level of purchasing power (B2C & B2B), which represents a quantifiable gain in growth. This is a direct function of the different feasible incremental reductions in the rates of rise in inflation or absolute unit price reductions.

Income-price elasticities of demand

The projection of sales volumes and value associated with reduced unit prices is a function of the income-price elasticity of demand proportional to price changes. Normally the downward projection of inflation and/or prices will generate a higher rate of dissemination of lower priced products and services into markets creating a growth in purchasing power and real incomes.

This avoids the negative impacts on real incomes associated with inflation control using raised interest rates or taxation. Interest-rate based inflation control augments financial costs and therefore reduces real incomes and taxation also reduces real incomes.

The nature of 3P policy instruments

3P makes use of two policy instruments to provide incentives for more efficient production and better quality produce.

- A Price Performance Ratio (PPR)
- A Price Performance Levy (PPL)

Price Performance Ratio

By setting the policy objective as the maintenance or increase in real incomes, corporate performance, in terms of contributions to real incomes growth, cannot be measured using the conventional measures of productivity as output by person hour or total factor productivity. This is because the distribution of such material gains to margins, shareholder value or executive bonuses, workforce wages or direct impacts on prices remain hidden.

With a policy objective of sustaining real incomes, it is the impact of a company on the rate of output inflation or price movements compared to input inflation or price movements which measures the impact of the company on real incomes of consumers. Thus, by measuring the response of output prices to changes in aggregate unit input costs it is possible to provide an estimate of this performance.

For this purpose, the Price Performance Ratio was developed as the measure of the percentage response in unit output prices to the percentage change in aggregate unit input costs.

$$PPR = \Delta UP / \Delta AUC$$

Where ΔUP is the change in unit output prices; ΔAUC is the change in aggregate unit costs.

Multiple states

The basic PPR formula above is the one appropriate for the state of inflation. In 1981, Robin Matthews⁵ in reviewing a monograph describing 3P noted that this was the only state being addressed and he suggested that all other possible states needed to be defined to extend the application of the policy to all other possible states.

These additional formulae were developed⁶ resulting in 3P becoming a macroeconomic policy able to manage any state of the economy.

PPR breakpoints

The PPR has useful breakpoints which separate performance states of companies and the economy and which reduce or increase consumer real incomes as well as producer margins.

In the case of PPRs that are greater than unity ($PPR > 1.00$) or equal to unity ($PPR = 1.00$) this indicates that a company is increasing ($PPR > 1.00$) or maintaining ($PPR = 1.00$) the output inflation rate at the input rate. In both cases the real incomes of consumers are depressed.

On the other hand, in the case of PPRs of less than unity ($PPR < 1.00$) indicates that a company is reducing inflation or absolute prices and raising consumer real incomes. It is this case that is of interest as the foundation for securing the policy objective.

The fate of margins

However, if companies operate on a PPR of less than unity by reducing either the rate of output inflation or reducing output prices there will be a reduction in unit margins. Therefore, if policy provides the means to compensate this reduction then this provides a basis for a policy incentive to alter the PPR in such a way as to maximise the sum total of margins and aggregate sales. This would ensure that such transactions raise consumer real incomes, the policy objective. The principal instrument to align this motivation of companies with this policy objective is the Price Performance Levy.

Price Performance Levy

The application of the PPR is realised through a Price Performance Levy (PPL). This is a taxation instrument which operates on a sliding scale according to the PPR value obtained.

There are many ways to relate the PPL to the PPR but in basic terms it consists of a formula that combines a Basic Levy "B" (the basic tax rate) which is weighted by an additional PPR function to increase (surcharge) or reduce (rebate) the Basic Levy B so as to vary net-of-levy margins.

Thus, companies with PPRs of less than unity receive PPL rebates which increase net margins. The rebates increase as a function of the PPRs value below unity. The lower the PPR the greater the rebate.

A PPR of unity ($PPR = 1.00$) pays the basic rate B and a PPR greater than unity ($PPR > 1.00$) pays a surcharge proportional to the value above unity, reducing net margins.

⁵ Professor of Economics, Cambridge University.

⁶ In practice the calculations are based on computer programs using a Boolean decision tree with Boolean operators to route the focus of the system to the correct formula according to the movements in prices.

There are “families” of PPL formulae which can intensify or attenuate the degree to which the PPR weights the Basic Levy B according to the state of the economy.

An example array of PPL rates and PPRs

An example of the application of a “power formula”⁷ for the Price Performance Levy (PPL) and the net margins resulting from the variations in PPL according to the PPR is shown below.

Variation of net margins with PPR

Gross Margin	PPR	PPL	Rebate (-) Surcharge (+)	Net margin
100	1.20	28.80%	+8.80%	71.20
	1.00	20.00%	0.00%	80.00
	0.80	12.80%	- 7.20%	87.20
	0.60	7.20%	- 12.80%	92.80
	0.50	5.00%	- 15.00%	95.00

McNeill, H. W., “The Bank of England: 1975-2025 – The Consequences for the People”, GBF, Amazon Editions, 2024.

Treasury & national economy accounts

The operation of the “surcharges” and “rebates” involve corporate money to the extent that surcharges or the Basic Levy B is actually collected when the situation warrants this action. All rebates consist of a sliding scale of “tax allowances” which represent taxation not collected.

The National Audit Office published an assessment of “Tax measures to encourage economic growth” in 2024 covering HM Treasury and HMRC activities. It is understood that something like £100 billion was made available as tax allowances by that so far it had not been possible to provide estimates on gains in growth resulting from the take up of these allowances. Based on our own reviews of tax allowances in Europe and UK, these have never come up with sound quantitative data on any impacts of tax allowances on growth.

Part of the issue is that such allowances are assigned on the basis of an assumption that benefits will be associated with actions such as investments that will increase productivity and growth. However, although the intent is to encourage growth the specific motivations of companies with respect to tax allowances are not always to invest as policy intends but to simply lower costs or tax charges. As a result, companies do not perform as a result of tax allowances as policy makers expect.

Supply side economics

In a similar fashion, “Mundellian”⁸ supply side economics offers higher income earners lower marginal tax rates with no certainty of this resulting in such funds being allocated the way to lower inflation or stimulate growth as policy makers imagine.

⁷ “power formula” is one of a family of PPL formulae which intensifies the weighting given to the Price Performance Ratio (PPR)

⁸ “Mundellian” refers to Robert Mundell the Canadian economist who developed supply side economics and who associated this with Robert Laffer’s Laffer Curve.

Making policy pay

In the case of 3P, benefits (rebates) are only provided as a result of companies demonstrating operational performance improvements demonstrably contributing to raised real incomes and national growth. The coordination of the timing of performance assessment and rebate relies upon the specific type of information management system deployed by 3P which makes real time settlement possible.

3P knowledge & calculation benefits

Because PPL estimates are determined at the individual corporation level, the perennial problem of central government establishing and imposing policy instrument values such as interest rates of tax allowances to a highly heterogeneous population of constituents and economic units can be optimised avoiding the imposition of arbitrary differential impacts. 3P effectively eliminates the “knowledge and calculation problem” identified by von Mises⁹ and Hayek¹⁰ affecting centralised government policy making and management.

3P provides enterprises with the freedom to set prices in such a way that policy actually assists in the allocation optimisation process no matter the condition of the company while supporting the principal policy objective.

The overall result is a general supply side externality which takes the form of a public good with economic activities creating markets characterised by mutual value-added transactions promoting positive growth.

Information management

An important requirement for this policy approach is a precise monitoring of corporate level transactions in order to estimate PPRs accurately and to avoid fraud or “creative accounting”. This is essential to ensure that corporate performance outcomes remain aligned with the policy objective.

The solution to this challenge is an integrated information management system which separates the oversight of corporate transactions from the policy facing components while ensuring a precise calculation of PPRs and PPLs according to the prevailing policy incentive settings.

Real time operation

A factor in supporting incentives is the possibility of real time settlement based on the design of the IT system in terms of corporate data confidentiality and security through automated levy calculations reducing the administrative overhead and delivering real time payments (settlements).

The corporate modules include information management support for such functions as trading floors for procurement and sales and a processing module to determine PPR values and to assess PPL settlements. As a result, revenue becomes a real time flow also. Part of the incentive on the part of companies to make use of 3P is that price setting and the PPL rebates can not only lever higher total sales volumes as a result of lower unit prices but the settlements in terms of PPL payments can be completed in real time.

While this represents a significant change in business rules surrounding price setting the impact on consumers is also real time avoiding the sometimes multi-month delays in the impacts of interest rate policy decisions..

A strategy for introducing the policy

Because RIO-3P has never been applied in the United Kingdom there would be an adjustment required at the commissioning stage to adjust the ranges of PPRs expected and the corresponding PPLs to satisfy policy

⁹ Ludwig von Mises "Economic Calculation in the Socialist Commonwealth" (1920), Published in Archiv für Sozialwissenschaft und Sozialpolitik (Archive for Social Science and Social Policy).

¹⁰ Friedrich Hayek, "Economics and Knowledge" (1937), *Economica*.

RIO-3P

objectives (growth in real incomes) involving adjustments to the information systems on the side of companies and government.

Therefore, it is best launched as a pilot scheme and on a voluntary basis.

The sectors where RIO-3P can bring about a rapid beneficial impact include utilities such as water and energy and primary production sectors such as minerals mining and agriculture.

Most utilities have a reduced number of inputs and outputs facilitating setups and commissioning of information systems.

The perennial plight of agriculture facing a constant diminishing terms of trade of rising costs and stagnant output prices in a buyers' market can benefit from the automatic adjustments made by 3P for yield variations.

Notable additional properties of RIO-3P

Companies volunteering to participate in a RIO-3P pilot scheme should find their competitive position changing rapidly in their favour which should encourage more to volunteer.

Under a RIO-3P regime, the impact of the PPR/PPL accounting in supply chains can result in an incremental or stepwise reduction in inflation or prices at each level of transaction, as one progresses down a supply chain. This should increase the motivation for sectors to attempt to bring as many supply chain nodes onshore.

This is illustrated below. "A" through "E" are different supply chains each with 3 participants with the same PPR values ranging from 0.25 to 1.20. For illustrative purposes, each supply chain has the same high input inflation rate of 15%. The output column shows the resulting inflation at the consumer level.

The impact of the Price Performance Ratio (PPR) on output inflation in a 3 node supply chain

	INPUT	PPR	PPR	PPR	OUTPUT
A	15%	1.20 1	1.20 2	1.20 3	25.9%
B	15%	1.00 1	1.00 2	1.00 3	15%
C	15%	0.95 1	0.95 2	0.95 3	13.5%
D	15%	0.50 1	0.50 2	0.50 3	1.9%
E	15%	0.25 1	0.25 2	0.25 3	0.23%

McNeill, H. W., "The Bank of England: 1975-2025 – The Consequences for the People", GBF, Amazon Editions, 2024.