



Michael Polanyi's economics: a strange rapprochement

Agnès Festré

► To cite this version:

| Agnès Festré. Michael Polanyi's economics: a strange rapprochement. 2018. <hal-01931732>

HAL Id: hal-01931732

<https://hal.science/hal-01931732v1>

Preprint submitted on 22 Nov 2018

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

MICHAEL POLANYI'S ECONOMICS: A STRANGE RAPPROCHEMENT

Documents de travail GREDEG
GREDEG Working Papers Series

AGNÈS FESTRÉ

GREDEG WP No. 2015-36

<http://www.gredeg.cnrs.fr/working-papers.html>

Les opinions exprimées dans la série des **Documents de travail GREDEG** sont celles des auteurs et ne reflètent pas nécessairement celles de l'institution. Les documents n'ont pas été soumis à un rapport formel et sont donc inclus dans cette série pour obtenir des commentaires et encourager la discussion. Les droits sur les documents appartiennent aux auteurs.

The views expressed in the **GREDEG Working Paper Series** are those of the author(s) and do not necessarily reflect those of the institution. The Working Papers have not undergone formal review and approval. Such papers are included in this series to elicit feedback and to encourage debate. Copyright belongs to the author(s).

Michael Polanyi's Economics: A Strange Rapprochement*

Agnès Festré

Université Côte d'Azur, CNRS, GREDEG, France[†]

GREDEG Working Paper No. 2015-36

Last version: October 2018

Abstract: In this paper we provide an analysis of Michael Polanyi's contribution to economics. We stress two major influences on Polanyi's economics: first, Hayek's opposition to central planning and his defence of self-organization as a superior mechanism for coordinating individual plans; second, Keynes' macroeconomic disequilibrium approach to the adjustment of savings and investment that called for government intervention.

Polanyi blent these two influences and provided an idiosyncratic synthesis, which is an unfortunately neglected contribution in the field of economics. Moreover, we show that this synthesis is consistent with two important features of Polanyi's intellectual background: on the one hand, liberalism, which entailed two overlapping notions of freedom (traditional private freedom together with public liberty); on the other hand, his humanistic end-oriented type of evolutionism tainted with Catholic ideas.

The paper highlights that these two features go hand in hand with Polanyi's view of tacit knowledge, which shapes his original and rich reflection about institutions.

Keywords: Michael Polanyi, Hayek, Keynes, spontaneous order, State intervention, liberalism, evolutionism

JEL codes: B25, B31, B41

* The first version of this paper owes a lot to Pierre Garrouste, my colleague and partner in life, who died August 21st 2016 in Nice after a two-year struggle against cancer. Warm thanks go to Martin X. Moleski for very helpful discussions and comments. We also thank Struan Jacobs, Nicolas Brisset, and Geoffrey Hodgson for their remarks and comments.

[†] Postal address : CNRS – GREDEG, Campus Azur, 250 rue Albert Einstein, CS 10269, 06905 Sophia Antipolis Cedex. E-mail : agnes.festre@gredeg.cnrs.fr

1. Introduction

Michael Polanyi, a very impressive and interesting scientist and philosopher, was born in Budapest in 1891 and died in 1976 in Northampton, UK. He completed a medical degree in 1913 and a PhD in physical chemistry³ in 1917, both at the University of Budapest. In 1919, he converted from Judaism to Catholicism⁴. He moved to Karlsruhe where he continued to study physical chemistry; then, after a short stay in Budapest, moved to Berlin where he obtained a position at the Kaiser Wilhelm Institute for Fiber Chemistry⁵. He moved to Great Britain in 1933 to take up a position at the University of Manchester after the Nazi regime's imposition of a prohibition on Jews in civil-servant positions. He continued to work in chemistry at the University of Manchester until 1948, but in 1937 his interest gradually switched to popular education in economics. As lamented by Melvin Calvin, one of Polanyi's Post-Doc student in 1935 and 1936 who later won the Nobel Prize, 'it was hard to interest Polanyi in chemistry subjects anymore' (Nye, 2002, p. 125 referring to Calvin 1991-2). He had many discussions about economics with his brother, Karl Polanyi (1886-1964), who was living in London. Like Karl, Michael was very concerned, for both professional and family reasons (his mother was from Vilnius), about the economic and political situation in the Soviet Union, which he visited for the first time in 1928 (Scott and Moleski, 2005, p. 154). In 1936, Michael Polanyi met Bukharin (Polanyi was invited to give a series of lectures to the Ministry of Health Industry in the USSR) who stressed that in socialist societies all scientific research is to be connected to the needs of the ongoing Five Year Plan. In this regard, Michael Polanyi noted developments in the study of genetics after Lysenko's doctrine received the support of the Soviet State. Similarly, in the same period in Great Britain, the Marxist John Desmond Bernal, was one of the defenders of planned scientific research. Increasingly concerned with the danger of a generalized tendency to planning in science, Polanyi founded in 1940 the Society for Freedom in Science in cooperation with the biologist John R Baker and the ecologist A. G. Tansley. The Society attracted various intellectuals and high profiles scholars working in very different domains. This meeting of minds contributed to making Polanyi acquainted with a variety of disciplines, including economics. Furthermore, it strengthened his inclination towards active engagement in political life. As a scholar untrained

³Michael Polanyi's son, John Polanyi, won the Nobel Prize for Chemistry in 1986.

⁴ 'Michael Polanyi was baptized into the Catholic Church on October 18, 1919 (well into the era of the White Terror), but it is unclear whether this was an act of faith or a practical step to facilitate his employment in Karlsruhe, Germany, where he was to emigrate shortly' (Frank, 2012, p. 209).

⁵For a precise biography of Michael Polanyi see Nye (2011) and Scott and Moleski (2005).

in economics he was probably more aware of the layman's exposure to fallacies and misrepresentations and of how they can be manipulated by political leaders. He was particularly concerned about the diffusion of Keynes' ideas in order to cure unemployment and used both moving picture technology and chemical apparatus as pedagogical tools aiming at describing the principles underlying the economic life in a way accessible to the general public⁶.

As well documented by the secondary literature, Polanyi's view of knowledge has some commonalities with Hayek's. Although there is a debate on when and to what extent Hayek incorporated the cognitive psychological content of *Sensory Order* (Hayek, 1952a) (see Caldwell 2004) and on how Hayek's notion of tacit knowledge differs from Polanyi's one (see Oguz 2010), both authors provided some epistemological grounds to the critique of economic planning and promoted self-organization as a more efficient economic coordination mechanism⁷.

At first sight, there are objective reasons why providing a consistent synthesis of Hayek and Keynes' economic ideas can be seen as an unachievable task; it is well known that the two economists disagreed heartily about the role of money in the economy and economic policy. Although Keynes was not a defender of central planning, he advocated use of government to help regulate the economy in the context of unemployment. Hayek believed that economic freedom was tied to free markets and the less government intervention, the better for the economy. However, they were not completely opposed. Hicks (1967) already highlighted proximities between Hayek and Keynes⁸. More recently, Boehm (1989) and Butos and Koppl (2014) emphasized that, in particular, they shared a subjectivist approach regarding expectations.

Our aim in this paper is to show that there is coherence in Polanyi's economics demonstrated by the rapprochement he proposes between Hayek and Keynes. To explain this coherence the aim is not trying to find proximities between Hayek and Keynes, but to show that *from Polanyi's point of view* it is possible to defend both conceptions. Our main argument is that

⁶ We refer here specifically to the two films, the 'economic machines' he designed in his chemical laboratory at the University of Manchester in the 1930s and the visual representations (in particular the 'money belt') he used in *Full Employment and Free Trade* (1945). See Biró (2017), Beira (2014-2015) and Moodey (2014-2015).

⁷ It is beyond the scope of this paper to analyse the proximity between Hayek and Polanyi visions of tacit knowledge. As well documented by the secondary literature, Gestalt psychology provided a common philosophic background. See Mullins (2010) for Polanyi's use of Gestalt psychology and De Vecchi (2003) for the place of Gestalt psychology in the making of Hayek's thought.

⁸ See also O'Driscoll, 1977), and more recently, Arnon (2014).

Polanyi's and Hayek's conceptions of liberalism and evolution are different, which made it possible for Polanyi to agree that the State should intervene to reduce unemployment while also upholding the concept of a self-organized economy and society.

A secondary objective of the paper is to shed light on Polanyi's approach to institutions.

The paper is organized as follows. In Section 2 we present Polanyi's mixed conception of economics. In Section 3 we present the conceptions of liberalism and evolutionism of Hayek and Polanyi respectively, arguing that these differences help to understand the synthesis provided by Polanyi in the field of economics. Section 4 concludes the paper.

2. Polanyi's mixed conception of economics

Polanyi's contribution to economics is found in a few articles (Polanyi 1935, 1938, 1940a) and in a book entitled *Free Employment and Free Trade* (1945). His writings are divided between attacks on the Soviet system and lucid commentaries on the work of Lord Keynes. Between 1935 and 1950, Polanyi corresponded with a number of important economists including Friedrich A. Hayek and John Maynard Keynes. His position as a scientist and a social thinker led him to become involved with a group of intellectuals in England concerned with social problems. This group, the Moot, was convened by Joseph H. Oldham, editor of the *Christian Newsletter* (Cash, 1996, p. 7).

In his writings in economics Polanyi is close to Hayek. He was however not convinced by Hayek's conception of economics and especially his defence of *laissez faire* in the field of

economic policy.⁹ When he read Keynes's *The General Theory of Employment, Interest and Money* he was impressed by its economic policy implications¹⁰.

In fact, Polanyi defends both a Hayekian conception of society and a Keynesian macroeconomic approach. The first is more in line with his conception of knowledge and emergence of novelty, which he describes also as a polycentric process, and the second is more in line with his idea that it is possible to solve economic inefficiencies using what Popper calls 'piecemeal technology'¹¹. We examine these two influences, which differ completely in the ways the arguments are organized: In his Keynes-inspired approach, Polanyi does not base his discourse on the idea of emergence but he is deliberately situated at the macroeconomic level. By contrast, in his Hayek-inspired approach, Polanyi's interest is focused on how an order emerges from the individuals' actions and interactions.

*2.1. Polanyi's Hayek-inspired approach to inter-individual economic coordination*¹²

What Polanyi takes from Hayek is the idea that freedom is an essential element of coordination¹³. In *The Republic of Science* (1962), Polanyi compares the market mechanism *à la* Hayek and the functioning of science¹⁴. He advocated against the idea that pure science

⁹ 'In the controversy between Laissez Faire and Planning my outlook leans distinctly towards the former... Yet I have proposed some measures, which many people may call "planning". If we understand by "planning" the setting aside – in whatever instance – of an alleged automatism, which economic science used to consider as inescapable, and its replacement by government action, then I have certainly suggested definite measures of "planning"' (Polanyi, 1945, p. 149). 'Besides, if I recalled the memorable campaign through which he [Friedrich Hayek] defended for a time some indispensable truths against the turbulent hopes of contemporary opinion, I should also have to criticize to a certain extent the position he took up in this struggle. He addressed an age obsessed by the fear of mass unemployment while turning an indifferent eye on this problem. This surely was a mistake' (Polanyi, 1949, p. 267).

¹⁰ 'But since the early 1930s a new and more enlightened opinion has begun to dawn upon economic science, and through the publication in 1936 of *The General Theory of Employment, Interest and Money*, by J.M. Keynes, the light finally broke through' (Polanyi, 1945, p. 2).

¹¹ By analogy with the central role of piecemeal experiments in the sciences, Popper argues that piecemeal social engineering is the only type of reform (in contrast to economic or social planning) that can be rationally justified, namely, a conception of public intervention that is small-scale, incremental, and continuously amended in the light of experience. Note that Polanyi never refers explicitly to the notion of piecemeal technology.

¹² For a comparison between Hayek and Polanyi, see Mirowski (1998-1999).

¹³ 'The essay I am offering here for the celebration of my honoured friend Fritz Hayek is on a subject close to his major interest' (Polanyi, 1997, p.183). This essay is part of a book published in 1969: *Roads to Freedom: Essays in Honour of Friedrich A. von Hayek*. This Festschrift of 'honorary essays' presented to Hayek on his 70th birthday includes essays by Erich Streissler, Jacques Rueff, Peter T. Bauer, James M. Buchanan, Gottfried Haberler, George N. Halm, Ludwig M. Lachmann, Friedrich A. Lutz, Fritz Machlup, Frank W. Paish, Michael Polanyi, Karl R. Popper, Günter Schmölders, and Gordon Tulloch.

¹⁴ For the debate over who, Hayek or Polanyi, is the father of the notion of spontaneous order, see Jacobs (1999) and the pro-Hayek response from Bladel (2005). Moleski would seem right in writing (personal communication): 'I am not sure it is fair to say that Polanyi "took" this theme from Hayek. I think it developed quite naturally from his instinctive dislike of Soviet economics and a philosophy of science that made it the handmaid of totalitarian ideals'.

could be based on social demand¹⁵. In *The Republic of Science* he begins by analysing the functioning of a free market *à la Hayek*, and stresses the idea that the scientific community should be subject to the same rules¹⁶:

What I have said here about the highest possible co-ordination of individual scientific efforts by a process of self-co-ordination may recall the self-co-ordination achieved by producers and consumers operating in a market. It was, indeed, with this in mind that I spoke of “the invisible hand” guiding the co-ordination of independent initiatives to a maximum advancement of science, just as Adam Smith invoked “the invisible hand” to describe the achievement of greatest joint material satisfaction when independent producers and consumers are guided by the prices of goods in a market (Polanyi, 1962, p. 56).

He called this process of coordination polycentricity: ‘I think I have proved in earlier writings that the production and distribution of modern technological products can be conducted only polycentrically, that is, by essentially independent productive centers distributing their products through a market’ (ibid, 183).

The idea of polycentricity is another avatar of Polanyi’s seminal distinction between two kind of orders which one finds in Polanyi’s 1941 essay “The Growth of Thought in Society”, where he developed his vision of the organization of science¹⁷. The first one ‘consists in limiting the freedom of things and men to stay or move about at their pleasure, by assigning to each a specific position in a pre-arranged plan’ (Polanyi, 1941, 431). By contrast, in the other order, which characterizes both natural and human settings, ‘no constraint is applied specifically to individual particles (...). The particles are thus free to obey the internal forces

¹⁵ ‘I appreciate the generous sentiments which actuate the aspiration of guiding the progress of science into socially beneficent channels, but I hold its aim to be impossible and indeed nonsensical. An example will show what I mean by this impossibility. In January 1945, Lord Russell and I were together on the BBC Brains Trust. We were asked about the possible technical uses of Einstein's theory of relativity, and neither of us could think of any. This was forty-years after the publication of the theory and fifty years after the inception by Einstein of the work which led to its discovery. It was fifty-eight years after the Michelson Morley experiment. But, actually, the technical application of relativity, which neither Russell nor I could think of, was to be revealed within a few months by the explosion of the first atomic bomb. For the energy of the explosion was released at the expense of mass in accordance with the relativistic equation $e = mc^2$ an equation which was soon to be found splashed over the cover of *Time* magazine, as a token of its supreme practical importance’ (Polanyi, 1962, p. 62).

¹⁶ For a critique of this conception see Knight (1949), Buchanan (1967) and the response of Roberts (1969).

¹⁷ Note that the concept of polycentricity diffused to governance studies, thanks to Vincent and Elinor Ostrom and the Bloomington School of institutional analysis (see Aligica and Boettke 2009).

acting between them, and the resultant order represents the equilibrium between all the internal and external forces' (ibid.).

In Polanyi (1948, 248-249) we find a demonstration, through the use of graph representations, of the impossibility of economic planning through the comparison between two opposed coordination devices that characterize the two kind of orders, namely, corporate authority and spontaneous order (see Figures 1-5 in the Appendix).

What Polanyi wants to demonstrate is the superiority – in terms of efficiency – of spontaneous order over corporate authority when the number of interacting individuals becomes significant. In other words, 'the impossibility of central economic direction lies in the much shorter span of control [the number of adjustable relations] of a corporate authority as compared with a self-adjusted system' (Polanyi, 1948, p. 256).

This approach based on the importance of the span of control in the definition of the principles of management was first proposed by Graimucas (1933), then revived by Meier and Bolt (2000) and developed by Theobalt and Nicholson-Crotty (2005)¹⁸.

According to Meier and Bolt (2000, p. 120), any quadratic formula relating production (Y) to span of control (X) within a given set of organizations can be defined by three key parameters, as denoted in the following equation:

$$Y = \alpha - \gamma(X - \beta)^2$$

where α is the highest value that Y can attain (i.e., maximum output), β is the value of X (span) where output is maximized, and γ is a constant that adjusts the curve to be either narrower or wider. Furthermore, they find a relation between organizational performance and span of control similar to Polanyi:

¹⁸The notion of 'span of control' has been first introduced in Management by Graicunas (1933, 1937). This notion came from the psychological notion of 'span of attention'. The formula known as the Graicunas formula can be written as follows:

$$r = n \left[\frac{2^n}{2} + (n - 1) \right]$$

where r is the number of relationship and n the number of subordinates. Accordingly, the 'span of control' is defined by n , the number of cross relationships equals $n(n-1)$ and the direct group relationships $n(2^n/2 - 1)$. See Gulick and Urwick (1937), Urwick (1956, 1974), Nickols (2011).

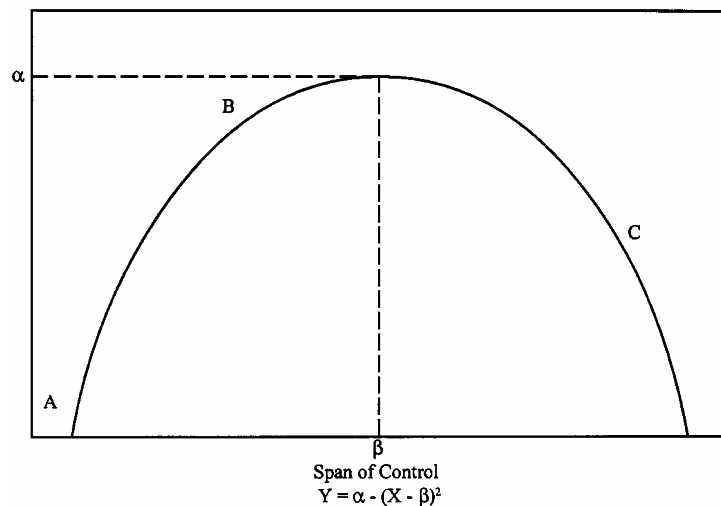


Figure 6. Span of Control and Outputs: The Theoretical Relationship

(source: Meier and Bolt, 2000, p. 121).

Polanyi completes his analysis of market efficiency (compared to corporate authority) with an analysis of the incentives needed for economic actions when their performance is not necessarily in the actors' interests. Accordingly, he lists the 'five determinants of societal action, which, for the sake of further discussion', he prefers 'to write in the sequence: Powers, Tasks, Tests, Rewards, Accession' (Polanyi, 1997, p. 186).

"Power" defines people's possibility to act. It is complete in a polycentric system, and limited inside a corporation. "Tasks" are the set of actions assigned to individuals. They are determined by senior individuals within a corporation and rationally defined by the individuals in a polycentric system. "Tests" are the set of tools used to evaluate individual performance. They are based on a contract in a polycentric system, and on a fair appraisal in corporations. "Accession" is linked to the procedure of "promotion or demotion". It is defined by a contract in the case of a business corporation¹⁹.

Polanyi then analyses the institutions that, in a polycentric system, 'provide the persons making decisions with the five factors of responsible societal action' (Polanyi, 1997, p. 189). He uses the figure below (slightly modified to clarify):

¹⁹ Note that Polanyi does not analyse Accession in the case of a polycentric system.

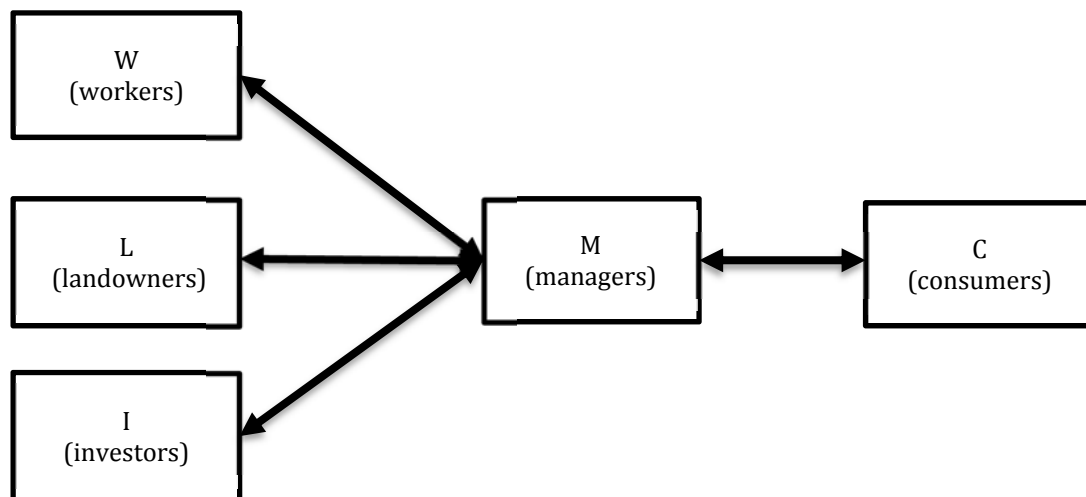


Figure 7. Resources allocation in an economic system

The double-headed arrows connecting the symbols expresses the following two way processes:

The W's allocate themselves to jobs offered by M (managers) while M's give jobs to W's. Similarly the L's assign sites to one of the plants controlled by an M, while an M decides to put his plant on a site placed at his disposal by an L. The I's allocate capital between different M's, while the M's allocate their ideas to one of the I's. On the right of the M's we see them distributing their products between the C's (consumers) while the C's choose between different M's in allocating their custom. (Polanyi, 1997, p. 190)

In the above quotation, the W's refers to the workers, the L's to landowners, while the I's stand for the investors. According to Polanyi the polycentric system permits the five determinants to function efficiently if, (i) there is a system of contracts that bilaterally links the different parties (W and M, L and M, I and M and M and C); (ii) this system of contracts being 'enforceable by a legal order of private law' (ibid., p. 190) and (iii) a price system exists that allows the different parties rationally to allocate their resources.

What distinguishes capitalism and socialism is mainly the contractual relationships between the I's and the M's. First, under socialism the I's 'are appointed by public authorities' (ibid, p.

193) and people cannot directly finance the M's and reap no profits from this: 'All risks of enterprise are pooled in the public treasury. The State bears all the losses and takes all the profits' (ibid., p. 194). Second,

in the competitive order $I \leftrightarrow M$, we still have the managers boosting their projects in competition with each other and trying to attract capital in the direction of greater profitability; but the I's being all officials of the same government cannot possibly pursue as many different and conflicting opinions as private individuals could' (ibid, p. 194).

Judging by what precedes, Polanyi's conception of the market economy sounds very close to Hayek's. More specifically, Polanyi argues that self-organization is a more efficient coordination device than planned organization because (i) from a threshold number of people, the span of control does not permit the hierarchy to organize the flows of information between the different levels of the organization efficiently; and (ii) to use modern parlance, the system of incentives is poor within an organization whereas it is strong in the market.

Nevertheless, Polanyi was conscious that the State had a role in making the market and the entire economy function efficiently²⁰. As he wrote: 'The State supervises commerce by controlling the standard forms of contracts through which it operates and by supporting the organization of markets which offer scope for public competition' (Polanyi, 1997, p.135). This is a traditional function of the State, namely, to define and enforce the rules of the economic game, in particular, contract law and to guarantee property rights.

However, according to Polanyi, roads, town halls and armaments should be funded by the public authorities: the modern State 'considers, in particular, that the care for children, for the sick, the old, and the unemployed is a public concern, and it provides services for these from public funds'. But 'the great majority of human satisfactions are, however, of distinctly individual character, and are parceled out through the market to individual consumers on commercial basis' (ibid). Thus, the State is obliged not only to defend freedom in economics,

²⁰ We do not develop this aspect of Polanyi's conception here; however, in our view, those elements are due to his strong humanism. See Kelleher (2008-2009) and below.

science and society in general but also to finance public goods and services and to avoid poverty and inequalities²¹. From this perspective it is interesting that Polanyi considers that the best way to reduce inequalities is to suppress inheritance. On the topic of speculation, Polanyi considers that ‘limitations on certain speculative opportunities and on the movement of “hot money” may be imposed permanently. However, he adds that the public will hardly approve of the permanent establishment of a broad battlefield between an army of officials and the private users of money’ (Polanyi, 1945, p. 87).

To sum up, according to Polanyi, the State has to ensure that the conditions for polycentricity (or self-organization) are warranted. In particular, property rights and contract law must be defined and enforced. Moreover, the State must first, finance public goods and public services and second, try to reduce poverty and economic inequalities as well as economic dysfunctions such as speculation for instance. The latter two tasks are absolutely not in line with Hayek’s conception of economics.

2.2. Polanyi’s Keynes-inspired approach to government economic intervention

In a letter to Toni Stolper, written in September 1937, Polanyi states that his beautiful vacation in the Bretagne ‘resulted in [the] valuable achievement of understanding Keynes’ book *General Theory of Unemployment!* A grandiose *oeuvre* that will offer nourishment to social powers for many years’ (Beira, 2014-2015, p. 9).

In his book *Full Employment and Free Trade* (1945) Polanyi takes as point of departure what he calls the ‘money circle’ and used the visual representation of a belt (the ‘Money Belt’) to characterize different states of “equilibrium” regarding the level of employment (see Figures 1 and 2 in the annexes)²². Thus, trade cycles are possible. When the economy expands, prices increase and ‘such a tendency makes prospects of further new business investment appear profitable’ (Polanyi, 1945, p. 25). The increase in new business investment creates a monetary expansion and prices rise again: ‘A business expansion is therefore a self-accelerating

²¹ Polanyi also notes that ‘if a local deficiency in health or education can be noted, national funds should, without question, be made available to remedy the weakness’ (Polanyi, 1945, p. 99).

²² Polanyi’s book was reviewed by Arndt (1946), Gilbert (1946), Lindblom (1946), Lutz (1946), Phelps Brown (1946), Stead (1946), T.M.R. (1945), Harrod (1945) and Woolbert (1946).

process' (ibid.). Similar but reverse reasoning can be applied to the process of contraction. However, expansion is not an indefinite process:

Once a retardation has set in a contracting force may gain the upper hand. Increased depreciation allowances allocated with respect to the increment of constructional equipment which was created in the upspring, combined with a comparative dearth of renewals (as to be expected in the immediate wake of a wave of new construction), will tend to produce a down-turn. Such a downward trend will go on self-accelerating for a while (ibid., p.25).

In 1938 Polanyi proposed an explanation for the existence of a cycle of reinvestment:

The cycles of reinvestment will be shown to be accompanied by regular changes in the age distribution, average age, and value of capital during which payments for reinvestment oscillate around the steady rate of amortisation, causing alternative phases of liquidation and re-absorption of capital and ending up eventually with the net liquidation of one half of the originally invested capital. The whole of this process is called 'The Settling Down of Capital' (Polanyi, 1938, pp. 153-154).

In this way Polanyi explains the Trade Cycle as the relationships between amortization payments and reinvestment. The first exceeds the second during a downturn, and the reverse effect is a source of revival following a slump.

This phenomenon, according to Polanyi, is a consequence of what he calls the Gap, that is, the difference between savings and investments.

This Gap is due to the fact that savings and investments depend on two sets of independent decisions that do not necessarily converge and 'expansions and contractions of monetary circulation arise in consequence' (Polanyi, 1945, p. 26). There is a tendency for gaps to be self-sealing because variations in the national income induce variations in both savings and investments in the same direction: 'This process of self-sealing, however, is achieved at the cost of adjusting Employment and National Income to some level which is not likely to be a desirable one. In fact, advanced industrial communities tend to adjust the level of employment well below full capacity' (ibid., p. 26).

Accordingly, because the automatic forces that fill the gap are not efficient in the sense that full employment is not naturally achieved, the gap has to be filled ‘artificially’:

The problem of Full Employment can now be seen to consist in the task of filling this gap. *In other words: to achieve Full Employment it is necessary to fill the Gap at Full Employment- the gap by which Savings exceed new commercial investment when Full Circulation is maintained* (Polanyi, 1945, p. 27, emphasis in original).

But this should not be achieved by any means. Polanyi realized that an insufficiency of demand meant an insufficiency of money. Therefore, the government should finance its deficit by issuing new money.

Interestingly, Polanyi introduces the principle of neutrality, according to which ‘the process undertaken in order to create sufficient circulation need involve and must involve no material sacrifice to speak of. *It should be, and can be, carried out in a neutral form, i.e., in a way requiring no materially significant economic or social action to accompany it*’ (ibid, p. 29, emphasis in original).

Clearly, Polanyi defines the ‘principle of neutrality’ differently from the conventional way monetary economists do. Traditionally, the principle of neutrality expresses the idea that nominal variables have no effect on real ones. This is the basis of the quantitative theory of money: If the quantity of money supplied increases then prices increase without any effect on GDP real value.

To a certain extent, the neutrality principle can be interpreted not only as an analytical tool but also as a pedagogical device aimed at making a clear distinction between what must be the province of markets (to provide for the (including monetary) needs of the public and what are the prerogatives of the State (i.e., the traditional regalian functions, but also providing for public goods, limiting inequalities, and importantly, acting as the guardian of the monetary circulation). The neutrality principle implies that the issuing of money during periods of depression should not constitute a financial burden for the public (condition 1), nor that it should produce mal- or overinvestment through inadequate tax (condition 2).

For Polanyi, an expansionary monetary policy based on fiscal deficit, and whose amount is limited to the usual government expenditures will meet the first condition because, in this case, the issuing of new money cannot be considered as borrowing:

If, employment being depressed for lack of circulation, the Government covers some of its expenditure by the issue of new money in order to supplement circulation and to restore employment, this must not be looked as a process of borrowing: but that the operation must, on the contrary, be regarded as a definitive financial act by which the Government discharges for the time being its obligation, as guardian of the level of monetary circulation (ibid, pp. 36-37).

As for the extent of the monetary policy and its potential redistribution effects, Polanyi writes that

Governments must use existing channels of public expenditure for issuing new money and do not undertake new public enterprises or deviate in any other way from the otherwise desirable course of economic policies, merely for the purpose of bringing money into circulation (Polanyi, 1945, p. 147).

Note that the two conditions for long-run efficient of monetary policy aimed at curing unemployment stand in sharp contrast with the dominant Keynesian position of the time.

Referring to Meade (1938), Polanyi writes that:

He expounded this method [the Keynesian theory] here with unsurpassed clarity, but failed to round off the picture by adding to it the principle of neutrality. His suggestion to distribute money as a supplement to social services in amounts compensating for circulatory deficiencies is in sharp conflict with this principle' (Polanyi, 1945, p. 124).

By the same token, Polanyi criticizes President Roosevelt's 1937 decision to impose a special tax on undistributed profits because such a policy induces a 'misdirection of human efforts, or

human relations' as well as employment policies as well as Beveridge's employment policies based on additional taxation (Polanyi, 1945, p. 29 et p. 57).

Polanyi is also strongly opposed to Keynesian massive fiscal policies that imply that the Government consolidates a floating debt by placing government bonds with the public. In these cases, government intervention is at odds with the principle of neutrality. Moreover, it has some counterparts in terms of seignuriage tax, which translates in a reduction of money circulation (see Polanyi 1945, p. 18).

In other words, Polanyi stresses the idea that the State, in order to solve unemployment due to the Gap, has to inject new money into the economy without compensation on the part of the public so long as this injection does not produce distortions in the real economy.

To the extent that the neutrality principle guaranties that State interventions do not distort individuals' incentives and resource allocation, they do not infringe the freedom of people to behave and coordinate. Therefore, they do not prevent spontaneous order from emerging.

As suggested by Manucci (2005, p. 156), the neutrality principle is a safeguard of the functional separation between economics and politics.

To sum up, Polanyi's half-forgotten contribution to macroeconomics is more important than acknowledged.

First, Polanyi provided an idiosyncratic coherent synthesis of macroeconomic Keynesian and microeconomic Hayekian ideas, which offers a room for a fiscal policy based on money issue as a means to cure unemployment²³. A related interpretation provided by Roberts²⁴ and van Cott is that Polanyi synthesized Keynesian economics with the monetary school of economics later associated with Milton Friedman²⁵.

It is true that contrary to Keynes who damned monetary policy, Polanyi considered money was all what mattered. On the other hand, he was not an expert of monetary theory. In particular, he did not consider, as Hayek did extensively, the role of banking credit in the

²³ See Spector and van Cott (2007) for a critique of macroeconomics textbooks presentations of pure fiscal policy that systematically neglect its underlying monetary mechanisms.

²⁴ Paul Craig Roberts is an economist who was one of Polanyi's last graduate student.

²⁵ Roberts and Van Cott make such claim: 'Being untrained as an economist allowed Polanyi to avoid pitfalls that confused economists. It also left him unaware of the magnitude of his achievement. He saw himself as a Keynesian, but in fact he achieved, in the early years of Keynesianism, before the monetarist critique, an integration of the two approaches that economists did not reach until the 1970s'.

cycle and its deleterious – in terms in over or malinvestment – interaction with government manipulation of money. He nevertheless warned against the risk of the misuse of the newly issued money in particular when it takes the form of the undertaking of new public enterprises.

Second, he was a visionary man correctly predicting that many of Keynesian policies were pointless, because they were mainly aimed at increasing the sphere of influence of government without solving the main problem according to Polanyi, namely, the needs of the public for cash balances.

As will be developed in the next section, Polanyi's economics must be put in perspective with his overall achievement, and in particular with his visions of liberalism and evolutionism.

3. Polanyi and Hayek's conception of liberalism and evolution

In the former section, we have provided a historical reconstruction of Polanyi's economic ideas. We have reached the conclusion that although Hayek and Keynes exerted a strong influence on his vision of economics, Polanyi nevertheless developed a consistent idiosyncratic synthesis. First, Polanyi stressed the idea that polycentricity (self-organization) is efficient compared to planning. Second, he supported State intervention – provided certain constraints are fulfilled – to help reduce unemployment. According to us, this synthesis can be better understood if put in perspective with Polanyi's views of liberalism and evolutionism. As a liberal, Polanyi introduces an important difference between private freedom and public liberty. As an evolutionist, Polanyi disagrees with Hayek's non-teleological interpretation.

3.1. Polanyi's liberalism

As highlighted by Mullins (2013) and Biró (2018), Polanyi envisions society as a network of overlapping layers of orders (a system of dynamic orders) that are governed by two kinds of coordination mechanisms (spontaneous market-like vs. planned organization-like). Despite differences among the various orders in society, the system as a whole cannot be maintained without what Polanyi calls 'public power'. Unlike the invisible hand, public power 'shelters and controls' the 'economic institutions of society'. In other terms, by making co-operation

the coefficient of the economic system, Polanyi appears to be rejecting competition in favor of co-operation. But competition is one of the constituent elements of the laws of the market, for which the 'invisible hand' is a metaphor (Moodey, 2014-2015, p. 32).

Polanyi's distinction between two notions of freedom, i.e., 'private freedom' and 'public liberty' reflects this dual view of coordination. Private freedom as 'individualistic' and 'self-assertive' (defended by utilitarians, romantics and nihilists) permits people to do what they please, 'whereas judges, scientists, theologians, and members of other dynamic orders have their freedom from *public purpose*' (Jacobs and Mullins, 2008, p. 127). This second kind of freedom relates to the notion of 'public liberty':

The freedom with which we are concerned here is not for the sake of the individual at all, but for the benefit of the community in which dynamic systems of order are to be maintained. It is freedom with a responsible purpose; a privilege combined with duties, as exacting as any that are shouldered by man. It may be called, therefore, Public Liberty – as opposed to Private Freedom (Polanyi, 1941, p. 438).

According to Polanyi, 'responsible public liberty sets a limit to irresponsible private freedom; but we must not think of the two as enemies. On the contrary, they merge into one another and mutually stimulate each other' (Polanyi, 1941, p. 440). In *The Foundations of Academic Freedom* (1947), Polanyi shows that public liberty supposes that scientists and scholars more generally respect standards that are based on tradition and discipline: 'These principles can be readily generalized for scholarship in general. Academic freedom can claim to be an efficient form of organization for discovery in all fields of systematic study controlled by a tradition of intellectual discipline' (Polanyi, 1947, p. 584).

For Polanyi, liberalism is grounded in a combination of the two kinds of freedom: private and public. When Polanyi takes the examples of the scientist and the judge, he stresses the idea that both have to respect standards inherited from tradition and, that it is on that basis that they can express their originality, that they can discover new results or propose new sentences. Scientists as well as judges act on 'spiritual grounds'. Both professions are committed to their job according to socially accepted rules²⁶.

²⁶ The role of commitment is essential in Polanyi's conception of science. See Hall (1982).

By contrast, Hayek's liberalism relates to a notion of spontaneous order usually seen as a single entity, which is equivalent to free society as a whole (see Jacobs, 2000).

Polanyi's liberalism is not in line with Hayek's in particular because Hayek endorsed Popper's theory of open society and, as well known, Polanyi was explicitly critical of Popper (cf. Jacobs and Mullins, 2011).

But despite some important differences, both Hayek and Polanyi were looking for ways to defeat the scientific socialism which was dominant during WW2. In a letter from July 1st, 1941, Hayek explained that he attached 'very importance to the pseudo-scientific arguments on social organization being effectively met and I am getting more and more alarmed by the effects of the propaganda' of the left scientists which 'discredit the reputation of science by such escapades'²⁷.

Polanyi is on the same line when he is concerned about the difficulty to diffuse liberal ideas that rely on propositions which are too abstract and not enough scientifically grounded, such as the notion of invisible hand. The problem with the invisible hand was precisely its inaccessibility, which frustrated the agent's economic activity from its larger social and moral sense, a void which central plannism fulfilled.

After the publication in *Nature* of Hayek's 1941 article on planning, science and freedom, Polanyi wrote him to express his commitment to their joint enterprise, stating that "the only real aim in my view is the starting of the literary and philosophical movement of our own for the renaissance of Liberalism"²⁸.

From this perspective, Hayek and Polanyi can be viewed as two pivotal figures of early neoliberalism. They shared the idea that the epistemological ground of neoliberalism (against planning) lies in a theory of knowledge that focuses on the tacit nature of knowledge and its related implications for science and society.

They however departed from one another concerning the implications in terms of organization of science. Polanyi focused on the notion of public liberty whereas, according to some commentators, Hayek's emphasis is on individual freedom²⁹.

²⁷ Hayek to Polanyi, 1 July 1941, Box 4, Folder 7, Polanyi Papers, University of Chicago Library.

²⁸ Polanyi to Hayek, 18 November 1941, Box 78, Folder 35, Hayek Papers, Hoover Archives.

²⁹ See Allen (1998) and Jacobs and Mullins (2015).

As suggested by Jacobs and Mullins (2015, p. 16), this is one of the reasons why Polanyi wrote an ambivalent review of Hayek's *Individualism and Economic Order*.

According to Polanyi, it not clear how to interpret Hayek's reference to ' "Acton and Burke [who] tell us that tradition is the only true bulwark of liberty" ' and his notion of individualist order which ' "must rest on the enforcement of abstract principles" '. For Polanyi, abstractness is a non-operational criterion for distinguishing between good and bad traditions or convention because we don't know 'how to distinguish between abstract principles on which we should base the order of the economy and speculative ideas, the fascination of which we must firmly resist?' (Polanyi, 1949, p. 267). The interpretation is even more problematic if we agree with Hayek that ' "the individual (...) must be ready and willing to adjust himself to changes and to submit to conventions which are not the result of intelligent design, whose justification in the particular instance may not be recognisable, and which often may appear unintelligible and irrational" ' (Polanyi, 1949, p. 268).

Polanyi's notion of public liberty is also associated with the importance of traditions as guides for individual behaviour. But it implies the idea of deliberate and meaningful commitment. By contrast, if for Hayek social norms and traditions are also important, it is mainly because individuals are essentially and involuntarily rule-followers.

From this perspective, Polanyi's liberalism is close to Keynes's conception of politics. Indeed, according to Keynes (1931, p. 344),

the political problem of mankind is to combine three things: Economic Efficiency, Social Justice, and Individual Liberty. The first needs criticism, precaution, and technical knowledge; the second, an unselfish and enthusiastic spirit which loves the ordinary man; the third, tolerance, breadth, appreciation of the excellencies of variety and independence, which prefers, above everything, to give unhindered opportunity to the exceptional and to the aspiring.

Moreover, in a series of lectures he gave in Oxford in 1924 and in Berlin in 1926, Keynes argued against the naïve doctrine of *laissez-faire*, saying that

the world is *not* so governed from above that private and social interest always coincide. It is *not* so managed here below that in practice they coincide. It is *not* a correct

deduction from the Principles of Economics that enlightened self-interest always operates in the public interest (Keynes, 1931, p. 312, emphasis in original).

To sum up, the idea of commitment makes Polanyi's conception of liberalism compatible with economic interventionism, under certain limits, as exemplified by his neutrality principle. In the following quotations, Polanyi defends Keynes's economic interventionism:

The orthodox Liberals [rejecting Keynes' theory out of ignorance or misunderstanding] maintain that, if the market is limited by the fixation of some of its elements, then it must cease to function, the implication being that there exists a logical system of complete laissez faire, the only rational alternative to which is collectivism (Polanyi, 1940, p. 56).

Also, in a 22 February 1937 lecture to the Manchester Political Society, Polanyi stressed that

the work of Keynes has brought an understanding of the trade cycle which seems also to lead up a proper definition of public responsibility in an industrial system. At last we have before us a fundamental criticism of liberal economics which avoids the mistakes of Communism (Polanyi 'On Popular Education in Economics', lecture delivered in February 1937 to the Manchester Political Society, box 25, Folder 9; cited in Jacobs and Mullins, 2015, p. 5, note 25; republished in *Tradition & Discovery* in Polanyi (2016)).

As will be developed further, the importance Polanyi gives to co-operation as opposed to competition, and to public liberty as opposed to private freedom, is close to his conception of mankind evolution.

3.2. Polanyi's evolutionism

Michael Polanyi's evolutionism has not been much discussed in the literature. As it can be easily imagined, it is deeply rooted in his view of knowledge. As recently argued by Biro,

Polanyi's economic thought is evolutionist in a sense that "it is based on changing knowledge in cognitive, behavioural, social and technical domains" (Biro, 2018, p. 207). Biro further draws a parallel with Dopfer and Potts' social evolutionism conceived as a multi level organized society that articulates – from both a bottom-up and top-down perspective – micro, meso and macro segments of the society, and that is based on the concept of rules, which are 'units of knowledge and therefore the building blocks of wealth and the locus of evolutionary change': 'all economic knowledge and the growth of knowledge can be analysed as a process of coordination and change in rules' (Dopfer and Potts, 2008, Preface).

There are textual evidences of the fact that Polanyi has always been an evolutionist, referring as early as in his 1941 essay to Köhler's notion of "spontaneous equilibration". But he gradually developed his own interpretation inspired by his vision of tacit knowledge and based on the notion of emergence.

Paksi (2011-2012) discusses Polanyi's understanding of evolutionary biology, as it can be reconstructed from Part IV of *Personal Knowledge* "The Logic of Achievement", along these lines. More precisely, in his attempt to situate the human knower in the largest context of biological evolutionary history, Polanyi is indeed an emergentist, not rejecting neo-Darwinism but arguing that it is logically unsatisfactory because it lacks an emergent principle of evolution, which entails finalist causes or end-directed processes³⁰. As he states,

the theory of natural selection, by subsuming that evolutionary progress under the heading of adaptation as defined by differential reproductive advantage, necessarily overlooks the fact that the *consecutive* steps of a long-range evolutionary progress – like the rise of human consciousness – cannot be determined *merely by their adaptive advantage*, since these advantages can form part of progress only in so far as they prove *adaptive in a peculiar way, namely on the lines of ascending evolutionary achievement* (Polanyi, 1958, p. 385, emphasis in original)³¹.

Polanyi claims, 'Darwinism has diverted attention for a century from the descent of man by investigating the *conditions* of evolution and overlooking its *action*. Evolution can be understood only as a feat of emergence' (Polanyi, 1958, p. 390, emphasis in original).

³⁰ Polanyi claims, 'Darwinism has diverted attention for a century from the descent of man by investigating the *conditions* of evolution and overlooking its *action*. Evolution can be understood only as a feat of emergence' (Polanyi, 1958, p. 390, emphasis in original).

³¹ 'Polanyi opposes moral relativism and advocates a society in which liberty is defended on the grounds that it facilitates the pursuit of transcendental ideals' (Goodman, 2005, p. 55).

As emphasized by Paksi (2011-2012, p. 51), Polanyi describes living beings (as well as artefacts like machines) in terms of ‘hierarchical levels which impose or are instantiated within boundary conditions; each higher level configuration operates within boundaries or boundary conditions left open (i.e., possibilities) by the lower level. Each level of harnessing and controlling the lower level(s)’. Processes operating at different levels must be independent and cannot be deduced from one another, otherwise the lower level processes wholly determine the upper ones. From this, Polanyi concludes that ‘the logical structure of the hierarchy implies that a higher level can come into existence only through a process not manifest in the lower level, a process which thus qualifies as an emergence’ (Polanyi, 1958, p. 45).

The parallel between Polanyi’s view of tacit knowledge and his interpretation of evolution is striking. In describing the concepts of (focal vs. subsidiary) awareness, he refers to stereoscopy³² and the notion of ‘clues’: ‘we don’t look at these two [the stereoscopic pictures] in themselves, but see them as *clues* to their joint appearance in the stereo-image’ and ‘the relation of *clues* to that which they indicate is a *logical relation* [italics due to M.P.] similar to that which a premise has to inferences drawn from it” (Polanyi, 1965, p. 799).

The articulation between the two types of awareness also implies an emergence. Subsidiary awareness of a whole cannot be deduced from focal awareness of its constituting parts; it is strongly linked to imagination and invention or new knowledge: ‘the *clues* of a problem anticipate aspects of a future discovery and guide the questing mind to make the discovery” (Polanyi, 1967, p. 188).

As we have hinted at in the introduction, Hayek’s view of the tacit dimension of knowledge differs from Polanyi’s ones. A closer look at Hayek’s notion of tacitness permits to contrast his evolutionism to the one of Polanyi.

As well known, Hayek’s notion of tacitness is related to the human mind’s classification, i.e., to the idea that perception is the result of this classification and not the other way around. Moreover, the process of knowledge creation is partly unconscious and not entirely

³² Stereoscopy refers to the techniques used by 3D imaging for creating or enhancing the illusion of depth in an image by means of stereopsis for binocular vision. Most stereoscopic methods present two offset images separately (about four inches from one another) a to the left and right eye of the viewer (a metaphor for subsidiary awareness). These two-dimensional are then combined in the brain to give the perception of 3D depth (a metaphor for focal awareness).

accessible: ‘it is impossible that our brain should ever be able to produce a complete explanation (as distinguished from a mere explanation of the principle) of the particular ways in which it itself classifies external stimuli’. In other terms, ‘to “explain” our own knowledge would require that we should know more than we actually do’ (Hayek 1952b, p. 47).

This explains, why for Hayek, evolution is a blind process, independent of individuals’ intentions:

though by moral conduct an individual may increase his opportunities, the resulting evolution will not gratify all his moral desires. *Evolution cannot be just*. Indeed, to insist that all future change be just would be to demand that evolution come to a halt’ (Hayek, 1990, p. 74, emphasis in original).

As the quotation clearly states, this does not imply that Hayek do not consider the personal and moral dimension of human beings. Social norms are indeed very important in his theory of evolution. In particular, they play a very important role at the individual (natural) level of selection of rules of conduct. By contrast, the social or cultural level of selection of rules (i.e., “the social order of actions”, see Hayek, 1967, p. 67) that take place at the group level is detached from individuals’ intentions (see Festré and Garrouste, 2009). As well known, Hayek’s conception of evolution is Lamarckian (because of the inheritance of acquired characteristics) and, for him, fitness is due to the capability of groups to resist competition³³. Competition then is the principle of social and economic selection and the rules of conduct are selected in so far as they permit group’s population to grow³⁴. This is the bedrock of Hayek’s argument of *group selection*³⁵.

By contrast, for Polanyi, the personal and moral dimension of human beings is at the core of the higher level processes of biological evolution:

I have not hesitated to value the more comprehensive levels of life as the higher form of existence, for the absence of value judgments in science is but a pretence, which, if followed strictly, would render biology blind not only to evolution, but to life itself. For the value of life comes into existence with life itself (Polanyi, 1964b, p. 24).

³³ See Hayek, 1990.

³⁴ Concerning the debate on Hayek’s conception of fitness, see Garrouste (1999) and Hodgson (1991).

³⁵ There is a sharp debate concerning the coherence of Hayek’s evolutionism. See Festré and Garrouste (2009).

Now, at the social level, evolution proceeds by new forms of knowledge that are embedded in persons and that can be disseminated in the society thanks to heroic engaged scientists: ‘the scientist’s decision depends on the strength of the beliefs in the light of which he interprets his observations, and we approve of this decision if we share these beliefs’ (Polanyi, 1950, p. 30). According to Polanyi, “*Man*” becomes better through evolution³⁶. Polanyi’s vision of Man is such that he considers that ‘man’s responsibility to standards of truth and rightness establishes him as a rational person’ (Polanyi, 1959, p. 90).

This is why evolution is teleological – in the sense of non-purely materialist but not implying vitalism – for Polanyi.

4. Conclusion

Polanyi’s life followed a very fascinating trajectory. His initial training was in natural sciences as a physical chemist. After moving to England, he repeatedly changed his mind and participated in societal debates on planning in economics as well as science. He defended the free market in line with Hayek’s conception of economics and society, and proposed a Keynesian approach to full employment. We have shown that Polanyi offered a consistent idiosyncratic synthesis of Hayekian and Keynes’ insights. Our interpretation is that this synthesis provided by Polanyi goes beyond the opposition between Hayek and Keynes. First, Polanyi, like Keynes and Hayek did not defend socialism and was a promoter of a free-market economy. Second, the neutrality principle can be interpreted as a means to reconcile State intervention and polycentricity. We have also emphasized that Polanyi’s conception of liberalism as well as his approach to evolution was key to understand his synthetic approach in economics.

From the perspective of institutional economics, Polanyi’s achievement illustrates his synthetic method by mixing different orders (spontaneous and deliberately organized) and is in sharp contrast with Hayek binary Manichean approach. As put forward by Nye (2011),

³⁶ ‘This is the point at which the theory of evolution finally bursts through the bounds of natural science and becomes entirely an affirmation of man’s ultimate aims’ (Polanyi, 1958, p. 404).

Michael Polanyi's original account of institutions is to be found in his work on the social dimension of science and provides a noteworthy connection with his brother Karl.

Furthermore, as we have emphasized, Polanyi considers that seeing is believing. Therefore, perceptions can be intentionally manipulated. This explains why he devoted some time to imagine new pedagogical devices based on visualisation that could serve the population to better integrate knowledge and fight against prejudice ideas: 'Modern education breaks down our natural predilections which favor the magical outlook and inculcates in us certain conceptions which primitive people do not possess' (Polanyi, 1950, p. 32).

Appendix

Following Polanyi, let us suppose a leader and three subordinates who each have three subordinates, who, in turn, three subordinates each (see Figure 1).

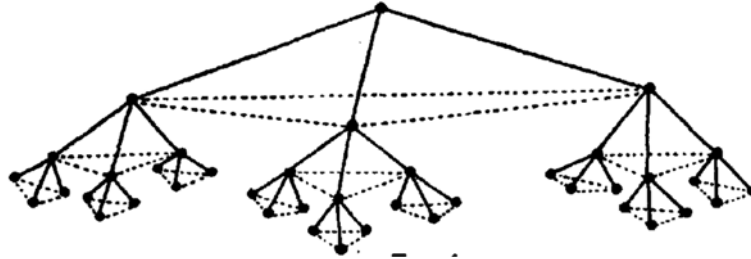


Figure 1. A pyramid of authority of 4 levels (source Polanyi, 1948, p. 248)

The total number r of connections between the nodes is given by:

$$r = 3 + 3^2 + 3^3$$

If one generalizes the three-level graph to l levels, the total number of connections is given by:

$$r = 3 + 3^2 + 3^3 + \dots + 3^{l-1}$$

The number m^{37} of ultimate subordinates equals 3^{l-1} and $i = r/m$ is the number of relations per person governed by the corporate authority (see Figure 2). In other terms, i can be interpreted as the number of connections by node and is given by the following geometric series:

$$i = (1/3)^{l-2} + (1/3)^{l-3} + \dots + 1$$

Therefore,

$$i = (3/2)(1 - (1/3)^{l-1})$$

³⁷ In his 1948 article Polanyi apparently makes an error when he evaluates m as r^{l-1} . However, it would seem to be a typographical error because the value of i is calculated using the value of $m = 3^{l-1}$.

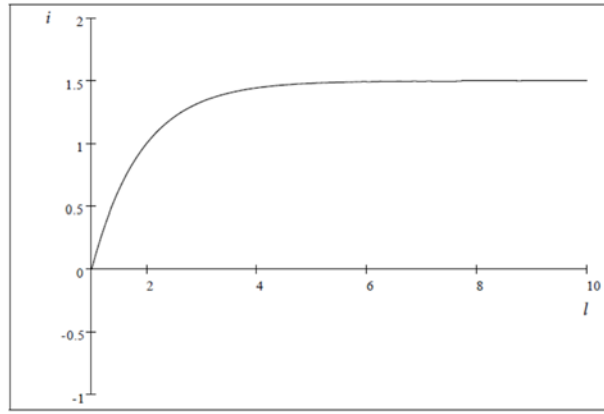


Figure 2. The curve of the function $i = (3/2)(1-(1/3)^{l-1})$ with $l \geq 1$

Suppose now that the nodes are directly connected to each other as in Figure 3, which represents a spontaneous order situation.

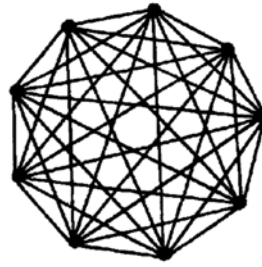


Figure 3. A system of spontaneous order of 9 individuals

(source: Polanyi, 1948, p. 249)

In the above figure, the number j of connections between the nodes equals $(9 \cdot 8) = 72$, that is, for l nodes $l(l-1)$, and for every new node the increase in j equals $l-1$.

Let k be the difference in the connections by nodes between the two organizational devices (spontaneous order and corporate authority). Accordingly:

$$k = j - i = (l - 1) - \left((3/2)(1 - (1/3)^{l-1}) \right)$$

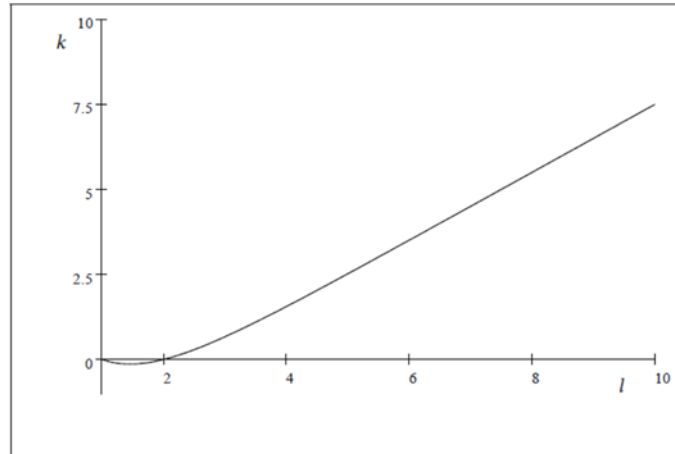


Figure 4. The curve of the function $k = (l - 1) - (3/2)(1 - (1/3)^{l-1})$ with $l \geq 1$

As shown in Figure 4, k begins to decrease and then increases from $l = 1.5$ onwards.

As far as the slope of k is concerned, it increases up to 1 and then remains constant (see Figure 5).

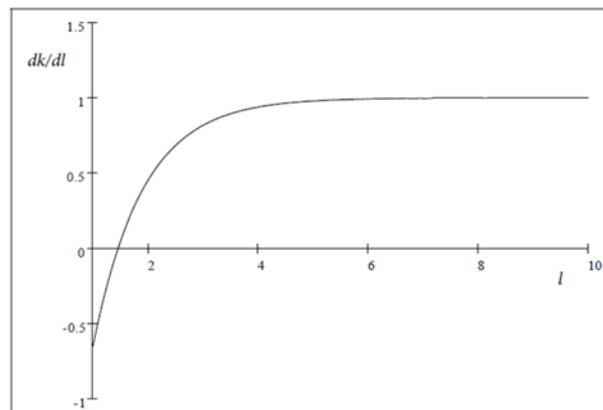


Figure 5. The curve of the function $dk/dl = 1 - (9/2)(\ln 3)(1/3)^l$, with $l \geq 1$

Insert Figure 8. The ‘Money Circle’
(source Polanyi, 1945, p. 4)

Insert Figure 9. ‘Expansion and
Contraction’
(source Polanyi, 1945, p.7)

References

- Aligica, P. D., and P. Boettke (2009), *Challenging Institutional Analysis and Development: The Bloomington School*, London: Routledge.
- Allen, R. T. (1998), *Beyond Liberalism: The Political Thought of F. A. Hayek & Michael Polanyi*, New Jersey: Transaction Publishers.
- Arndt, H. W. (1946), 'Review of Full Employment and Free Trade by Michael Polanyi', *International Affairs*, 22(4): 567.
- Beira, E. (2014-2015), "'Visual Presentation Of Social Matters" as a Foundational Text of Michael Polanyi's Thought", *Tradition & Discovery: The Polanyi Society Periodical*, 41(2): 6–12.
- Biró, G. I. (2018), 'Changing knowledge in the early economic thought of Michael Polanyi', *Journal of Evolutionary Economics*, 28(2): 207–223.
- Bladel, J. P. (2005), 'Against Polanyi-Centrism: Hayek and the Re-Emergence of "Spontaneous Order"', *The Quarterly Journal of Austrian Economics*, 8(4): 15–30.
- Buchanan, J. M. (1967), 'Politics and Science: Reflections on Knight's critique of Polanyi', *Ethics*, 77(4): 303–310.
- Calvin, M. (1991-2), 'Memories of Michael Polanyi in Manchester', *Tradition & Discovery: The Polanyi Society Periodical*, 18(2): 40–42.
- Cash, J. M. (1996), *Guide to the Papers of Michael Polanyi*, Chicago: The University of Chicago Library, Department of Special Collections.
- De Vecchi, N. (2003), 'The Place of Gestalt Psychology in the Making of Hayek's Thought', *History of Political Economy*, 35(1): 135–162.
- Dopfer, K., and J. Potts (2008), *The general theory of economic evolution*, New York: Routledge.
- Festré, A., and P. Garrouste (2009), 'The Economic Analysis of Social Norms: A Reappraisal of Hayek's legacy', *Review of Austrian Economics*, 22(3): 259–279.
- Frank, T. (2012), 'From Scientist to Scholar: The Turns of Michael Polanyi', *Euresis Journal*, 2: 205–222.
- Garrouste, P. (1999), 'Le problème de la cohérence de l'évolutionnisme hayékien', *Economies et Sociétés*, 35(1): 91–105.
- Gilbert, J. C. (1946), 'Professor Polanyi's Full Employment and Free Trade', *The Manchester School*, 14(2): 85–97.

Goodman, C. P. (2005), 'Beyond Nihilism', in S. Jacobs, and R. T. Allen (eds.), *Emotion, Reason and Tradition: Essays on the Social, Political and Economic Thought of Michael Polanyi*, Burlington: Ashgate Publishing Co, pp. 55–68.

Graicunas, V. A. (1933) 'Relationship In Organization', *Bulletin of the International Management Institute*, 7, 39–42. Reprinted in L. H. Gulick, and L. F. Urwick (eds., 1937), pp. 182–187.

Gulick, L. H., and L. F. Urwick. (eds., 1937). *Papers on the Science of Administration*, New York: Institute of Public Administration, Columbia University.

Gulick, W. (2008), 'Michael and Karl Polanyi: Conflict and Convergence', *First Principles ISI Web Journal*.

Hall, R. L. (1982), 'The Role of Commitment in Scientific Inquiry: Polanyi or Popper?' *Human Studies*, 5, 45–60.

Harrod, R. (1945), 'Full employment', *Manchester Guardian*, 9 Nov. 1945.

Hayek, F.A. (1941), 'Planning, Science, and Freedom', *Nature*, 143 (3759): 580–584.

Hayek, F.A. (1952a), *The Sensory Order: An Inquiry into the Foundations of Theoretical Psychology*. London: Routledge & Kegan Paul.

Hayek, F.A. (1952b), *The Counter-Revolution of Science: Studies on the Abuse of Reason*. Glencoe, Ill.: The Free Press.

Hayek, F. (1990), *The Fatal Conceit: The Errors of Socialism*, London: Routledge.

Hicks, J. R. (1937), 'Mr. Keynes and the "Classics"; A Suggested Interpretation', *Econometrica*, 5(2): 147–159.

Hodgson, G. M. (1991), 'Hayek's Theory of Cultural Evolution: an Evaluation in the Light of Vanberg's Critique', *Economics and Philosophy*, 7: 67–82.

Jacobs, S. (1999), 'Michael Polanyi's Theory of Spontaneous Orders', *The Review of Austrian Economics*, 11: 111–127.

Jacobs, S. (2000), 'Spontaneous order: Michael Polanyi and Friedrich Hayek', *Critical Review of International Social and Political Philosophy*, 3(4): 49–67.

Jacobs, S., and R. T. Allen (eds., 2005), *Emotion, Reason and Tradition: Essays on the Social, Political and Economic Thought of Michael Polanyi*, Burlington: Ashgate Publishing Co.

Jacobs, S., and P. Mullins (2008), 'Faith, Tradition, and Dynamic Order: Michael Polanyi's liberal thought from 1941 to 1951', *History of European Ideas*, 34(1): 120–131.

Jacobs, S., and P. Mullins (2011), 'Relations between Karl Popper and Michael Polanyi', *Studies in History and Philosophy of Science*, 42: 426–435.

Jacobs, S., and P. Mullins (2015), 'Friedrich Hayek and Michael Polanyi in Correspondence', *History of European Ideas*, vol. 42, n° 1, 107–130.

Kelleher, W. (2008-2009), 'Respect and Empathy in the Social Science Writings of Michael Polanyi', *Tradition & Discovery: The Polanyi Society Periodical*, 35(1): 8–32.

Keynes, J. M. (1931), *Essays in Persuasion*, London: Macmillan.

Keynes, J. M. (1936), *The General Theory of Employment, Interest and Money*, Macmillan: Cambridge University Press.

Knight, F. H. (1949), 'Virtue and Knowledge: The View of Professor Polanyi', *Ethics*, 59(4): 271–284.

Lindblom, C. E. (1946), 'Review of Full Employment and Free Trade by Michael Polanyi', *Journal of Political Economy*, 54(5): 463.

Lutz, F. A. (1946), 'Review of Full Employment and Free Trade by Michael Polanyi', *The American Economic Review*, 36(5): 928–930.

Manucci, M. (2005), 'Observations on Michael Polanyi's Keynesianism', in S. Jacobs, and Allen, R. T. (eds.), *Emotion, Reason and Tradition: Essays on the Social, Political and Economic Thought of Michael Polanyi*, Burlington: Ashgate Publishing Co, pp. 149–164.

Meade, J. E. (1938), *Consumers' Credit and Unemployment*, New York: Oxford University Press.

Meier, K. J., and J. Bolt (2000), 'Ode to Luther Gulick, Span of Control and Organizational Performance', *Administration & Society*, 32(2): 115–137.

Mirowski, P. (1998-1999), 'Economics, Science and Knowledge: Polanyi vs. Hayek', *Tradition and Discovery: The Polanyi Society Periodical*, 25(1): 29–42.

Moodey, R. W. (2014-2015). "'Visual Representations of Social Matters" and Later Changes in Polanyi's Social Theory', *Tradition & Discovery: The Polanyi Society Periodical*, 4(2): 25–34.

Mullins, P. (2010), 'Michael Polanyi's Use of Gestalt Psychology', in T. Margitay (ed.), *Knowing and Being*, Newcastle upon Tyne: Cambridge Scholar Publishing, pp. 10–29.

Mullins, P. (2013), 'Michael Polanyi's Early Liberal Vision: Society as a Network of Dynamic Orders Reliant on Public Liberty', 42: 162–171.

Nye, M. J. (2002), 'Michael Polanyi', *Hyle – International Journal of Philosophy of Chemistry*, 8(2): 123-127.

Nye, M. J. (2011), *Michael Polanyi and His Generation: Origins of the Social Construction of Science*, Chicago: University of Chicago Press.

- Oguz, F. (2010), 'Hayek on Tacit Knowledge', *Journal of Institutional Economics*, 6(2): 145–165.
- Paksi, D. (2011-2012), 'In defense of Polanyi's Understanding of Evolution: A response to Walter Gulick', *Tradition and Discovery: The Polanyi Society Periodical*, 38(2): 48-55.
- Phelps Brown, E. H. (1946), 'Review of Full Employment and Free Trade by Michael Polanyi', *The Economic Journal*, 56(221): 108–110.
- Polanyi, M. (1935), 'U.S.S.R. Economics – Fundamental Data, System, and Spirit', *The Manchester School*, 6(2): 67–88.
- Polanyi, M. (1938), 'The "Settling Down" of Capital and the Trade Cycle', *The Manchester School*, 9(2): 153–169.
- Polanyi, M. (1940a), 'Economics by Motion Symbols', *The Review of Economic Studies*, 8(1): 1–19.
- Polanyi, M. (1940b), *The Contempt of Freedom: The Russian Experiment and After*, London: Watts & Co.
- Polanyi, M. (1941), 'The Growth of Thought in Society', *Economica*, 8(32): 428–456.
- Polanyi, M. (1945), *Full Employment and Free Trade*, Cambridge: Cambridge University Press.
- Polanyi, M. (1946), 'Review of The Economics of Peace by K. Boulding', *The Manchester School of Economics and Social Studies*, 14: 81–86.
- Polanyi, M. (1947), 'The Foundations of Academic Freedom', *The Lancet*, 3: 583–586.
- Polanyi, M. (1948), 'Planning and Spontaneous Order', *The Manchester School of Economics and Social Studies*, 16(3): 237–268.
- Polanyi, M. (1948/1974), *Personal Knowledge: Towards a Post-Critical Philosophy*, Chicago: University of Chicago Press.
- Polanyi, M. (1949), 'Review of Individualism and Economic Order by F. A. Hayek', *Economica*, 16(63): 267–268.
- Polanyi, M. (1950), 'Scientific Beliefs', *Ethics*, 61(1): 27–37.
- Polanyi, M. (1958), *Personal Knowledge: Towards a Post-Critical Philosophy*, Chicago: University of Chicago Press.
- Polanyi, M. (1959), *The Study of Man*, Chicago: University of Chicago Press.
- Polanyi, M. (1962), 'The Republic of Science: Its Political and Economic Theory', *Minerva*, 1: 54–74.

Polanyi, M. (1964), 'The Emergence of Man', Fourth Duke Lecture, Duke University, delivered on March 2.

Polanyi, M. (1965). 'The Structure of Consciousness', *Brain*, 88(4): 799-810.

Polanyi, M. (1997), *Society, Economics and Philosophy*, in R.T. Allen (ed.), *Selected Papers*, London: Transaction Publishers.

Polanyi, M. (2016), 'On Popular Education in Economics', *Tradition & Discovery: The Polanyi Society Periodical*, 42(3): 18-24.

Roberts, P. C. (1969), Politics and Science: A Critique of Buchanan's Assessment of Polanyi, *Ethics*, 79(3): 235–241.

Roberts, P. C., and N. Van Cott (1998-1999), 'Polanyi's Economics', *Tradition & Discovery: The Polanyi Society Periodical*, 25(3): 26–30.

Scott, W. T., and M. X. Moleski (2005), *Michael Polanyi, Scientist and Philosopher*, Oxford: Oxford University Press.

Simon, H. A. (1946), 'The Proverbs of Administration', *Public Administration Review*, 6(1): 53–67.

Spector L. C. and T. N. van Cott (2000), Textbooks and Pure Fiscal Policies: The Neglect of Monetary Basics', *Econ Journal Watch*, 4(1): 60–70.

Streissler, E. (ed., 1969), *Roads for Freedom: Essays in honour of Friedrich A. von Hayek*, London: Routledge & Kegan Paul.

Stead, W. (1946), 'Review of Full Employment and Free Trade by Michael Polanyi', *Annals of the American Academy of Political and Social Science*, 247: 203–204.

Theobalt, N. A., and S. Nicholson-Crotty (2005), 'The Many Faces of Span of Control, Organizational Structure Across Multiple Goals', *Administration & Society*, 36(6): 648–660.

T. M. R. (1945). 'Review of Full Employment and Free Trade by Michael Polanyi', *Journal of the Royal Statistical Society*, 108(3-4): 470–471.

Urwick, L. F. (1974), 'V. A. Graicunas and the Span of Control', *Academy of Management Journal*, 17(2): 349–354.

Woolbert, R. G. (1946), 'Recent Books on International Relations', *Foreign Affairs*, 24(4): 742–757.

DOCUMENTS DE TRAVAIL GREDEG PARUS EN 2015

GREDEG Working Papers Released in 2015

- 2015-01 LAETITIA CHAIX & DOMINIQUE TORRE
The Dual Role of Mobile Payment in Developing Countries
- 2015-02 MICHAËL ASSOUS, OLIVIER BRUNO & MURIEL DAL-PONT LEGRAND
The Law of Diminishing Elasticity of Demand in Harrod's Trade Cycle (1936)
- 2015-03 MOHAMED AROURI, ADEL BEN YOUSSEF & CUONG NGUYEN
Natural Disasters, Household Welfare and Resilience: Evidence from Rural Vietnam
- 2015-04 SARAH GUILLOU & LIONEL NESTA
Markup Heterogeneity, Export Status and the Establishment of the Euro
- 2015-05 STEFANO BIANCHINI, JACKIE KRAFFT, FRANCESCO QUATRARO & JACQUES RAVIX
Corporate Governance, Innovation and Firm Age: Insights and New Evidence
- 2015-06 THOMAS BOYER-KASSEM, SÉBASTIEN DUCHÊNE & ERIC GUERCI
Testing Quantum-like Models of Judgment for Question Order Effects
- 2015-07 CHRISTIAN LONGHI & SYLVIE ROCHHIA
Long Tails in the Tourism Industry: Towards Knowledge Intensive Service Suppliers
- 2015-08 MICHAEL DIETRICH, JACKIE KRAFFT & JOLIAN MCHARDY
Real Firms, Transaction Costs and Firm Development: A Suggested Formalisation
- 2015-09 ANKINÉE KIRAKOZIAN
Household Waste Recycling: Economics and Policy
- 2015-10 FRÉDÉRIC MARTY
Régulation par contrat
- 2015-11 MURIEL DAL-PONT LEGRAND & SOPHIE POMMET
Nature des sociétés de capital-investissement et performances des firmes : le cas de la France
- 2015-12 ALESSANDRA COLOMBELLI, JACKIE KRAFFT & FRANCESCO QUATRARO
Eco-Innovation and Firm Growth: Do Green Gazelles Run Faster? Microeconomic Evidence from a Sample of European Firms
- 2015-13 PATRICE BOUGETTE & CHRISTOPHE CHARLIER
La difficile conciliation entre politique de concurrence et politique industrielle : le soutien aux énergies renouvelables
- 2015-14 LAUREN LARROUY
Revisiting Methodological Individualism in Game Theory: The Contributions of Schelling and Bacharach
- 2015-15 RICHARD ARENA & LAUREN LARROUY
The Role of Psychology in Austrian Economics and Game Theory: Subjectivity and Coordination
- 2015-16 NATHALIE ORIOLE & IRYNA VERYZHENKO
Market Structure or Traders' Behaviour? An Assessment of Flash Crash Phenomena and their Regulation based on a Multi-agent Simulation
- 2015-17 RAFFAELE MINIACI & MICHELE PEZZONI
Is Publication in the Hands of Outstanding Scientists? A Study on the Determinants of Editorial Boards Membership in Economics
- 2015-18 CLAIRE BALDIN & LUDOVIC RAGNI
L'apport de Pellegrino Rossi à la théorie de l'offre et de la demande : une tentative d'interprétation

- 2015-19** CLAUDE BALDIN & LUDOVIC RAGNI
Théorie des élites parétienne et moment machiavélien comme principes explicatifs de la dynamique sociale : les limites de la méthode des approximations successives
- 2015-20** ANKINÉE KIRAKOZIAN & CHRISTOPHE CHARLIER
Just Tell me What my Neighbors Do! Public Policies for Households Recycling
- 2015-21** NATHALIE ORIOL, ALEXANDRA RUFINI & DOMINIQUE TORRE
Should Dark Pools be Banned from Regulated Exchanges?
- 2015-22** LISE ARENA & RANI DANG
Organizational Creativity versus Vested Interests: The Role of Academic Entrepreneurs in the Emergence of Management Education at Oxbridge
- 2015-23** MURIEL DAL-PONT LEGRAND & HARALD HAGEMANN
Can Recessions be 'Productive'? Schumpeter and the Moderns
- 2015-24** ALEXANDRU MONAHOV
The Effects of Prudential Supervision on Bank Resiliency and Profits in a Multi-Agent Setting
- 2015-25** BENJAMIN MONTMARTIN
When Geography Matters for Growth: Market Inefficiencies and Public Policy Implications
- 2015-26** BENJAMIN MONTMARTIN, MARCOS HERRERA & NADINE MASSARD
R&D Policies in France: New Evidence from a NUTS3 Spatial Analysis
- 2015-27** SÉBASTIEN DUCHÊNE, THOMAS BOYER-KASSEM & ERIC GUERCI
Une nouvelle approche expérimentale pour tester les modèles quantiques de l'erreur de conjonction
- 2015-28** CHRISTIAN LONGHI
Clusters and Collective Learning Networks: The Case of the Competitiveness Cluster 'Secure Communicating Solutions' in the French Provence-Alpes-Côte d'Azur Region
- 2015-29** NOBUYUKI HANAKI, EIZO AKIYAMA, YUKIHIKO FUNAKI & RYUICHIRO ISHIKAWA
Diversity in Cognitive Ability Enlarges Mispricing
- 2015-30** MAURO NAPOLETANO, ANDREA ROVENTINI & JEAN-LUC GAFFARD
Time-Varying Fiscal Multipliers in an Agent-Based Model with Credit Rationing
- 2015-31** THOMAS JOBERT, FATIH KARANFIL & ANNA TYKHONENKO
Trade and Environment: Further Empirical Evidence from Heterogeneous Panels Using Aggregate Data
- 2015-32** BERTRAND GROSLAMBERT, RAPHAËL CHIAPPINI & OLIVIER BRUNO
Bank Output Calculation in the Case of France: What Do New Methods Tell About the Financial Intermediation Services in the Aftermath of the Crisis?
- 2015-33** MOHAMED SIRY BAH & THOMAS JOBERT
Une analyse empirique du processus de convergence des pays africains
- 2015-34** TAKASHI YAMADA & NOBUYUKI HANAKI
An Experiment on Lowest Unique Integer Games
- 2015-35** DINO BORIE, PIERRE GARROUSTE & ISMAËL RAFAÏ
Le temps et l'erreur comme mesures de la quantité d'attention : une approche expérimentale
- 2015-36** AGNÈS FESTRÉ
Michael Polanyi's Economics: A Strange Rapprochement