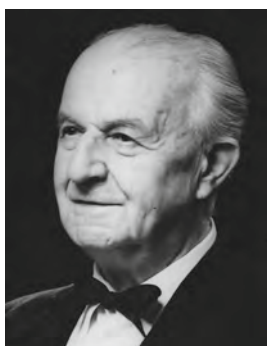


# François Perroux (1903–1987): Father of French Regional Science and Growth Pole Theory



André Torre 



François Perroux. Photo source Institut Mémoires de l'édition contemporaine <https://www.imec-archives.com/archives/fonds/000PRX>

## 1 Introduction

François Perroux's work had a major impact from the 1950s to the 1970s, both on economic theory and its applications to growth and development processes. However, his work is now somewhat neglected, and his sometimes controversial contribution is often underestimated. The purpose of this chapter is to recall the essential contribution of François Perroux to social sciences and especially to regional science, a contribution that is important in several respects, whether it concerns his theoretical

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elaborations in the field of development, growth poles, and economic space theory; his applications of growth pole theory; his role as an adviser in many developing countries, particularly in Africa and South America; or his intellectual leadership in the creation of a French section of regional science, of which he contributed to the initial deployment.

François Perroux is one of the founding fathers of regional science and undoubtedly the initiator of French and French-speaking regional science in the 1950s and 1960s. Although his work draws primarily from the tradition of Austrian authors, such as Schumpeter, Sombart, Morgenstern, and Von Mises, his theoretical contributions take into account in a fundamental way the question of space and the regional and local dimensions. He incorporates these dimensions into an original theory of growth and development, which has had an impressive posterity and is still influential today in terms of development principles. His discussions and critical friendship with Walter Isard led him to develop a theoretical conception that partially diverges from macroeconomic models to introduce more items about personal development and cooperative behaviors. His theoretical and pragmatic ideas and elaborations then lead him to influence very strongly and in the long-term the development approaches of numerous countries or regions, in particular through their use of his open and innovative spatialized growth pole theory.

## 2 A Short Biography

François Perroux was born in Lyon in 1903, the city where he defended his Ph.D. in 1928 on the problem of profit at the Faculty of Law (the faculties of economics did not yet exist in France at that time). He graduated as a major in the Aggregation in Law in 1928 and was appointed full Professor at the University of Lyon at the age of 25. He remained a teacher in Lyon until 1935, before joining the Sorbonne at the University of Paris, as well as the Institute of Political Studies (*Institut d'Études Politiques*) in Paris. In 1944, with the sponsorship of John Maynard Keynes and the support of the National Council of Resistance, he founded the Institute of Applied Economics (*Institut de Science Économique Appliquée*, ISEA), which became the Institute of Applied Mathematical and Economic Sciences (*Institut de Sciences Mathématiques et Économiques Appliquées*, ISMEA). He was a member of the Economic and Social Council of France from 1959 to 1969.

Perroux published many books on economics in the 1930s, in which he emphasized the social dimension of the economy and its link with the institutional structures of nations and regions. He then tried to design an intermediate path between communism and liberalism, based on the concepts of cooperation and corporatism and the consideration of human development. He played an important role in advising the Vichy regime during part of World War II, continuing to try to trace this third path, before separating from that regime and joining free France. Still today, his role during this period remains highly debated and controversial according to commentators.

From 1947, he became the main French economist, by his institutional position at the ISMEA and with the public authorities, but also by his many and very popular works, which exerted a very strong influence on economists and others in academic circles. He also gave birth to a vast posterity, with many disciples and inheritors, and his legacy lives on through the implementation of industrial and development policies directly inspired by his work. He opened the way to mathematical economics and formalized approaches in France, promoting the development of such research within universities. He was also a central figure in initiating the French system of national accounts, and beginning in the 1950s, played a role as advisor in development processes of various regions and underdeveloped countries. He died in Paris in 1987, in his final years having published several works that shed more light on his foundational theory.

## 2.1 *Perroux's Contribution to Economic Theory*

François Perroux was a very broad and versatile thinker. He produced numerous and wide-ranging contributions, including important insights into development theory, the social economy, planning methodology, economic spaces, and the regional development process. Moreover, he never lost sight of the applicability of his analytical elaborations, anxious to see them translated into reality and to see his proposals implemented within the framework of public, industrial, or spatial planning policies.

Perroux remains basically what would be called today a heterodox economist, because he was not convinced by the marginalist analysis and the balanced growth theory, which seemed to him too restrictive and cut off from reality. He began as a defender of the neo-Austrian equilibrium model, then gradually moved toward evolutionism and considerations of power asymmetries between agents. In 1934, he received a scholarship that allowed him to become a Rockefeller Fellow. Visiting Austria, the Danube, Germany, and Italy, he met Ludwig Von Mises, Oscar Morgenstern, and Werner Sombart, as well as following the courses of Sigmund Freud and Carl Schmitt. He came back to France infused with the values of evolutionism and the importance of considering time and economic dynamics. In 1935, he took on the French translation and wrote the introduction to Schumpeter's Theory of Economic Development (*Theorie der wirtschaftlichen Entwicklung*).

Perroux brought deep criticism of neo-classical thinking. He considered it as “the unfaithful son of the classics,” which forgets all phenomena that are foreign to the market, such as the State, the institutions, and social relations (Perroux 1961). He was skeptical of the partial equilibrium and critical of the fact that the general equilibrium model is based on the assumption of “the homogeneity of human agents and the goods and services they use.” He considers that this hypothesis, which constitutes the very foundation of the mathematical coherence of the model, leads to a theoretical elaboration which is not only far from reality, but in addition is directly contrary to the real character of the human agents and the economy they form (Perroux 1961).

Within this “atomistic” economy, where only similar and equal individuals interact, social organization is supposed to have no influence on market exchanges. This reductionism eliminates the notion of power, asymmetrical relations, differences between agents, differences in needs, but also separates the individual from the social relations in which he or she is immersed,<sup>1</sup> thus prohibiting the possibility of economic choices that are not only individual. One of the consequences is to make unseen nonmarket phenomena, such as the State, political and public constraints, conditioned and planned acts, and, more generally, all that is now called “representations,” e.g., the very phenomena which constitute the conditions for the possibility of economic activities. Thus, in addition to the institutional dimension, we lose sight of the sociological determinants of the behaviors and actions of the actors. “Economic agents are in society before they go to market and when they go there” (Perroux 1982). In the same way, he claimed that this approach forgets the social economy sector, which is considered foreign to the economy, even though it is an integral part of it.

Perroux proposes to replace individual agents, maximizing solely on the basis of the price system, by what he calls “active units,” made up of groups of people, communities, firms, regions, and even states. These active units, heterogeneous by, e.g., their character, their size, their coalitions, are above all capable of acting, collaborating, coalescing, or opposing certain decisions, and they correspond to a more holistic vision of economic functioning. They are equipped with control variables and capable of a strategic objective function of transforming the environment. Moreover, the exchanges between active units are not limited to quantities of goods and services: they are composite interactions, which incorporate exchanges of tangible goods, but also different types of relationships. Among them are power relations.

The incorporation of power relations, asymmetric relations, and struggle relations is essential in Perroux’s conception, and leads him to elaborate the notion of struggle-competition, which is ultimately close to the contemporary notion of coope-tition: Hence his interest in game theory (and his friendship with Oskar Morgenstern) that includes these two components. He is very interested in the domination processes of certain groups of actors, such as firms or organizations, and he considers economic relations as “a combination of free and reciprocal transfers of uses and power relations; it logically expresses the economic relationship which is essentially a cooperation of conflict, a competition of struggle.” In stating this approach, he comes up against the very harsh criticisms of the proponents of economic orthodoxy, such as Mark Blaug’s well-known and severe appreciation of Perroux’s theory of domination, claiming that it is a set of ideas that cannot be reproduced and “simply a slogan masquerading in theory” (Blaug 1964, p. 563).

Finally, it can be said that Perroux’s analytical attempt consists in producing an intermediate point of view between microscopic and macroscopic dimensions by integrating the variables of power and space and departing from the marginalist tradition, and by incorporating different dimensions (sociologic, psychologic, etc.) into the understanding of the economic behavior of groups of actors. Thus, until the

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<sup>1</sup> We would call this embeddedness today.

1980s, he tried to propose a complete and alternative elaboration to that of general equilibrium, without completely reaching the goal of his ambition. As Benjamin Higgins mentioned at the end of his life, Perroux “was still struggling to fill in the gaps in his general theory; the structure was incomplete. What is more tragic, he knew it” (Higgins 1983, p. 33).

## 2.2 *On the Notion of Development*

At the Liberation of France in 1944, Perroux was put in charge of the elaboration of the French national accounts system in collaboration with institutional officials Pierre Uri and Jean Marczewski. This was done at the request of the Minister of Finance of the provisional government. It was in this context that he undertook a mission to England (in June and July 1945) that enabled him to establish in-depth contacts with various colleagues, such as John Hicks, Richard Stone, Roy Harrod, Joan Robinson, Thomas Balogh, Denis Robertson, and also Friedrich von Hayek.

However, despite his involvement in the development of the system of national accounts and the recognition of its undeniable usefulness, Perroux remained very dissatisfied with the use of the concepts of growth and development, especially in the definition of GDP. He believed that economic growth, thus defined, does not take account of imbalance processes and that it is based on an opaque indicator:

Gross national product is in no way an analytical quantity; it is an empirical and statistical aggregate, the aggregate of goods, objects obtained by a national economy over a period of time. (Perroux 1981, p. 47)

This aggregate, homogeneous by construction (which is also a problem in countries where price systems differ from one branch to another) cannot in any case answer questions as essential as those concerning the economic and social objectives of growth.

Rather than referring to the concept of growth, which is too limited for him, he proposes to turn to the development question, which seems more representative of the different economic and social dimensions, and not only of the quantitative increase in production value. Development is defined as “the combination of the mental and social changes of a population that make it capable of cumulatively and sustainably growing its overall real product” (Perroux 1961, p. 155). This definition of development, which applies to both developed and developing countries or regions, is very different from that of the standard authors of the time. In particular, it takes into account the dynamics at work in these spaces. It also anticipates the future definition of composite indices of human development such as HDI, which consider different components or factors of development beyond solely economic ones. This theory is developed in particular in the book *L'économie du XXème Siècle* (The Economy of the Twentieth Century) (Perroux 1961), which can be read as his general theory of economic growth as centered around the notions of domination, growth poles, harmonious growth, and spaces.

The break with the quantitative paradigm is clear, since development is presented as the sum of structural and social changes of different natures. As an evolutionary economist, Perroux adhered to the ideas that (1) economies and societies can evolve; (2) these developments result largely from novelties, evolutions that can appear and spread; and (3) there are different stages and successive steps of development. It thus opens the door to the idea of underdeveloped or emergent countries (and economies), as well as to that of convergence (or its absence) between countries or regions. This approach also anticipates that of Amartya Sen, since Perroux considers that nourishing, caring for, educating, and liberating human beings constitute:

... very basic operations capable of providing everyone with the “starting goods.” They open to men the access to the status of persons and societies full of meaning beyond effectiveness; they allow them to strive towards fulfilment. (Perroux 1969)

Indeed, it is not a question of carrying out all these operations against the will of the people, but rather of “putting them, by common effort, in a position to be able to feed, to form and to operate their own liberation.”

### 2.3 *Economic Spaces*

Unlike many economists of his time, François Perroux’s interest in spatial or regional dimensions did not stem from reading Alfred Marshall or from popular theories of agglomeration. Rather, it resulted from the intimate and often reaffirmed political conviction in the course of his career about the necessity to reflect on economies and societies in terms that transcend the borders of nations. Thus, in many books, such as *L’Europe sans rivages* (Europe without Frontiers) (Perroux 1954), he presented himself as a fervent defender of a very large Europe, well beyond the limits of the present EU. This anti-nationalist conception also opens the door to an interest in smaller space organizations, such as the current EU regions. As well, it introduces the consideration of multiple spaces, which make sense and within which economic actors will register and evolve in order to take into account the reality of economic and social processes. It thus supports the elevation of economics to the status of an applied science.

When François Perroux published his article entitled “Economic Spaces: Theory and Applications” in the *Quarterly Journal of Economics* in February 1950 (Perroux 1950a), his contribution had already been promoted to various American colleagues, in particular during a public discussion at Harvard on November 2, 1949, in the presence of Walter Isard. François Perroux thus became the first French economist to introduce the concept of space in economic analysis; the article would be published in French in the ISEA journal, *les Archives de l’ISEA*, and later reissued in the well-known *Economie Appliquée* (Perroux 1950b). He opposes the conflating of economic space—in which actors, organizations, groups of people, or economically characterized goods evolve—with geonomic space (or the so-called banal space of localization) defined by relations between points, lines, surfaces, and volumes.

There are three economic spaces that interest him. To understand these, let's take the example of a firm's spaces.

1. The first is the economic space, defined as a content of the plan; it concerns all the relations existing between the firm, its suppliers, and its clients. This space has nothing in common with ordinary space; it has no spatial content and cannot be represented geographically.
2. The second is the economic space, defined as a field of forces; made up of producing "centers" and receptacles of "forces"; this is the one that is closest to the geonomic space. The firm, as a "center," attracts and takes away people and things from its "plan space." We find here the relations of domination, power, influence, and competition, with their asymmetries, as well as the phenomena of agglomeration and centrifugal forces.
3. Finally, the economic space as a homogeneous set corresponds to the economic relations that the structure of the firm maintains with other structures: the structure of the firm presents a more or less strong homogeneity with other structures (organization, prices, etc.), although they belong to different environments.

For Perroux, this conception of economic spaces makes it possible to escape the "illusions of localization" of people, machines, or goods, which are, in fact, largely nonlocalizable and which evolve in much wider and multiple spaces. The superimposition of the three types of economic spaces proves how "the nation that has become a State has created and installed the illusion that the various human and economic spaces are superimposable." But above all, criticism of the illusions caused by the "banal" space leads to the idea that a fruitful cooperation between economy and geography could be engaged, as similarly argued by Jean Gottman (1950). In this article in the *Revue Économique*, which in English would be titled "On the organization of space: Considerations of geography and economy," Gottman compares the reciprocal epistemologies of the two disciplines, concluding that a convergence is possible, despite often different objectives.

## 2.4 *Growth Pole Theory*

This interest of Perroux's in spatial dimensions, with a strong economic vision, is reflected in his development of growth pole theory, which brings together in a single concept all the principles of Perrouxian analysis. As such, it was his greatest success and perhaps his major contribution to economic analysis. The theory contains unbalanced principles of growth and development, dynamic properties, asymmetries between economic units of different sizes and statuses, relationships of power and influence, and consideration of economic and geographical dimensions in different economic and social contexts. This is a theory of economic development, but also of the spatial diffusion of growth and development.

Developed in the mid-1950s, growth pole theory would prove to be an extremely popular concept in the 1960s and 1970s; it continues to the present day to inspire

policy applications in different countries and regions. It is based on the fundamental assertion that:

... growth does not appear everywhere at the same time; it appears within certain places or growth poles, with various intensities; it is diffused through various channels with various final effects for the economy as a whole. (Perroux 1955, p. 309; Perroux 1969)

It is thus based on a nonlinear vision of the processes of development and growth and on the assumption that the latter is unbalanced and unequal, presenting various peculiarities regarding the different types of spaces (territories), regions, nations, etc. Therefore, it has a spatial dimension, has variable intensity, and is transmitted through different channels, with different effects for the whole economy.

The growth pole approach is based on three assumptions (Perroux 1955, 1982):

- Economic growth is localized. It is not distributed in space or in the production system.
- It is always unbalanced, with variable intensity, and is transmitted through various channels, with different rhythms and effects according to economic domains.
- It is based on the existence of a propulsive unit (or set of propulsive units), which produces linking effects on other activities distributed in the same geographical space.

The notion of “unbalanced” growth is here expressed in a spatial form, in which the industrial dimensions, and also the productive or innovative firms, play an essential role. A growth/development pole is a driving/propulsive economic unit or a set of localized units (an enterprise, an industry, a combination of firms or industries) that exerts a driving force on other units with which it is connected; as well, it provokes training effects, which are mainly local. The growth of these dynamic industries can be expected to generate more investment, employment, and distribution of factor payments.

This polarization effect is based on two main concepts: (1) “external” local economies of scale, which lead to the nurturing of backward and forward economic supply linkages, as well as fiscal and final demand linkages; and (2) economies of agglomeration, which are associated with spatial clustering and the geographic concentration of economic activities (Speakman and Koivisto 2013). The ability to polarize can thus be of a technical nature and go through inter-industry exchanges, or it can be based on income effects (Paelinck 1965). Two main categories of polarization effects derive then from the introduction of these effects: economies of agglomeration, which encourage the regrouping of complementary activities within the same area, and linkage effects between firms, most often at the local level, but not always, since the dissemination of beneficial effects can go beyond the local level and be important even at the national level.

These effects depend both on the nature of the industries and on the intensity of the links that are formed, these being stronger as the pole becomes radiant, complex, and allows an optimization of externalities. Investment should be pushed into a project that maintains the highest number of total linkage investments. They can be of two types: *upstream*, in line with the increase in purchases by suppliers or subcontractors



resulting from the increase in production of the driving firm; or *downstream*, thanks to investment in industry or service sectors that sell new products on the market.

Central to the growth pole is a group of dynamic industries that are connected around a particular resource. And at the heart of the growth pole is the propulsive firm, which initiates the development process by driving its localized environment into its growth dynamics (Ravix and Torre 1991). The very concept of a growth pole cannot be understood without analyzing that of a driving firm. In fact, Perroux substitutes for the figure of the innovative entrepreneur of Schumpeter (1934) his propulsive firm, which is at the heart of the local system and originates the main training effects. Often large, this firm uses its extra profits (resulting from its innovation policy) to reduce costs and control some complementary activities: able to govern the development and the growth of other technically linked firms.

We can see that the Perrouxian vision is based above all on large-scale production units, industrial and most often urban. The growth pole theory, in its initial version, thus applies above all to well-structured and powerful regions, with a strong and hierarchical industrial structure. A well-functioning pole necessitates a very strong interdependence between firms. To this must be added the importance and quality of the workforce, a consumer market, a mass of autonomously available capital, and the presence of research centers. Development will then produce snowball effects, with a non-negligible psychological aspect (anticipation of investments). Thus, on the one hand, growth is primarily driven by industry, which is a debatable point, and on the other hand, the amplifying effects of growth take place through the relationships being established between companies.

This theory, located in its time, finds similarities with other approaches, and particularly with two contemporary contributions to the economic analysis of growth: Myrdal's theory of cumulative growth (see Meardon 2001) and Hirschman's (1958) concept of "driving industries." As with Myrdal (1957), Perroux's growth pole concept posits a cumulative growth of firms and the economy, but in a much more explicit spatial context. But the approach is much more closely aligned to the Hirschmanian analysis of growth. The driving effects mentioned by Perroux can indeed be interpreted in terms of backward and forward linkages relating firms or industries identified by Hirschman (1958). An investment in a project induces investment in the subsequent stages of production, which is called a linkage, and it has outcomes such as diversification in value chains. And a backward linkage is a creation of investment in the stages of production leading up to the final product, such as investment in logistics or the storing of goods.

Hirschman and Perroux's concepts led to reinterpretations of the two analyses in terms of input-output relations. This recasting originated in the research of one of Perroux's main French disciples, Jacques Boudeville, who stated that the effects of propulsive industries are being studied:

... through regional activity, the technical matrix that characterizes it and the polarization vectors that modify its structure. In the long term, it is necessary to combine indirect or associated investments and the corresponding capital coefficient matrix, itself modified by polarization. (Boudeville 1972, p. 154)

This approach, inspired by the work of Leontief (1941), is developed and modeled by various authors, such as Lasuen (1969). The work became a tool of industrial policy, often applied in a very mechanistic approach close to that of Rostow (1960) with his stages of growth.

Perroux's legacy would also later influence studies on the processes of innovation diffusion (Thomas 1975). As Lasuen (1969) points out, these evolutionary possibilities were largely ignored by the first readers of Perroux in favor of more Keynesian readings, even though the latter, in its initial text, explicitly refers to Schumpeter and the force of innovations breaking the stationarity of the economic circuit and causing growth. For Lasuen, Perroux "took Schumpeter's tool-box ... from its original sectoral-temporal setting and applied it to a sectoral-temporal-geographical universe," whereas Berry (1972, pp. 340–341) considers that "the role played by growth centers in regional development is only one particular case of the general process of innovation diffusion." However, it was following the publication of the English translation of Hägerstrand's (1967) works<sup>2</sup> that the notions of poles of growth and diffusion of innovations began to be reconciled.

Today, and without being conclusive, we can assess this extremely rich approach which has undergone so many reinterpretations, reevaluations, and criticisms. The contribution of Perroux's growth pole theory to regional science has been immense (Higgins and Savoie 1988; Jansen 1970) and is attested to by an impressive bibliography: about 1.8 million citations in articles on Google Scholar! The characteristics of the propulsive firm were for a long time considered to be the most interesting contribution of this approach. We can now attribute the theory's seminal, pathbreaking status to its description of the mechanisms of the links or relations giving rise to the creation of localized networks and firms capable of implementing innovations locally and thus generating localized growth effects.

## 2.5 *Growth Pole Theory: Policy Applications*

One of the great originalities and successes of growth poles theory is that its impact has not been limited to theoretical elaboration: its principles have been applied and it has become a tool of economic policy implemented all over the world. This exceptional success is certainly linked to Perroux's desire to develop a pragmatic approach rooted in reality and to his efforts to promote and implement planning initiatives and development projects. But the success of growth poles as a tool goes much further and reflects, even today, the power of a concept and an operational and original method. However, its implementation has been accompanied by changes that sometimes go

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<sup>2</sup> First published in Swedish in 1953.

beyond or profoundly alter the initial intuition. The theory's operationalization has given rise to many criticisms of growth pole strategies' effectiveness and their real effects. A great confusion exists between the different types of growth or development poles and their real connection to the initial concept of Perroux's. Darwent (1969) tried to sort out the confusion in a review article that was the very first paper published in the inaugural volume of *Environment and Planning*, but the issues he grappled with then continue to hold lively relevance and have become even more complex today.

In the 1950s, under the influence of Perroux and his disciples, growth poles became one of the privileged tools of French planning and development policies. France has been a highly centralized country for centuries, with the state intervening in all areas of public life, and the taste of public authorities for polarization policies, which started with the growth pole policies inspired by Perroux and his disciples, continues to be confirmed, even in the 2000s (Pumain and Torre 2020), with the policy of poles of competitiveness. It was during the 1960s and 1970s, however, that the most ambitious polarization policies were implemented, under the impetus of the National Agency for Planning and Development (DATAR). There was success in regions, such as Brittany, and in urban agglomerations, like that of Lyon. As well, there were failures, such as in Marseille, with the problems experienced in promoting petrochemical industries in the area of the Berre Pond.

Subsequently, the growth pole approach was applied in many regions and industrialized countries, for example in Canada, where it was used to promote the development of the Montréal region. But it was deployed most especially in emerging countries, with the idea of provoking, through targeted investments, development processes that are first localized and then can be extended to other poles or other regions, or even the national economy. Applications have been implemented in Latin America (for instance, in Argentina, Mexico City, Venezuela... often with petrochemical complexes) and most notably in Brazil. The Brazilian growth pole strategies have been especially targeted on the development of peripheral regions, like the Nord-Este and Amazonian, with the idea of fostering a transition from extraction of raw materials to their transformation. This is also the case in Africa (Algeria, Mali, Madagascar, Mozambique, Burkina Faso, Ethiopia, Nigeria, Sudan, etc. as detailed in Speakman and Koivisto 2013), with, here again, the idea of provoking localized growth or development processes likely to extend to a whole country.

In most cases, encouraging the development process has been seen as being linked to the implementation or strengthening of an industrial complex; growth is supposed to impact firms and related industries, and thus spread through the region of origin, possibly creating related centers in other areas. Originally, it was essentially viewed as a process of industrialization, in sectors such as chemicals, electronics, modern energy centers, but the list expanded in the twenty-first century to encompass petrochemical complexes, agrochemical clusters, semiconductor chips, new rare metals,

among others. To fully function, polarization must be based on the creation of production value chains based on real subcontracting (allowing the propagation of innovation), as well as a minimum of intra-regional integration to avoid any tendency toward autarchic development.

This approach has been widely criticized with respect to its global record of successes and failures. There have been too many critiques to discuss individually and in depth in an article of this type. But a number of themes recur frequently, and a brief treatment of these should assist in better understanding the complex and changing nature of the growth pole approach.

The first remark is essentially analytical and raises the very question of the applicability of this approach to reality. The implementation of growth pole policy aims to create the conditions for new and induced economic development. However, whereas Perroux's analytical contributions explain well the *functioning* of such poles, the theory addresses not at all their appearance, contains no explanation of a catch-up process, and remains timeless. There is no explanation for the mechanism of *ex nihilo* creation of growth poles, and even less of the possible connection between an already old industrial framework, for example, one dating from the beginning of the twentieth century, and innovative industries. However, this is the very basis of the functioning of propulsive firms or industries and their supposed driving effects.

The second criticism, and probably the most commonly put forward, is the possibility of creating "white elephants" in areas with little or no industrialization, an objection also raised to the Hirschmanian approach. The danger can clearly be seen of creating an industrial complex not closely related to its local environment, with the local industrial fabric insufficiently developed in terms of suppliers or subcontractors. As a result, the investments made to develop a firm or group of industries can come to nought. The development effects, if they exist, will take the form of leakages that benefit neighboring regions and even very remote countries. The implantation of a propulsive activity is then analogous to making a graft foreign to its host environment, its failure to thrive attributable to an insufficient density of local relations. Thus, in the second half of the twentieth century, policies inspired by growth pole theory gave rise to massive developments in the Latin American peripheries which sometimes became the origin of new imbalances.

Another criticism relates to the characteristics of the targeted production units, which are often big firms and major companies in the industry sector. This leaves out a good part of contemporary economic activities in both developed countries, with the significant growth of service activities, and in developing countries, with the permanence of agricultural and craft activities. Growth pole theory is often concerned only with the high-end sectors of the economy. It neglects the potential of other sectors, and even more so of small firms and the informal sector, which in fact play vital roles in many economies. In the operationalization of growth pole strategies, they are often considered as a brake or an obstacle to economic growth, which then gives a very technocratic and capitalist dimension to this approach to growth. Far from considering the needs of local populations, such schemes become, without

a doubt, the antithesis of the very social conception of development proposed by Perroux.

There are also criticisms related to the negative externalities caused by the development of growth poles, with sometimes irreversible damage caused by pollution of the natural environment. Examples include the experiments conducted in building the petrochemical complex at Berre Pond in France and the El Tablazo complex at Maracaibo Lake in Venezuela.

The impacts of development poles are also contestable in terms of their effects on jobs and other economic benefits. After the initial phase of major development work involving a largely low-skilled workforce, the results sometimes leave planners wondering about the cost effectiveness of the ongoing benefits generated as a result of providing the huge start-up investments, subsidies, and other fiscal resources. In addition, local populations often find themselves confronted with land expropriations, negative externalities generated by the development work, and a changed labor market with new activities put in place that they are not always able to fit in with.

Today, somewhat surprisingly, the topicality of the notion of a growth pole and policies based on their implementation remains important, especially in developing countries and regions. For the World Bank (Speakman and Koivisto 2013) growth poles are still one of the major tools of intervention in underdeveloped regions. Recent investments in Madagascar, Chile, and Mexico (with large coastal tourist complexes planned on the model of Cancun), for example, are being implemented under plans sometimes quite remote from Perroux's initial approach. Several growth poles have been planned and built in Africa over the past decade, and today a very precise methodology has been developed and tested to meet the requirements for the installation of growth poles in terms of issues involving the coordination of actions, accountability, risk management, and risk-sharing (Speakman and Koivisto 2013). Growth poles thus remain spatially targeted investment instruments and sets of policy for accelerating economic growth in developing countries, most often based on a mix of public and private investment. Their implementation continues in the face of questions that have arisen about the transferability of a development tool to countries with different levels of development.

In summary, it can be said that the growth pole method remains a tool often used in regional or national policies, with sometimes significant discrepancies between initial major investments and results. If attempts to apply this theory in practice have sometimes proved disappointing, it is often because the local conditions and environment have not been sufficiently considered. Moreover, it is rare to encounter, in economic reality, a "pole" in the strict sense of the term. But forms of polarization and growth pole development initiatives—albeit perhaps straying far from Perroux's initial definition—continue to be common features of the global economic landscape.

### Perroux and the French-speaking Section of the RSA

The French-speaking section of the RSA (ASRDLF, standing for the *Association de Science Régionale de Langue Française*) was founded in 1961 by Walter Isard and François Perroux, seven years later than the RSA, after a long trip of Isard in Europe. The intention was to involve not only French but all French-speaking scholars interested in regional issues and the space-economy.

The head office was located in Paris on the premises of the Institute of Applied Economics, founded by François Perroux a few years earlier. The two founding members were subsequently appointed for life (see Bailly et al. 2022).

The Association operated through an enlarged Bureau of about ten members and a Board of Directors. The first general secretary of the Association was Jacques Boudeville (an economist disciple of Perroux's), and François Perroux was its first President. In practice, Perroux and especially Boudeville were the true first animators of the Association. The early years of the Association were marked by the personality of François Perroux.

A recent celebratory anniversary history of the ASRDLF (Bailly et al. 2022), *60 ans de science régionale francophone (60 years of French-speaking regional science)*, is available as a pdf file downloadable from the Association's website.

## 3 Conclusion

François Perroux, arguably the most influential French economist of the twentieth century, made important contributions to economic analysis, especially in terms of growth and development processes, domains where he adopted a nonstandard and often evolutionary approach. He contributed decisively to the establishment and development of regional science in France and in French-speaking countries. His founding role for French regional science can be attributed both to his organizational activities and to his scholarly leadership, most especially through his setting out of growth pole theory, which has had such an immense and ongoing theoretical impact. Finally, as a pragmatic economist, he has seen his ideas and principles spread throughout the world, with the implementation of many development policies inspired by his research. His influence and legacy remain strong today, in particular with regard to unbalanced growth issues and the development paths of emerging regions or countries.

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