

Linnemer, Laurent; Visser, Michael

Working Paper

Jean-Michel Grandmont - A Forthcoming Mind

CESifo Working Paper, No. 7060

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Linnemer, Laurent; Visser, Michael (2018) : Jean-Michel Grandmont - A Forthcoming Mind, CESifo Working Paper, No. 7060, Center for Economic Studies and ifo Institute (CESifo), Munich

This Version is available at:

<https://hdl.handle.net/10419/180322>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

**Jean-Michel Grandmont
A Forthcoming Mind**

Laurent Linnemer, Michael Visser

Impressum:

CESifo Working Papers

ISSN 2364-1428 (electronic version)

Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH

The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute

Poschingerstr. 5, 81679 Munich, Germany

Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de

Editors: Clemens Fuest, Oliver Falck, Jasmin Gröschl

www.cesifo-group.org/wp

An electronic version of the paper may be downloaded

- from the SSRN website: www.SSRN.com
- from the RePEc website: www.RePEc.org
- from the CESifo website: www.CESifo-group.org/wp

Jean-Michel Grandmont

A Forthcoming Mind

Abstract

This profile of Jean-Michel Grandmont is based on several interviews we had with him between September 2016 and April 2017. The interviews took place at our CREST offices, located at that time in Malakoff, just south of Paris. The objective of the profile is twofold. First, we trace the career of this highly influential mathematical economist who made seminal contributions to the fields of monetary economics, temporary equilibrium, business cycle theory, and aggregation of individual behavior. Second, we show how Grandmont and his colleagues contributed to changing the French landscape of economic research.

JEL-Codes: B310, D500, D700, E300.

Keywords: general equilibrium, money, nonlinear dynamics.

Laurent Linnemer
CREST, ENSAE
France - 92245 Malakoff
laurent.linnemer@ensae.fr

Michael Visser
CREST, CNRS, ENSAE & CRED
University of Paris 2
Paris / France
michael.visser@ensae.fr

May 17, 2018

We thank Bernard Caillaud, Edouard Challe, Bruno Jullien, Laurent Lamy, and Guy Laroque for helpful discussions and comments. We are indebted to Jean-Michel Grandmont for his patience with our questions, his time, and the many photographs he unearthed for us. We are also grateful to Magali Noël-Linnemer for her careful reading and constructive suggestions. The first author also gratefully acknowledges the hospitality of KIER, Kyoto University, where part of this profile was written.

1 Introduction

Jean-Michel Grandmont has his own office at CREST, so it was convenient and easy for him to join us and discuss his career, accompanied by warm tea, chocolate, and nuts. He turned out to be an energetic and enthusiastic talker. In preparation for our first interview, Grandmont had written a list of names and dates on a small piece of paper, a little reminder which he consulted now and then while talking about the past. Overall, though, he has an infallible memory for a man not so far from his eighties, especially regarding events that occurred in the late 1960s and in the 1970s, a particularly colourful but also moving period for Grandmont both personally and professionally.

We were about to end our third meeting, it was getting late and the lights had turned on outside. Grandmont confessed that he had been in a somber mood for a couple of days because he associated our interviews with the end of life, obituaries, and so on. We tried to cheer him up by showing tables with rankings of economists according to their number of publications and citations (more on these tables below). To our surprise, Grandmont was not impressed. Although he was glad to see the names of some of his friends, he did not appear particularly proud or honored to rank highly among Nobel prize winners and former presidents of the Econometric Society.

Unexpectedly, he said “I do not care so much about this. Let me tell you about the greatest compliment I have ever received. Not long ago, in 2012 or 2013, I was invited to Vietnam to deliver the keynote lecture at the Vietnamese Economists Annual Meeting. I recall there was this delegation of economists who welcomed my wife Josselyne and myself at the airport. Among them was a PhD student, a very kind young woman, who later during our stay helped my wife to find her way in Hanoi. Back home in Paris I sent an email to tell her how much I had appreciated her kind help. She responded that I was welcome, adding ‘You are very different from the other professors and I would like to thank you for this. The very first time I saw you I actually thought your wife was the professor.’ Josselyne was impressed by the whole group of academics, which made her behave rather formally. Meanwhile I felt at ease and was apparently kind with everyone, and so it happened that the student mistook my wife for the professor. I have received similar compliments before, I really appreciate it, it means a lot to me.”

2 Early youth and the 1960s

Although he was born in Toulouse, in December 1939, Grandmont is a bona fide Parisian. France had declared war on Germany in September of that year and soon thereafter Jean and Paulette Grandmont, Jean-Michel’s parents, decided to leave Paris and move to the south-west. This turned out to be a fortunate choice since after the French military debacle in June 1940, and the ensuing armistice, the Toulouse region would be part of the free zone unoccupied by German soldiers (but under the rule of the Vichy regime). Paulette was a school teacher and Jean an immigrant from Romania, who had taken a French name when arriving in France in 1932. He was industrious and full of imagination and would become a businessman after the war as well as a local politician. Dominique, Grandmont’s younger brother, was born in January 1941, in Montauban. After a brief military career, he became a respected (but struggling) French poet.¹ The family spent the war years in the countryside (Corrèze) and returned to Paris by the end of the summer of 1944, shortly after the liberation. Jean and Paulette were already separated by that time; Jean-Michel and Dominique were primarily raised by their mother.

Jean-Michel was an outstanding student, although not from the start. Indeed, the two young brothers were not particularly keen pupils during elementary school. Their father Jean had a fantasy that his sons would become musicians. He persuaded Paulette to take them out of school so they

¹He has a well maintained website: <https://dominiquegrandmont.wordpress.com>.

Photograph 1: Jean-Michel with his violin. Paris, *circa* 1949.



could devote themselves to violin lessons. During this one-year school sabbatical, both children were homeschooled by Paulette when not learning the violin. Neither Dominique nor Jean-Michel turned out to be virtuoso violinists (admittedly Dominique kept taking music lessons) and the family decided it was time to go back to school. Jean-Michel returned for the last year of elementary school which back then was very important as there was a compulsory secondary school entrance exam. Somewhat unexpectedly, Jean-Michel excelled during that year and in secondary school he started to win prizes.² After high school he enrolled in the *Classes Préparatoires* for a three-year period to prepare the national entry exams of the highly selective *Grandes Écoles*. He was admitted, in 1960, to the *École Polytechnique*,³ the leading French engineering school that provides high-level general training in mostly scientific subjects. The professors quickly detected Grandmont's technical talents and advised him to study mathematics or physics after graduating. He decided instead to pursue his studies at *École des Ponts et Chaussées* (the school of bridges and highways).⁴ Although this school offered hardly any economics courses back in the 1960s, it was there, in a course given by Marcel Boiteux, that the young Grandmont became interested in economics, and started reading textbooks such as Samuelson's *Foundations of Economic Analysis*, and Hicks's *Value and Capital*. The latter is in particular devoted to static general equilibrium analysis, but also considers a dynamic setting with temporary and long-term equilibria. Grandmont immediately liked the idea of consumers making current decisions depending on their anticipations regarding future prices, but he was puzzled by the lack of bridges between micro- and macroeconomics.

On several occasions, Jean-Michel Grandmont mentioned his desire to help others and be useful in life. "France has given me a lot, I have received an excellent education from the State, all for free. I therefore want to do something in return for my country, and be useful." After finishing *Ponts et Chaussées*, he was therefore happy to find a position as an economist at CERMAP,⁵ a state-financed

²At his first school ceremony, Jean-Michel was happily surprised to see his father and, once adult, he came to rationalize his academical successes in terms of getting his father's recognition even after his accidental death in 1973.

³Grandmont was also admitted to two other elite schools, *École des Mines*, and *École Normale Supérieure*, both based in Paris.

⁴At the end of the curriculum, *École Polytechnique* ranks its students according to scholastic performance, and the highest on the list are offered the possibility to enter a so-called *Corps d'Etat*. Broadly speaking, their members become high-level civil servants employed within State administrative bodies (typically ministries), and as part of their further training they are required to specialize in another *Grande École*. Ranked 10th, Grandmont entered one of the most prestigious outlets of *Polytechnique*, the *Corps des Ponts et Chaussées*.

⁵*Centre d'Études et de Recherches Mathématiques Appliquées à la Planification* (Center of Research and Study in Mathematics Applied to Planning).

research centre whose primary mission was to advise the government on all sorts of economic issues. He enthusiastically began his research career working on empirical topics. His first paper, together with Françoise Fabre, another CERMAP economist, studied the cost-effectiveness of screening for cervical cancer.⁶ Given the empirical results found in the paper, Grandmont was convinced that early screening for this disease had to be implemented on a large scale, and tried to convince the decision-makers at the Ministry of Health and physicians. This turned out to be an unpleasant experience. The Ministry of Health did not appreciate two young researchers telling them what to do. For their part, the physicians were outraged because Fabre and Grandmont had dared to study the effectiveness of screening by putting a numerical value on human life. In the end nothing changed, and the paper had no impact whatsoever on public health policies. Grandmont told us “I was relatively quickly vaccinated against empirical work, not necessarily empirical research per se, but rather the part of the job which consists in persuading policy makers to take scientists’ recommendations seriously.” Although he would occasionally continue working on empirical-orientated topics (notably a project on the pricing of natural gas, and a paper on the demand for money, published in the *European Economic Review*, Grandmont (1973)), the screening-for-cancer research marked a turning point in Grandmont’s career. From then on he essentially turned his back on empirical research, preferring henceforth to live in the abstract world of fundamental research.

One day a colleague at CERMAP gave Grandmont a copy of Gérard Debreu’s *Theory of Value*. He read the book from cover to cover in barely two weeks, and was struck by one of its endnotes:

Two important and difficult questions are not answered by the approach taken here: the integration of money in the theory of value (on this point see D. Patinkin (1956) and his references), and the inclusion of indivisible commodities.

Theory of Value, Gérard Debreu, 1959, page 36 (endnote 3 of chapter 2).

“In this book Debreu presents a rigorous reformulation of general static equilibrium theory, that is to say he essentially formalizes part I of Hicks’s *Value and Capital*. I was impressed by the highly technical approach taken by Debreu, and had finally found what I had been looking for for a long time,” Grandmont recalled. “The book was very appealing to me, and then there was this footnote about money not being incorporated into the framework, and my disappointing experience with empirical research. It was like an epiphany, I suddenly knew what I wanted to do. My ambition was to reconsider the Hicksian temporary equilibrium model using the generality and mathematical rigor of Debreu, and in particular study the conditions required to obtain a monetary equilibrium.” Grandmont’s mind was made up: he wanted to pursue a PhD thesis and wrote a letter to Debreu, at that time professor at Berkeley University, asking him to be his supervisor. Despite Grandmont having no sound training in economics at all back in that period, Debreu accepted and pushed the Berkeley Economics Department into admitting him to its Graduate program. His colleagues at CERMAP were surprised by his plans. They told him, “You are already a researcher, what is the point of embarking on a Ph.D. thesis?” At the time, it was, unlike today, quite uncommon to go abroad to undertake doctoral research⁷ and hardly any scholarships were available to finance Ph.D. students. The French administration was, however, generous and granted him two-years’ paid leave. Grandmont had to come back, though, after this period, otherwise he would lose his job at CERMAP.

In September 1968, aged 28, Grandmont headed to California with his first wife, Annick, to start his Ph.D. At their first meeting, he outlined his research plans to Debreu and told him that, for financial reasons, the job had to be done in only two years. The famous economist responded

⁶The paper appeared as a CERMAP working paper under the title “Une étude économique de la prévention et du dépistage précoce du cancer du col de l’utérus”, and was published in 1970 in *Cahiers du Séminaire d’Économétrie*, by Fabre alone (acknowledging Grandmont’s contribution to the research).

⁷Among Grandmont’s contemporaries there were some exceptions: Jean-Jacques Laffont went to Harvard (Ph.D. 1975), and Jean-Pascal Benassy to Berkeley (Ph.D. 1973). Roger Guesnerie and Guy Laroque, however, had no Ph.D.

that Grandmont first had to take the courses of Berkeley's Ph.D. program and pass all the exams. Regarding the content of the thesis itself, Debreu did not offer much help: "Very well Jean-Michel, but you will have to work on your own because I have never really thought about this topic." The first year at Berkeley Grandmont would anyway work without supervision since Debreu announced that he was going to spend the year in Belgium at the Centre for Operations Research and Econometrics (CORE).

Grandmont worked hard that first year and managed to successfully pass all exams while surrounded by daily anti-war protests on the Berkeley campus. Jean-Michel was on the anti-war side and took part in many demonstrations, including the People's Park Protest of May 1969 where one student was shot dead. In one of the courses students were required to read Patinkin's *Money, Interest, and Prices*. "At that time there was a controversy between Keynesian and neoclassical economists, the former claiming that prices are essentially rigid and the latter that they are instead completely flexible," Grandmont told us. "Neo-classical economists such as Patinkin argued that prices adjust at each date such that demand equals supply in all markets, and so a monetary equilibrium always exists. If prices drop in a given period, the consumers' real endowment of money increases. This makes them richer, which in turn leads to higher demand. This so-called real balance effect (RBE) is sufficiently strong, according to Patinkin, to ensure that equilibrium can always be restored. My intuition was that the existence of an equilibrium is not guaranteed under Patinkin's assumptions. I wrote down an extremely simple model of a pure exchange economy, with a single consumer, one good, two time periods, and a Cobb-Douglas utility function. As it turned out, I was right, for certain parameter values the consumer wants to consume more than their endowment in period 1, and equilibrium does not then exist."

We asked Grandmont to write down his model again, almost fifty years after Berkeley, and he gladly accepted. We reproduce it here using Grandmont's notations.⁸ The single consumer has an endowment of the good in the two periods, denoted ω_1 and ω_2 , and holds a quantity m_0 of fiat money at the beginning of period 1. The demand in period 1 (resp. 2) is denoted x_1 (resp. x_2), and the quantity of money left over at the end of period 1 (to use in period 2) is denoted $m_1 \geq 0$. The utility function depends only on consumption in each period, and is specified as a Cobb-Douglas: $u(x_1, x_2) = x_1^\alpha x_2^{1-\alpha}$ with $0 < \alpha < 1$. Almost microeconomics 101, but there is a twist: the second-period price is anticipated. That is,

$$p_2^e = \psi(p_1) \geq 0.$$

Until the early seventies, see the review of Grandmont's book *Money and Value* by Lucas (1984), neo-classical economists assumed that the anticipated inflation rate is constant and exogenously determined. This amounts to specifying $\psi(p_1) = \lambda p_1$, with $\lambda > 0$ (implicitly, Patinkin's assumption was $\lambda = 1$).

The consumer program writes:

$$\begin{aligned} \max_{x_1, x_2} u(x_1, x_2) &= \max_{x_1, x_2} x_1^\alpha x_2^{1-\alpha} \\ \text{s.t. } p_1 x_1 + m_1 &= p_1 \omega_1 + m_0 \\ \psi(p_1) x_2 &= \psi(p_1) \omega_2 + m_1 \\ p_1 &\geq 0, m_1 \geq 0, \end{aligned}$$

and the resulting Marshallian demand is:

$$x_1^* = \alpha [\omega_1 + m_0/p_1 + \psi(p_1)\omega_2/p_1],$$

which varies with p_1 for two reasons. First through the RBE, m_0/p_1 , and second through the intertemporal substitution effect, $\psi(p_1)\omega_2/p_1$. The question now is: does a price p_1 such that demand

⁸The model can also be found in Gale (1985)'s review of Grandmont (1983), except that Gale leaves the consumer's utility function unspecified and does not therefore explicitly derive the first period demand.

equals supply (i.e., $x_1^* = \omega_1$) always exist? Under the assumption $\psi(p_1) = \lambda p_1$, demand becomes

$$x_1^* = \alpha [\omega_1 + \lambda \omega_2 + m_0/p_1].$$

The term $\alpha [\omega_1 + \lambda \omega_2]$ can be larger than ω_1 , in which case demand is always larger than supply in period 1, even if $p_1 \rightarrow +\infty$: there is no equilibrium. Grandmont noticed that if the expected price ψ is a bounded function⁹ of the current price (implying $\psi(p_1)/p_1 \rightarrow 0$ as $p_1 \rightarrow +\infty$), the existence of an equilibrium is restored. Thus, if the consumer has a price expectation that is relatively “insensitive” to the current price, an equilibrium on the goods market exists, and hence on the market for money.

Having completed all the required courses by the end of his first year at Berkeley, Grandmont could start working on his thesis. The financial situation of Annick and Jean-Michel, however, was tight (Jean-Michel had to pay the tuition fees out of his own pocket) and the young couple found it difficult to make ends meet. Jean-Michel was lucky: Daniel McFadden¹⁰ found him a summer job coaching and counselling undergraduate students, but as it turned out very few actually showed up. The job thus meant extra cash and ample time to focus on research. Grandmont continued thinking about the counterexample and managed to generalize the model to an arbitrary number of goods and consumers, and a general preference structure. The resulting work formed the basis of one of the chapters of his Ph.D. thesis. A repolished version was later published in a book edited by Jacques Drèze¹¹ (Grandmont (1974)).¹² The paper challenges neo-classical monetary theory on two fronts. First, unlike Patinkin’s claim, it minimizes the role of the RBE as the key equilibrating mechanism. Second, it leads to the conclusion that the neutrality-of-money prediction is, in general, invalid.

During his second year at Berkeley, Grandmont also worked on a different subject, namely the axiomatization of the expected utility theory of Von Neumann and Morgenstern. Unlike the VNM setup, there is, however, a continuum of states of the world in Grandmont’s model. He gave an early draft of the paper to Debreu, and, for the first time, Grandmont actually got feedback. Earlier attempts to receive comments from his supervisor had not been successful. Grandmont used to meet Debreu regularly in his office, every two weeks, giving him manuscripts with new research results each time. Usually Debreu merely put them on a pile on his desk without giving any comments. This paper, however, made Debreu react, although in an unusual manner. After a few days he came to see Grandmont and told him “Jean-Michel I have read your paper” and went away.¹³ Grandmont was surprised but happy (“I have a paper!”). Later, he sent the final manuscript to the newly founded *Journal of Economic Theory*, where it was accepted for publication without revision (Grandmont (1972)).¹⁴ After a year of intense work, Grandmont completed his Ph.D. thesis in the summer of 1970.

3 The 1970s

Back in France Jean-Michel obtained a research position at the CNRS (*Centre National de la Recherche Scientifique*), the national scientific research institute, for which he would work his whole career. The CNRS covers all scientific domains and is unique in the sense that its researchers (about

⁹The function ψ is bounded if there are positive real numbers ϵ and η such that $\epsilon \leq \psi(p_1) \leq \eta$ for all p_1 .

¹⁰That year, McFadden taught Debreu’s course in Mathematical Economics. Grandmont also has fond recollections of Avinash Dixit’s course, in Mathematical Economics as well.

¹¹Jacques Drèze (Ph.D. Columbia University, 1958) was born in 1929 and was the leading theoretical economist in Belgium. He was in 1970, President of the Econometric Society. See the interview of Drèze: Dehez and Licandro (2005).

¹²Grandmont initially sent the paper to *Econometrica* but it was rejected. He then accepted Drèze’s invitation to publish the paper in his upcoming book. Retrospectively, Grandmont regrets this decision and feels that he should have been more ambitious by submitting his paper to another journal first.

¹³Debreu was a silent and introverted man who interacted very little with fellow economists. See D  ppe (2012).

¹⁴The referee report was very succinct: “The paper is good, there is nothing to change.” Not surprisingly, Grandmont suspects that Debreu was the referee of his paper.

Photograph 2: Jean-Michel with his daughter Céline, Berkeley 1970.



11,000 in total) have no teaching obligations and can devote all their time to research. The institute's policy consists in affiliating the scientists it recruits to universities, *Grandes Écoles*, or other types of scientific centres throughout France. Grandmont was affiliated to the centre he belonged to before leaving France, now called CEPREMAP (*Centre d'Études Prospectives et de Recherches en Économie Mathématique Appliquée à la Planification*). He started working with two economists, Yves Younès, a colleague at CEPREMAP, and Guy Laroque, back then assistant professor at ENSAE.¹⁵ These collaborations turned out to be very fruitful, and Grandmont managed to publish about ten papers with these two researchers (separately or together) during a relatively short time span.

Born in Tunisia in 1936, Younès was also a mathematical economist. He obtained his PhDs from both Paris and Tunis Universities in 1962, and held a position at Tunis University. In the late 1960s he left his home country because of the political turmoil there, and came to Paris to join CERMAP as a researcher. In France, he developed a scientific relationship with Edmond Malinvaud¹⁶ and Jean-Michel Grandmont. Younès had been one of the few people to encourage Grandmont to study at Berkeley. Only three years older than Grandmont, he was already an established researcher with an article (in French) forthcoming in *Econometrica* (Younès (1972)). Younès had also written a working paper in July 1970 on the role of money in a general equilibrium environment (but with price rigidity) which, in 1975, would be published in the *Review of Economic Studies* under the title “On the Role of Money in the Process of Exchange and the Existence of a Non-Walrasian Equilibrium.” So it was only natural for Grandmont and Younès to work together. Their collaboration on cash in advance models of money in a general equilibrium set-up led to two path-breaking articles in the *Review of Economic Studies*: Grandmont and Younès (1972) and Grandmont and Younès (1973). Later, they also published a paper jointly with Laroque, in the *Journal of Economic Theory* (Grandmont, Laroque, and Younès (1978)). Yves Younès was elected fellow of the Econometric Society in 1978, and made many original contributions during his career. They are reviewed in Malinvaud (1999). Younès died in 1996 of a malignant brain tumor.

Grandmont and Laroque met at the Roy seminar, named after the French economist and statis-

¹⁵ *École Nationale de la Statistique et de l'Administration Économique* (National School of Statistics and Economics Management).

¹⁶ Edmond Malinvaud (1923-2015) was a leading figure in the French economics and econometrics communities. In 1963, he was President of the Econometric Society. See the special issue of *Annals of Economics and Statistics*, No. 125/126, June 2017, in honor of Malinvaud.

tician René Roy.¹⁷ This was at the time the only regularly organized economics seminar in Paris. It was there where economists such as Paul Champsaur, Jacques Lesourne, and Edmond Malinvaud, discussed and presented their work. Laroque (also a former student of *École Polytechnique*) perfectly matched with Grandmont’s personality and style of working. “I sometimes have the tendency to work into dead-end directions. It happens rather frequently that, even after struggling for weeks with a subtle proof, I do not realize that the thing just cannot be right,” Grandmont told us. “With Guy we performed like a perfect team, because, among his many qualities, he had this talent to find counterexamples showing that my conjectures were wrong. I would then adapt or reinforce the assumptions of the model, and so we went back and forth until convergence.” Together they published eight papers. Laroque downplayed his contribution, arguing that Grandmont did the largest share of their papers. “I had less time to do research compared to Jean-Michel; at ENSAE and later at INSEE¹⁸ I always had many administrative tasks. Grandmont spent much time on the proofs of our theoretical results, he was technically more gifted than I.” Guy Laroque wrote a tribute to Jean-Michel Grandmont for a special issue of the *International Journal of Economic Theory* (IJET) (Laroque (2006)).

Shortly after his return to Paris, Grandmont received a paper from McFadden with his and the econometrician’s name on the title page. It was a technical note generalizing the well-known result that opening up the world economy allows some consumers to gain from international trade while others are worse off. By taxing winners and compensating losers, however, all consumers are better off relative to autarchy. The analysis uses a general equilibrium setting and draws again heavily on the work of Debreu. Grandmont was surprised as he had never seen the paper before, and wrote McFadden a letter asking why he was listed as coauthor. The latter answered, very elegantly, “Unless you start screaming, I wish you to co-sign this paper with me, because to prove that there is an equilibrium I had to use one of the lemmas in your thesis. Without your lemma, I would not have been able to show its existence, and hence I hope you will accept to be my coauthor on this work.” The paper was published in 1972 in the *Journal of International Economics*, Grandmont’s second publication in a major academic journal (Grandmont and McFadden (1972)).

In 1972 Grandmont received an invitation from Drèze to spend a year at CORE as a visiting research professor. CORE had been founded in 1966, and had quickly become the major research center in mathematical economics outside the United States (see Düppe (2017)). It was modelled after the Cowles Foundation, and Grandmont was immediately attracted by the American style of doing research at CORE: a well-functioning Working Paper series, strong interactions between researchers, frequent seminars and many visitors from abroad.¹⁹ Annick did not want to move and live in the small Belgian town of Leuven, so Jean-Michel travelled back and forth to Paris every weekend. Many Sundays, however, were devoted to working with Laroque on their numerous projects. In particular, they wrote a paper on temporary equilibrium with fixed prices later published as Grandmont and Laroque (1976b)²⁰ in the *Review of Economic Studies*, and another one, published later in *Econometrica* (Grandmont and Laroque (1976a)), on the liquidity trap. Needless to say, long distance and Grandmont’s fervor for research took a toll on his marriage.

At CORE, Grandmont also wrote a paper with Alan Kirman, at the time associate professor there, and Wilhelm Neufeind, who was working there on his Ph.D. thesis. The paper was to be Grandmont’s shortest – hardly 3 page long – and appeared a year later in the *Review of Economic*

¹⁷Roy (1894-1977) had been President of the Econometric Society in 1953. For more about him, see Malinvaud (1977) and Allais (1988).

¹⁸*Institut National de la Statistique et des Études Économiques* (National Institute of Statistics and Economic Studies).

¹⁹Several French economists visited CORE in the early 70s, among them Paul Champsaur, Jean-Jacques Laffont, Claude Henry, Roger Guesnerie, and Thierry de Montbrial (see Düppe (2017)).

²⁰For more on this topic and this paper, see chapter 7 in Backhouse and Boianovsky (2013).

Studies (Grandmont, Kirman, and Neufeind (1974)). The paper introduces the γ topology (like the g in Grandmont) on E , the set of all economies, by the system of open sets $\{E, E^u, \emptyset\}$, where E^u is the set of all economies with a unique equilibrium, and $\emptyset$ the empty set. Theorem 1 of the paper states that $\overline{E^u} = E$, i.e., the closure of E^u (the smallest closed set containing E^u) is E . Rephrasing this topological property, the theorem implies that for each element $e \in E$ there is an element $e^u \in E^u$ which is arbitrarily close to e .²¹ The theorem thus suggests that uniqueness of equilibrium can be obtained at no cost, i.e., without the usual stringent conditions on consumers' preferences and firms' production technologies.²² Of course, the paper is a lark. The authors play with the type of techniques used at the time by mathematical economists but their specific topology (making the proof of Theorem 1 trivial) is ad-hoc and of no practical usefulness.²³ When they sent the paper to the *Review of Economic Studies* they mentioned to the Editor: "We emphasize that this article was submitted on the 1st of April, and, we wish this to be mentioned should it be accepted for publication." The paper was accepted without being sent to referees, and footnote 1 of the paper indicates "*Received April 1st (Eds.)*." This is the only hint that the paper is indeed a joke. Some economists missed this, however, and cited the paper as if it were a serious result (there is, for instance, a citation in *Econometrica* (2000), and a more recent one in the *Journal of Economic Dynamics & Control* (2007)).²⁴

Back in the early 70s, only a few French economists published their papers in English. The vast majority of them still wrote in French, either because they believed that the language of Voltaire should somehow be preserved and protected, or simply because they did not master English sufficiently well. For Grandmont, English was the obvious medium to disseminate economics research. This put him, a couple of times, into awkward situations. For instance, in the Autumn of 1970, Grandmont submitted a paper for presentation at the Roy seminar. Roy's secretary told him that the manuscript had to be translated into French before the seminar (which Grandmont did, in a week). Roy, who had been blind since World War I, where he was wounded in a blast by a piece of shrapnel, had to rely on his secretary, who used to read him the papers before their presentation at the seminar. A few years later, in the summer of 1973, hostile opposition mounted when Grandmont published the English version of a paper with Laroque in the newly created (at Grandmont's insistence) Working Paper series at CEPREMAP. The director of CEPREMAP summoned Grandmont to his office and said, "Jean-Michel, this is not possible, we are in France, in a French research centre, therefore you ought to publish in French." There were protests from politicians as well. A communist member of the Senate wrote a letter to the Prime Minister telling him that there was this publicly financed institute whose researchers dared to publish in English. Alfred Sauvy, a renowned demographer at the Collège de France was also outraged and resigned from the board of CEPREMAP. In a personal letter to Grandmont he wrote, "this is just inconceivable, you cannot write in English, if you write in English you become a lackey of the Americans." Surprisingly, even Malinvaud seems to have been on the anti-English side: "Jean-Michel, we are in Paris, here you should express yourself in French." Grandmont felt slightly disappointed. "I had come back from CORE, had even rejected a job offer from Drèze to replace Kirman. And back home my initiatives to change things were suddenly blocked."

Both Grandmont and Laroque told us that the working environment was hostile for economists with their profiles. "Most of our colleagues disliked mathematics, and they were skeptical about publishing papers in international journals," recalls Laroque. "For graduates of *Polytechnique* it was

²¹The authors write: "In showing here that economies with a unique equilibrium are likely, we will incidentally show that if being likely is interpreted carefully, within the context of a particular problem, then a surprising number of apparently improbable phenomena may in fact rigorously be shown to be likely."

²²See Sonnenschein (1972), Sonnenschein (1973), Mantel (1974), and Debreu (1974).

²³The authors also define two other topologies for which the result holds: the κ (as Kirman) topology and the ν (as Neufeind) topology. But the γ topology is the coarsest of all (Theorem 2 of their article)!

²⁴Grandmont does not mention the paper on his CV, nor do Kirman and Neufeind.

practically impossible to become a professor at university, those of us attracted by academia often ended up at INSEE.” Grandmont told us he was regarded by some people as a traitor, merely because he had done his Ph.D. abroad and published in international journals. “It was an unpleasant period, I also felt a bit isolated at CEPREMAP, apart from Younès there were relatively few researchers to whom I felt close.²⁵ I was happy therefore that I could go away each summer and spend two months at Stanford.” All the papers of Grandmont with Younès and Laroque were finished (if not already published) by the end of 1973, yet, Jean-Michel had no idea how these works were perceived by foreign researchers, while in France there was no enthusiasm. So the invitation by Debreu, in 1974, to a summer workshop organized at Berkeley, was a boost to Grandmont’s confidence. Indeed, there he met with many fellow academics who gave him positive feedback. Among them, Arrow, who invited him to spend three months at Harvard in 1975. During the same summer, Jean-Michel was invited to give a lecture at the World Congress of the 1975 Econometric Society in Toronto. Finally, in the Autumn of 1974, the Econometric Society elected him a fellow, only three years after earning his Ph.D.²⁶ Comprehensively, Grandmont sees 1974 as a pivotal year for him.

Starting in 1976, Grandmont attended for several years in a row the workshop on economic theory and mathematical economics of the Institute for Mathematical Studies in the Social Sciences (IMSSS).²⁷ It was during one of these summers at Stanford that Grandmont presented for the first time the paper “Intermediate Preferences and the Majority Rule”, published in 1978 in *Econometrica* (Grandmont (1978)).

Photograph 3: Grandmont, Paris, mid 1970s.



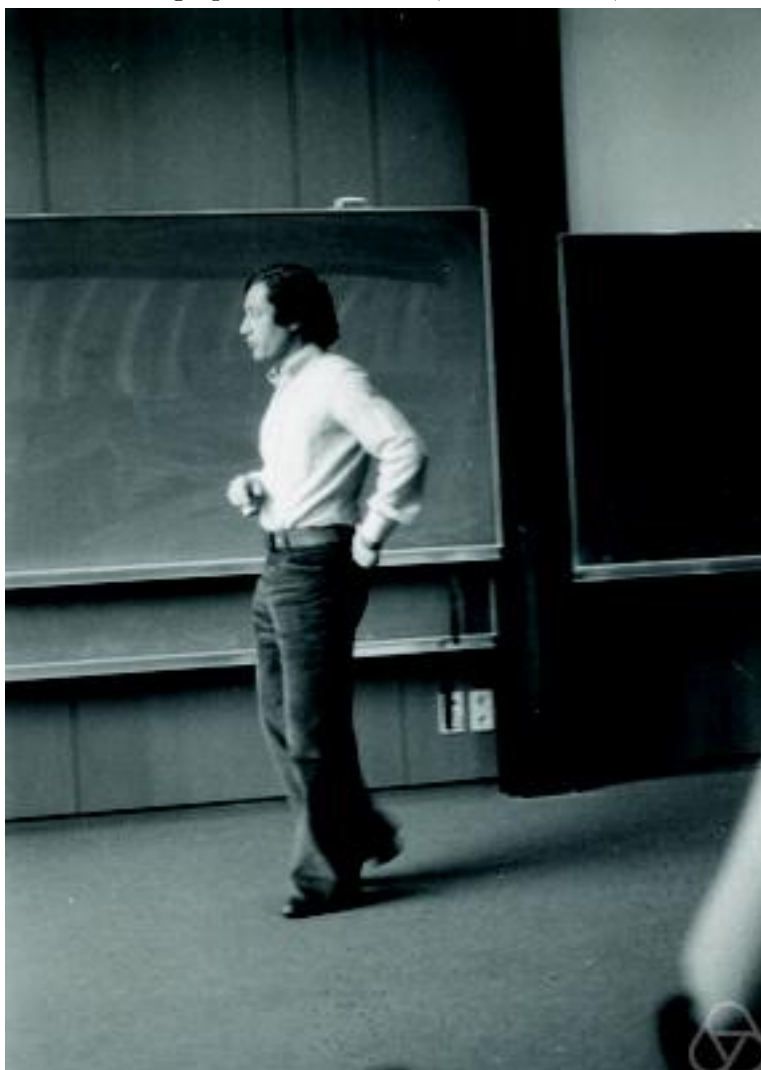
In his 1978 paper, Grandmont establishes a major result in the theory of voting: under which circumstances can individual preferences be aggregated through the majority rule? Or mathematically stated: Is the majority rule transitive? To understand the context of this article it is useful to quote Tullock:

²⁵Most members of CEPREMAP were not mathematically oriented. Many of them belonged to the *école de la régulation* led by Michel Aglietta, André Orléan, Robert Boyer, and Alain Lipietz. Although Aglietta, Boyer, and Lipietz went to *École Polytechnique* and had initially the same mathematical background as Grandmont, they were interested in the role played by institutions, in particular in relation to economic crises.

²⁶Grandmont thought he was the youngest (in terms of age after the Ph.D.) economist ever to be nominated Fellow of the Econometric Society and, indeed, among the economists of his generation, he certainly was one of the youngest Fellows. Yet, Kenneth Arrow received his Ph.D. in 1951 and was elected fellow the same year, at the age of 30. In the same generation as Grandmont, Jean-Jacques Laffont was also elected Fellow three years after his Ph.D.

²⁷In 1989 the program (which had started in 1969) was reorganized to its current formation as the Stanford Institute for Theoretical Economics. (SITE).

Photograph 4: Grandmont, Oberwolfach, 1977



Author: Konrad Jacobs.

Source: Archives of the Mathematisches Forschungsinstitut Oberwolfach.

“A phantom has stalked the classrooms and seminars of economics and political science for nearly fifteen years. This phantom, Arrow’s General Impossibility Theorem, has been generally interpreted as proving that no sensible method of aggregating preferences exists. The purpose of this essay is to exorcise the phantom, not by disproving the theorem in its strict mathematical form, but by showing that it is insubstantial. I shall show that when a rather simple and probable type of interdependence is assumed among the preference functions of the choosing individuals, the problem becomes trivial if the number of voters is large. Since most cases which require aggregation of preferences involve large numbers of people, ‘Arrow problems’ will seldom be of much importance.” [Tullock \(1967\)](#)

[Tullock \(1967\)](#) is a nice but special case (indifference curves are circles). He wrote himself: “So far we have used two unrealistic assumptions, that the indifference curves are all perfect circles, and that the individual optima are evenly distributed over the issue space. The elimination of these assumptions will make the model much more realistic.” He adds in a footnote: “In a very kind letter Professor Arrow generally agreed with the argument presented in this paper. However, he pointed out that the following portion is not mathematically strict. He expressed a desire for ‘a stronger and stricter

statement.’ I also would like to convert what is now a strong argument into a mathematical proof, but have been unable to do so. Perhaps some reader with greater facility in the use of mathematical tools will be able to repair the deficiency.” This task was, in the 1970s, probably on the agenda of many mathematical economists, including Arrow’s and Debreu’s.

Grandmont, who read Tullock’s paper in 1975 while visiting Harvard, made a breakthrough. He introduced families of relations (or preferences if transitive) called intermediate relations on a set X of alternatives.²⁸ They have the following intuitive property. Let $(R_a)_{a \in A}$ be such a family indexed by a (a point in a subset A of a Euclidean space). Grandmont assumes (H.2) that for every a' and a'' in A , for all $a \in (a', a'')$, then $R_a \in (R_{a'}, R_{a''})$ in the sense that for all x and y in X , if $x R_{a'} y$ and $x R_{a''} y$, then $x R_a y$. This class includes the important case of constant-elasticity-of-substitution utility functions: $U_a(x) = (\sum a_i x_i^\rho)^{1/\rho}$.²⁹ The paper then exhibits a sufficient condition (which holds in Tullock’s example) for the majority rule to coincide with a particular R_{a^*} (and therefore to be transitive if R_{a^*} is a preference). Grandmont could finish this paper thanks to a remark by James Mirrlees. Indeed, Grandmont was first trying to follow Arrow’s idea of single peaked preferences, which was hard to grasp in a multidimensional space. Mirrlees visited the CEPREMAP in 1976 and suggested to Grandmont that it might be a question of symmetry instead. Grandmont told us that three days after Mirrlees’s remark the paper was completed.

Table 1 lists Grandmont’s main publications. They are divided into four research domains: Money, Short-run equilibrium, Business cycle and non-linear dynamics, and Aggregation. Most of Grandmont’s output from the 1970s falls into the first two categories. Table 1 also shows that during this decade he managed to publish altogether 14 articles in international journals. The two tables we showed Grandmont during one of our interviews (mentioned at the beginning of this profile) are in the Appendix. Table 2 gives, among other things, a ranking of economists according to a publication score counting only articles published in *Econometrica* and *Review of Economic Studies* between 1971 and 1980. Table 3 ranks economists according to a citation index, using citations received by their publications in these two journals.³⁰ During the period 1971-1980, Grandmont managed to publish seven articles in these two journals, and as a result he ranks 9th in Table 2 and is the first French economist (Guy Laroque is ranked 13rd and Jean-Jacques Laffont 14th). He is ranked 23rd in Table 3 (second French economist after Jean-Pascal Benassy, himself ranked 18th). Figure 1, also in the Appendix, is a visual representation of the citations and publication rankings. It plots economists according to the citation index (x-axis) and the publication index (y-axis).

Overall the 1970s represented a booming period for Grandmont. On top of his numerous publications during these years, he received many honours and gratifications. He was nominated Associate Editor of several prestigious journals: the *Journal of Economic Theory* (1973), the *Journal of Mathematical Economics* (1973), and *Econometrica* (1976). He acted as chairman of the 1977 ESEM (European Meeting of the Econometric Society) Program Committee and gave one of the invited lectures at the World Congress of the 1975 Econometric Society in Toronto. A revised version of the lecture was published under the title “Temporary general equilibrium theory” in *Econometrica* (Grandmont (1977a)). On the home front, two very joyful events took place with the births of his

²⁸Previously, Davis, DeGroot, and Hinich (1972) had generalized Tullock’s example (which is in dimension 2) to larger dimensions. Plott (1967) and Simpson (1969) are also contributions on this topic. See pages 1140-1143 in Sen (1986).

²⁹Indeed, $(U_{\lambda a' + (1-\lambda)a''})^\rho = \lambda (U_{a'})^\rho + (1-\lambda) (U_{a''})^\rho$. Cobb-Douglas utility functions are a special case of C.E.S.

³⁰We have deliberately focussed on *Econometrica* and the *Review of Economic Studies* since they are the most prestigious outlets for mathematical economists. The publication period 1971-1980 corresponds to the ten years after Grandmont earned his PhD (1971). The ranking criterion used to establish the list in Table 2 accounts in particular for the number of pages and authors of each article. Similarly, the criterion used to determine the ranking of Table 3 is a function of the citations (see Perry and Reny (2016)) that each article cumulated over a ten-year span taking into account the number of authors of each article. Details on this and the other aspects of the two tables are in the Appendix.

Miscellaneous

- 1972:** “Continuity properties of a von Neumann-Morgenstern utility” *J. of Economic Theory*
- 1972:** “A technical note on classical gains from trade” with D. McFadden *J. of International Economics*
- 1973:** “On the short-run and long-run demand for money” *European Economic Review*
- 1974:** “A new approach to the uniqueness of equilibrium” with A. Kirman and W. Neufeld *Review of Economic Studies*
- 1978:** “Equilibrium with quantity rationing and recontracting” with G. Laroque and Y. Younès *J. of Economic Theory*

Money

- 1971:** Ph.D. Berkeley *On the short-run equilibrium in a monetary economy*
- 1972:** “On the Role of Money and the Existence of a Monetary Equilibrium” with Y. Younès *Review of Economic Studies*
- 1973:** “On the efficiency of a monetary equilibrium” with Y. Younès *Review of Economic Studies*
- 1973:** “Money in the pure consumption loan model” with G. Laroque *J. of Economic Theory*
- 1975:** “On money and banking” with G. Laroque *Review of Economic Studies*
- 1976:** “The liquidity trap” with G. Laroque *Econometrica*
- 1983:** *Money and Value: A Reconsideration of Classical and Neoclassical Monetary Economics*

Short-run equilibrium

- 1974:** “Stochastic processes of temporary equilibria” with W. Hildenbrand *J. of Mathematical Economics*
- 1976:** “On temporary Keynesian equilibria” with G. Laroque *Review of Economic Studies*
- 1977:** “Temporary general equilibrium theory” *Econometrica*
- 1977:** “The logic of the fix-price method” *Scandinavian J. of Economics*
- 1982:** “Temporary general equilibrium theory” *Handbook of mathematical economics*
- 1989:** “Keynesian issues and economic theory” *Scandinavian J. of Economics*

Business Cycle and Nonlinear dynamics

- 1985:** “On endogenous competitive business cycles” *Econometrica*
- 1986:** “Stabilizing competitive business cycles” *J. of Economic Theory*
- 1986:** “Stability of cycles and expectations” with G. Laroque *J. of Economic Theory*
- 1991:** “Expectations driven business cycles” *European Economic Review*
- 1998:** “Expectations formation and stability of large socioeconomic systems” *Econometrica*
- 1998:** “Capital-labor substitution and competitive nonlinear endogenous business cycles” with P. Pintus and R. de Vilder *J. of Economic Theory*
- 2017:** “Countercyclical Endogenous Uncertainty Shocks, Efficiency Wages and Procyclical Precautionary Labor Productivity” *CREST working paper 2017-12*

Aggregation

- 1978:** “Intermediate preferences and the majority rule” *Econometrica*
- 1987:** “Distributions of Preferences and the Law of Demand” *Econometrica*
- 1992:** “Transformations of the commodity space, behavioral heterogeneity, and the aggregation problem” *J. of Economic Theory*
- 2017:** “Behavioral Heterogeneity: Pareto Distributions of Homothetic Preference Scales and Aggregate Expenditures Income Elasticities” *CREST working paper 2017-11*
- 2018:** “Aggregation of heterogeneous beliefs, asset pricing, and risk sharing in complete financial markets” with L.-E. Calvet and I. Lemaire, *Research in Economics*

Table 1: Main publications of Jean-Michel Grandmont

two daughters, Céline in June 1970 (Berkeley), and Juliette in April 1974 (Paris).³¹ There was, however, sad news as well. In 1973 Grandmont's father died in a car accident. Furthermore, during these years his relationship with Annick was deteriorating. The frantic work pace in this early stage of Grandmont's career was at the root of many tensions with his wife, and the couple decided to divorce in 1978.

4 The 1980s

In the 1980s Grandmont pursued his research activities and, although he published less compared to the preceding decade, he made seminal contributions to the new field of nonlinear dynamics in macroeconomics. In parallel to his research he began teaching and spent time supervising Ph.D. students. The atmosphere at CEPREMAP improved, according to Grandmont, after the nomination, in 1977, of a new director, Claude Fourgeaud, and the arrival of a group of young, ambitious and international-orientated economists such as Jean-Pascal Benassy, Christian Gouriéroux, and Pierre Picard. He started a new life with Josselyne Bitan, who had been his secretary at CEPREMAP over the past years.³²

Photograph 5: Grandmont, J. Bitan, K. Shell and his daughter and son, Paris, 1978.



The book *Money and Value* (Grandmont (1983)) was published in the Econometric Society Monograph Series in Pure Theory.³³ The title refers to the titles of two books that have profoundly influenced Grandmont, Debreu's *Theory of Value* and Patinkin's *Money, Interest, and Prices*. It summarizes Grandmont's work on the role of money in general equilibrium, and, considering that

³¹Céline is nowadays a mathematician, and works as senior researcher at INRIA (the National Institute for Research in Computer Science and Control). Juliette is a film producer, and recently she co-produced (with Emily Morgan) "I am not a Witch," a film by Rungano Nyoni, which received a BAFTA in 2017.

³²In Spear (2001), an interview with Karl Shell (who spent the academic year 1977-78 at CEPREMAP), one can find photograph 5, a copy of which was given by Karl to Jean-Michel and Josselyne.

³³It was the second book to appear in the Series, the first being *Mathematical Economics: Twenty Papers of Gerard Debreu*, by Debreu.

this is a text on abstract mathematical economics, the book has sold well (between five and six thousand copies according to Grandmont). The book was well received:

“Those familiar with [Grandmont’s] work will expect a rigorous and mathematically sophisticated treatment of the issues and they will not be disappointed. In addition, he takes pains to explain in a heuristic fashion –and quite successfully– the significance of the mathematical proofs [...]. For this Grandmont should be praised because he has opened up an area of the literature which by its nature was previous restricted to a very narrow audience.” [Lucas \(1984\)](#)

“This is a beautifully written book. There is hardly a subject the author touches on that he does not enhance with the clarity and elegance of his exposition. Though it places much less emphasis on mathematical technique, the book stands comparison with the classic texts of Debreu (1959) and Hildenbrand (1974).” [Gale \(1985\)](#)

Both reviewers are, however, also critical. [Lucas \(1984\)](#) states, “This study is, therefore, controversial for two reasons: first, because it attacks the foundations of neoclassical monetary theory; and second, because it is not often that one observes a general equilibrium theorist pronouncing on policy issues (Frank Hahn to the contrary). I have my doubts, however, that his conclusions will find wide acceptance in the profession for they are based on an assumption about the formation of price expectations which many will find pathological.” [Gale \(1985\)](#) criticizes the book on similar grounds: “Expectations clearly play a crucial role at every stage of the analysis in this book. It is most unfortunate that both the general treatment of expectations and the particular assumptions made about them have been overtaken by the rational expectations hypothesis (REH). Since the original papers were published, the REH has become the generally accepted tool for modeling expectations. Whatever stories may be told about learning from past experience, there is no serious theory in these pages to explain where the expectation function ψ comes from. Given the strong restrictions placed on ψ , it is most unlikely to be consistent with the REH. There is an ad hoc air about the whole construction that makes the theory less persuasive than it should be, despite the generality and rigor of the analysis in other respects.”³⁴

Money and Value marks the end of a research period for Jean-Michel. The 70’s were years of high inflation with peaks at 11% in 1974 and 1979, and 13.5% in 1980. At the same time unemployment rose (from 3.8% in 1966 to 7.7% in 1976), a rebuttal for the Philipps curve and a blow for Keynesian stabilization policies (allowing for some inflation to lower unemployment). This economic environment helped the rise of New Classical economists in the footsteps of Milton Friedman: Robert E. Lucas, Finn E. Kydland, Edward C. Prescott, and Thomas J. Sargent to name a few Nobel laureates whose careers progressed in parallel with Grandmont’s.

New Classical Economics seeks microeconomics foundations for macroeconomics instead of the price rigidity assumptions of the Keynesian models. Grandmont could only be sympathetic with the idea of building macroeconomics on sound microeconomics. Yet, these foundations relied heavily on the representative consumer model and the rational expectation hypothesis. Grandmont was, from his theoretical perspective, unconvinced by this framework.

The academic environment of the time has been described by Paul Krugman in one of his blog articles where, as usual, the author does not mince his words:

“I don’t think this [New Classical] clique could have formed and grown powerful in the first place without the intellectual and ideological foundations. Economics as a discipline being what it is, attacks on Keynesian economics as being inconsistent with rational behavior

³⁴The function ψ referred to by [Gale \(1985\)](#) is the same function as that appearing in the Cobb-Douglas example discussed earlier in the profile.

Photograph 6: Grandmont, Paris, *circa* 1980.



were bound to get some traction, and the stagflation of the 1970s certainly helped that attack, even if it was less relevant than claimed. Animus against government activism also played a key role, both in motivating the new classical economists themselves and in guaranteeing them external support.

Once the thing had gotten going, however, I think you understand its dynamics much better if you stop assuming that the motives of the movement's leaders were pure.

[...]

Well, while the explicit message of such manifestos is intellectual – this is the only valid way to do macroeconomics – there's also an implicit message: from now on, only my students and disciples will get jobs at good schools and publish in major journals. And that, to an important extent, is exactly what happened; Ken Rogoff wrote about the 'scars of not being able to publish sticky-price papers during the years of new neoclassical repression.' As time went on and members of the clique made up an ever-growing share of senior faculty and journal editors, the clique's dominance became self-perpetuating – and impervious to intellectual failure."

Paul Krugman, *The New Classical Clique*, September 26, 2014, Blog NYT.

Krugman admits that he belongs to a different clique of international macroeconomics which developed around Rudiger Dornbusch and Stanley Fischer, and their students. Most mathematically-oriented macroeconomists were, however, in the New Classical group. As it happened, Grandmont positioned himself as a critic of these mathematical models from within the mathematical apparatus, thus putting himself in a rather uncomfortable position. Keynesians paid relatively little attention to Grandmont's attacks (as they were not well versed in this type of model) and New Classical economists saw them as remarkable mathematical exercises interesting only for a narrow audience.

Although Grandmont managed to voice his criticisms by publishing them in top journals, they did not change the course of mainstream macroeconomics.

In any case, Grandmont, who had never been convinced by the central role played by self-fulfilling expectations, decided to thoroughly study Lucas (1972), a key article (with 5,600 citations on Google Scholar) in the rational expectation macro-monetarist literature. His primary goal was to show that by changing the model slightly, multiple equilibria could exist. With multiple equilibria, public policy becomes important to help agents coordinate their expectations. So, Jean-Michel worked long hours trying to understand one of the proofs. At some point, Christian Gouriéroux (who, at the time, was working part-time at CEPREMAP) popped up in Grandmont's office and saw on the blackboard formulae that are familiar to a statistician. They discussed Lucas's model for a while and then Gouriéroux said: "Jean-Michel you don't understand because there is a mathematical error." As a consequence, Lucas's results are less general than stated, and uniqueness is not proven. Instead of writing a note himself, Grandmont sent a letter to Lucas explaining where he disagreed. Following this, Lucas published a corrigendum himself in 1983 in the *Journal of Economic Theory* (the corrigendum is cited 14 times on Google Scholar). At the end of his corrigendum, Lucas wrote: "Clearly these new restrictions leave open possibilities for equilibrium behavior that were not apparent in the original. To try to judge the economic interest of these possibilities would be beyond the scope of this note." Clearly, this was the task that Grandmont decided to follow in the 1980s.

Before a session of the Roy seminar, Jean-Michel was working in the seminar room drafting ideas about how behavior could converge to several cyclical equilibria in the same type of models used by the New Classical economists. By chance, Pierre Malgrange saw the graphs Grandmont was drawing and asked about them. Again, Jean-Michel explained that he was lost, to which Pierre retorts "You are lost because this is chaos theory." Malgrange was working at the time with Rose-Anne Dana on the dynamics of growth models which also used nonlinear dynamics. The theory was summarized by Edward Lorenz (the author of the paper "Predictability: Does the Flap of a Butterfly's Wings in Brazil set off a Tornado in Texas?") as: "When the present determines the future, but the approximate present does not approximately determine the future."

In June 1984 Grandmont gave the Walras-Bowley lecture at the American Summer Meetings of the Econometric Society.³⁵ The presentation formed the basis of his 1985 *Econometrica* article "On Endogenous Competitive Business Cycles". Lucas seized the opportunity to invite Jean-Michel Grandmont for a week to Chicago University. He kindly picked Grandmont up at the airport and in the car the two joked about where Grandmont fitted on the political spectrum. Jean-Michel positioned himself at the center but most Grandmont's colleagues at CEPREMAP saw him as a right-winger (in particular because of his use of mathematics and his publications written in English in international journals). But Lucas said that for him, Grandmont was a left-wing economist and even a socialist! Lucas had cleared his schedule to spend as much time as possible with Grandmont and they exchanged about their models. Nancy L. Stokey from Northwestern University and a former student of Arrow, who was visiting Chicago University at the time, joined them.³⁶ At some point they talked about Lucas's 1972 article. Rather bluntly, Grandmont stated that the paper (like Jean-Michel's own 1985 paper) was an example, that could not therefore pretend to be a general theory. Lucas was disappointed (even furious according to Grandmont) with Grandmont's lack of tact. What

³⁵The Walras-Bowley Lecture is an annual lecture given by a non-North-American member at the summer North American meeting or, in World Congress years, at the World Congress. The lecture is named after the French economist Léon Walras and the British statistician Arthur L. Bowley. Walras' law states that if all markets but one are in equilibrium, then the remaining market must also be in equilibrium. Bowley's law states that the share of a country's economic output that is given to employees remains constant over time. The first Walras-Bowley lecture was delivered by Maurice Allais in 1961. Symmetrically, the Fisher-Schultz Lecture is an annual lecture given by a non-European member at the European meeting.

³⁶Nancy Stokey and Robert Lucas were already working on their book *Recursive Methods in Economic Dynamics*, with Edward Prescott. The book was published in 1989.

could have been the start of a scientific friendship turned out to be a source of resentment. A decade later, in 1994, Jean-Michel showed that he was, however, not rancorous. In that year he was a member of the Nominating Committee for Officers and Council of the Econometric Society. Jean-Michel Grandmont knew that Lucas had not been President yet and proposed his candidacy for the position of second vice-President. Lucas was elected.

To summarize Grandmont's Walras-Bowley Lecture, there is no better way than using Grandmont's own words from the abstract of his paper. "This paper develops an example in which persistent deterministic business cycles appear in a purely endogenous fashion under *laissez-faire*. These cycles are not attributable to exogenous 'shocks' nor to any variation of policy since there are none in the model. Markets clear in the Walrasian sense at every date, and traders have perfect foresight along the cycles. The origin of these cycles is the potential conflict between the wealth effect and the intertemporal substitution effect that are associated with real interest rate movements. Business cycles appear in particular when the degree of concavity of a trader's utility function is sufficiently higher for old agents than for younger ones. The techniques employed to study the occurrence and the stability of such business cycles are borrowed partly from recent mathematical theories that have been constructed by using the notion of the 'bifurcation' of a dynamical system in order to explain the emergence of cycles and the transition to turbulent ('chaotic') behavior in physical, biological, or ecological systems. The equilibrium level of output is shown to be negatively related to the equilibrium level of the real interest rate. A similar relation exists (but in the opposite direction) between equilibrium real money balances and real interest rates. These relations hold both in the long run, i.e. along business cycles, and in the short run, i.e. on the transition path, and whether movements of the real interest rate are anticipated or not. The basic ingredient there is the condition that older agents have a higher marginal propensity to consume leisure. Monetary policy by means of nominal interest payments is shown to be extremely effective. A permanent change of the rate of growth of the money supply by these means is superneutral. Yet, there exists a very simple deterministic countercyclical policy that enables monetary authorities to stabilize completely business cycles and to force the economy back to the unique (Golden rule) stationary state. Due to the nonlinearity of the model such a policy affects not only the variances of real equilibrium magnitudes but also their means."

This paper is Grandmont's most cited publication (it has generated more than 1,200 Google Scholar citations), but in spite of this he said to us, "The paper has not had the impact I hoped it would have."

Officially Grandmont has so far supervised the doctoral dissertation of just a handful of students: Stefano Bosi, Guido Cazzavillan, Shikuan Chen, Patrick Pintus, and Tadashi Shigoka. A small number in light of Grandmont's fame. One explanation for this might be that he does not systematically push potentially interested students to actually pursue doctoral research. "My research topics are technically demanding, and risky in the sense that working on these topics has a high chance of not resulting in interesting and publishable results. More than once I have discouraged students who told me they wanted to work (for example on aggregation) under my supervision." Another possible explanation is Grandmont's relative lack of openness and receptiveness to research subjects beyond his own specialized area of research. Or, as Laroque put it, "Jean-Michel is like Debreu, he makes no comments on subjects unfamiliar to him." Unofficially, Grandmont has guided many Ph.D. students though, especially in the later phases of his career.³⁷ He has also helped and incited many young promising students to write a thesis in the U.S., urging them, however, to return to France afterwards. In some cases Grandmont has even offered financial support to students or changed the minds of reluctant parents who were not happy to see their children going abroad. Among students

³⁷Alain Venditti, Karine Nourry, Thomas Seegmuller, Teresa Lloyd-Braga, Leonor Modesto, Robin de Vilder, and Jean-Pierre Drugeon, for example.

who did a Ph.D. in the U.S. thanks to a nudge from Grandmont are Philippe Aghion (Harvard 1987), Bernard Caillaud (M.I.T. 1988), and Bruno Jullien (Harvard 1988).

In June 1985, Grandmont co-organized a conference in Paris on nonlinear dynamics in economics. One year later, he was the editor with Pierre Malgrange of a special issue of the *Journal of Economic Theory* (Volume 40, Issue 1, October 1986) which brought together 11 articles presented (or circulated) at the conference. The special issue was dedicated to his wife Josselyne.³⁸ In the introduction, [Grandmont and Malgrange \(1986\)](#) write: “The approach revives an old idea that can be found in the earlier (in particular, Keynesian) literature, namely that business cycles may be significantly caused by volatile expectations, i.e., by ‘market psychology’ or ‘animal spirits.’ Specifically, the claim is that, even if the real fundamental characteristics of the private sector are constant over time, prices and quantities may nevertheless fluctuate persistently under *laissez-faire*, if private economic units predict that they will do so.” In addition to the introduction, Grandmont authored two articles: [Grandmont \(1986b\)](#) and [Grandmont and Laroque \(1986\)](#).

Photograph 7: Grandmont, J.P. Benassy, A. Monfort, G. Laroque, and Ph. Aghion, Paris, 1989.



³⁸Jean-Michel wrote “The role of Josselyne Bitan was in fact essential during the whole venture. Without her efficiency, dynamism, and cheerfulness, this project would not have been completed. It seems only fair that this issue be dedicated to her.” The articles of this *Journal of Economic Theory* special issue are also published in the book [Grandmont \(1987a\)](#).

Photograph 8: Grandmont and J.J. Laffont, Paris, 1989



In the spring of 1988 Jean-Michel was invited by Assar Lindbeck to visit the University of Stockholm for two months. Several colleagues thought, wrongfully, that he was there on a self-promotional tour to increase his chances of getting the Nobel prize.³⁹ On the contrary, Grandmont went to Sweden among other things to discuss about Maurice Allais' contributions with the Nobel Prize Committee (part of whose members were economists at Stockholm University). "In that year I was going to be elected vice-president of the Econometric Society, so the Committee members might have known I would be the president of the Society two years later," Grandmont recalls. Two years before, Jean-Jacques Laffont had also been selected to become President of the Society but lost the vote to James Mirrlees. Laffont would be elected President in 1990. Grandmont saw these elections⁴⁰ and his invitation to Stockholm as a recognition of the renewal of economics research in France.

Each year the Committee requested reports from experts summarizing the scientific contributions of candidates proposed for nomination. A couple of years prior to Grandmont's visit to Stockholm, the Committee had asked him to write such a report on Allais. Grandmont had contacted Malinvaud for advice (since Malinvaud was close to Allais and knew his scientific work well). Malinvaud did not, however, particularly motivate Grandmont by telling him that the Committee requested many reports all the time and that most of them ended up in oblivion. So when he arrived in Sweden, Grandmont had not written a report. He had, however, studied Allais's books and articles (whose works were mostly in French and not yet translated, and consequently relatively unknown), and he could talk at length about them. Back in Paris he finally wrote a report knowing that a few months later, in October 1988, Allais would receive the Nobel prize (five years after Debreu in 1983). "This is one of my best memories. I contributed to the success of someone I admire a lot, for his scientific contributions above all, but also for what he has done for economic research in France," Grandmont said. His report on Allais was published in the *Scandinavian Journal of Economics* (Grandmont (1989d)).

As in any scientific institution, scientists at the CNRS go through different ranks as they proceed in their career. At the bottom is the so-called *Chargé de Recherche* level, and at the top the *Directeur de Recherche* level (each of them divided into sub-levels 2, 1 and 0). While Grandmont moved quickly from the CR to DR class, the step from DR2 to DR1 took an unusual long time, about twelve years. According to Grandmont, this promotion was blocked many times because the National Committee at the CNRS (in charge of evaluating the careers of all CNRS economists) was made up of left-wing and orthodox economists who disliked not only his work but also his personality. In the same period, the CNRS wanted to honour him with a silver medal, one of the highest academic distinctions attributed by the institution. Grandmont, unhappy with the promotion decisions of the National Committee, did not accept the prize however. "So I am one of the few economists having refused the silver medal." The year after this incident Grandmont was promoted to the DR1 class.

After Kenneth Arrow left Harvard in 1979, the Department of Economics was looking for his replacement. Jerry Green telephoned Grandmont and asked him if he would be interested in applying. Grandmont was flattered and told Green that, of course, he was interested but could not apply for personal reasons. Grandmont told us that as his two teenage daughters were living with his ex-wife Annick, it would have been impossible to move with them to the U.S. To this day he feels that this was the right decision, but nonetheless Grandmont cannot avoid wondering once in a while how his career would have evolved had he obtained a job at Harvard. A few years later Grandmont took a part-time position at the Department of Economics at Yale though. He was affiliated to Yale between 1987 and 1994, where he taught at the graduate level. During that period he was also the supervisor (alongside Willem Buiter and Christopher Sims) of Guido Cazzavillan, an Italian Ph.D. student at Yale, who

³⁹Between 1980 and 1994, Assar Lindbeck was chair of the Committee for the Prize in Economic Sciences in Memory of Alfred Nobel and financed by the Sveriges Riksbank.

⁴⁰The previous French President of the Econometric Society was Malinvaud in 1963, Debreu was President in 1971 but as an American.

wrote his thesis on “Self-Fulfilling Beliefs and Indeterminacy in Three Models of Endogenous Growth with Aggregate External Effects”. After completing his thesis, in 1994, Cazzavillan returned to Italy where he obtained a position at the university of Ca’ Foscari in Venice. Since 1995, Grandmont has been teaching there to masters students.⁴¹

5 From the 1990s until today

Grandmont entered calmer waters in the 1990s. “I had turned fifty, and had started the third phase of my career. After about twenty years mostly devoted to research, I felt the need to shift my attention to other activities. I wanted to do things with a sustainable and lasting impact, and wished to change some of the institutional structures in France.”⁴² With this in mind he applied for the position of director of CEPREMAP, but his candidacy was not retained. Disappointed, Grandmont applied for a part-time professorship at *École Polytechnique*. At that time the Department was primarily made up of people working in the private sector. Their approach to teaching was practically-orientated, and several of them were opposed to Grandmont since they disagreed with his plans to turn the Department into a Caltech-style academic research group. Grandmont succeeded in getting the position, though, in particular thanks to the support of Thierry de Montbrial. According to Grandmont, de Montbrial had forcefully convinced the other members of the selection committee that a mistake similar to the one made regarding Allais,⁴³ should be avoided at all costs. Grandmont was Professor at *Polytechnique* between 1992 and 2004 and headed the Department for six years. During this period many new (assistant) professors were recruited, most of them with very strong publication profiles. Grandmont was also one of the driving forces behind the Department’s move from the heart of Paris to Palaiseau. In 1996 he left CEPREMAP, the institute where he had worked for about a quarter of a century, and became affiliated to CREST, the research centre of ENSAE. At CREST, Grandmont has been in charge of counseling students interested in pursuing doctoral research, and also of setting up and organizing the necessary courses.

The 1990s were also years of additional rewards. In 1987, Grandmont was invited to give the first Clarendon Lectures in Economics, and in 1990 he was made Doctor honoris causa of the University of Lausanne. In 1992 he received the Alexander von Humboldt Research Award, and was made Foreign Honorary Member of the American Academy of Arts and Sciences. In 1995, Grandmont was decorated with the *Palmes académiques* by the French Ministry of Education. Last but not least, he was named *Chevalier* of the *Légion d’honneur* in 2004.

The main publications of this period are three papers in the *Journal of Economic Theory* (Grandmont (1992), Grandmont (1998b) and Grandmont, Pintus, and De Vilder (1998)) and one in *Econometrica* (Grandmont (1998a)). In Grandmont (1992), he again tackles the aggregation issue, extending his previous work (Grandmont (1978) and Grandmont (1987b)), using a distributional approach. Consumers’ preferences belong to a particular class and the population of all consumers is described by a distribution over that class. Grandmont shows that strong macroeconomic regularities are obtained essentially through distributional assumptions: prevalence, in the aggregate, of the weak axiom of revealed preference, of gross substitutability, and on the uniqueness and stability of the Walrasian exchange equilibrium.

In 1998, Jean-Michel Grandmont was the editor of a special issue of the *Journal of Economic Theory* “Market Psychology and Nonlinear Endogenous Business Cycles”. This is an echo of the 1986 special issue in the same journal. In the introduction to the issue (Grandmont (1998b)) he

⁴¹Cazzavillan died prematurely at the age of 51 in 2014.

⁴²Grandmont divides his professional life into three phases, the 1970s corresponding to phase 1, the 1980s to phase 2, and the years thereafter to phase 3.

⁴³In the mid-eighties, the Department had turned down the candidacy of Allais.

Photograph 9: Grandmont's photograph for *Econometrica* front page, Paris, 1991.



writes: “The idea that expectations of the agents of a socioeconomic system can influence the observed trajectories of that system, and in particular generate multiple equilibria (stationary, with a steady growth, or fluctuating over time), through a mechanism of self-fulfilling prophecies, has a long history in the social sciences” and warns that public intervention should (in the presence of multiple equilibria) “tend to coordinate the agents’ expectations through appropriate policy rules that are clearly announced and understood by the public.” [Grandmont, Pintus, and De Vilder \(1998\)](#) develops a simple geometric characterization of sunspot equilibria (stochastic endogenous fluctuations), in terms of the invariance properties of their supports in the underlying deterministic dynamics.

In 1990 Grandmont gave the Econometric Society Presidential Address at the 1990 World Meetings held in Barcelona. The lecture was published in *Econometrica* in 1998 ([Grandmont \(1998a\)](#)). It is another attempt by him to cast doubts on the rational expectation hypothesis: “The informational requirements underlying the axiom of self-fulfilling expectations are, of course, extraordinarily demanding, and many of us have voiced doubts over the years about its practical relevance.”⁴⁴ The paper shows that under reasonable assumptions about the learning processes (agents are ready to extrapolate a wide range of regularities from the past, including divergent ones), the learning dynamics is locally divergent.⁴⁵

⁴⁴Grandmont himself rarely uses the expression “rational expectations” as he does not see them as particularly rational. He prefers the term “self-fulfilling expectations”.

⁴⁵His ideas on the inadequacy of self-fulfilling expectations are still vivid today, see [Hommes \(2013\)](#) and [Beaudry](#),

Photograph 10: Grandmont, Venice, circa 2003.



Grandmont retired in 2004. He has steadily kept on working though, sharing his time between CREST and the University of Ca' Foscari. Even now that CREST has moved to Palaiseau,⁴⁶ about 15 kilometers south of Paris, Grandmont still comes regularly to his office. Still full of ideas and research plans, he has recently published two papers in the CREST Working Papers series (Grandmont (2017a) and Grandmont (2017b)).

In June 2013, the Aix-Marseille School of Economics and GREQAM organized a conference on “Instability and public policies in a globalized world: Conference in honor of Jean-Michel Grandmont.” The proceedings of the conference were published in a book (Nishimura, Venditti, and Yannelis (2017)). In the introduction to the volume, Alain Venditti recounts his first encounter with Grandmont. Alain was then completing his Ph.D. on “Endogeneous Fluctuations in Optimal Growth Models” and he met with Jean-Michel (who had accepted to be on Alain’s Ph.D. committee) to discuss his thesis. After their meeting, Jean-Michel sent Alain back to work! Alain admits he was “strongly depressed” but thanks to Jean-Michel’s advice and a few months of additional work “the thesis had indeed significantly improved!”

One of Grandmont’s favorite films is *Dead Poets Society*, directed by Peter Weir and released in France in 1990. It tells the story of a new English teacher at a boarding school who inspires students through his unorthodox way of teaching poetry. The teacher encourages the students to seize the day and make the most of their lives. The film does not have a happy ending as one of the students commits suicide, but nonetheless Grandmont said, “I found this a magnificent movie, it should be appealing to young people, the film conveys a message to them: you have only one life, grab this chance not just to have fun but also to be useful, and do something in your life.”

On December 16th, 2016, Jean-Michel Grandmont received an honorary fellowship from Ca’

Galizia, and Portier (2017), for example.

⁴⁶CREST and the Department of Economics of *École Polytechnique* now form a joint research centre – still called CREST by the way.

Foscari University.⁴⁷ Part of the ceremony can be watched on YouTube.⁴⁸ It gives a good idea of today's Jean-Michel Grandmont: a kind and affable man who likes to put forward his status of grandfather (eight grandchildren in a recomposed family) and who modestly portrays himself as part of a long chain. The beautiful conference hall of the university is fully packed, not only with professors who wish to honour Jean-Michel, but especially with students. On one of his slides is a photo of Guido Cazzavillan. Grandmont tells how the two had met at Yale, and how they had become friends over the years. His thank you speech is mostly devoted to non-academic issues. He tells the audience a bit though about his latest research projects, explaining why the representative consumer approach is a bad modelling choice, and that a more promising avenue consists in studying the conditions that must be imposed on the distribution of individual characteristics such that aggregate behavior has satisfactory properties. Towards the end of the speech, Grandmont returns to one of his favorite leitmotifs. Looking directly at the students and pointing a finger at them, he says, "You kids, you are the future of society; the way you can best help society is first to live your own life, go abroad, but then return and give back to the city that has given you so much."

⁴⁷Jean-Michel Grandmont was also made Doctor Honoris Causa in Economics in 2007 by Keio University in Tokyo. Jean-Michel told us that he is a great admirer of Japan where he went as a tourist at the end of his studies at *École des Ponts et Chaussées*. He is also a research fellow of RIEB (Research Institute for Economics and Business Administration) at Kobe University.

⁴⁸See <https://www.youtube.com/watch?v=EBChHkhcGFo>

Photograph 11: Grandmont, G. Debreu, and T. Maruyama. Conference on mathematical analysis in economic theory in honor of Professor Gérard Debreu. October 4–5, 1997, Keio University (Tokyo).



Photograph 12: J. Bitan, G. Debreu, and Grandmont, Tokyo, 1997



APPENDIX

Table 2 lists the top 40 most productive theoretical economists according to our publication score.⁴⁹ It also gives some information (collected in 2017) about each of them. Clicking on a name opens a webpage with more information about the author. The dag sign, †, indicates that the person is deceased.

For example, [Peter C. Fishburn](#) who is ranked 1st, was born in 1936, is a US citizen, obtained his PhD at Case I.T. in 1962 under the supervision of Ackoff, R. He was elected fellow of the Econometric Society in 1974 (12 years after his PhD completion). His publication score is 125.7 (that is, he published 125.7 normalized pages between 1971 and 1980). He published the equivalent of 13.5 articles alone or (14 co-published articles), i.e. he mostly published alone. His broad field is economics (as opposed to econometrics). Finally he has not been president of the Econometric Society, nor the American Economic Association, and he has not received the Nobel Prize of Economics.

Table 2: Theoretical Economists, i.e. ECMA and RESTUD, $T=1971-1980$

Rank	Name	Born	Nat	PhD U.	Year	(Advisor)	Fellow ECMA	Score	art/au	(art)	Field	Pr. ECMA	Pr. AEA	Nobel
1	Fishburn, PC	1936	USA	Case I.T.	1962	(Ackoff, R)	1974 (12)	125.7	13.5	(14)	eco			
2	Sargan, JD [†]	1924	UK	Cambridge	1947		1963 (16)	111.7	8.5	(9)	trics	1980		
3	Phillips, PCB	1948	NZ	L.S.E.	1974	(Sargan, JD)	1981 (7)	99.4	7.5	(8)	trics			
4	Maddala, GS [†]	1933	IND	Chicago	1963	(Griliches, Z)	1975 (12)	94.6	9.3	(12)	trics			
5	Stiglitz, JE	1943	USA	M.I.T.	1966	(Solow, RM)	1973 (7)	86.2	5.8	(8)	eco			2001
6	Feldstein, MS	1939	USA	Oxford	1967	(Gorman, WM)	1970 (3)	79.2	6.5	(8)	trics			
7	Hammond, PJ	1945	UK	Cambridge	1974	(Mirrlees, JA)	1977 (3)	77.1	6.5	(9)	eco			
8	Dreze, JH	1929	BEL	Columbia	1958	(Vickrey, WS)	1965 (7)	75.6	5.1	(9)	eco	1970		
9	Grandmont, JM	1939	FRA	Berkeley	1971	(Debreu, G)	1974 (3)	69.2	4.5	(7)	eco	1990		
10	Turnovsky, SJ	1941	NZ	Harvard	1968	(Dorfman, R)	1981 (13)	67.6	4.7	(7)	eco			
11	Sen, AK	1933	IND	Cambridge	1959	(Robinson, J)	1968 (9)	67.5	5.0	(5)	eco	1984	1994	1998
12	Diewert, WE	1941	CAN	Berkeley	1969	(McFadden, D)	1975 (6)	64.9	6.0	(7)	eco			
13	Laroque, G	1946	FRA	Paris 6	1971		1979 (8)	64.0	4.5	(7)	eco	2002		
14	Laffont, JJ [†]	1947	FRA	Harvard	1975	(Arrow, KJ)	1978 (3)	63.9	4.7	(9)	eco	1992		
15	Savin, NE	.	USA	Berkeley	1969	(Jorgenson, DW)	1985 (16)	63.8	6.0	(8)	trics			
16	Fisher, FM	1934	USA	Harvard	1960	(Meyer, JR)	1963 (3)	60.2	4.8	(6)	trics	1979		
17	Green, JR	1946	USA	Rochester	1970	(McKenzie, LW)	1975 (5)	59.4	5.0	(7)	eco			
18	Schmeidler, D	1939	ISR	Hebrew	1969	(Aumann, RJ)	1980 (11)	58.9	5.9	(10)	eco			
19	Heal, GM	1944	UK	Cambridge	1969		1977 (8)	57.8	4.0	(6)	eco			
20	Hausman, JA	1946	USA	Oxford	1973		1979 (6)	57.8	4.0	(6)	trics			
21	Amemiya, T	1935	JAP	J. Hopkins	1964	(Christ, CF)	1974 (10)	56.8	6.0	(6)	trics			
22	Hart, OD	1948	UK	Princeton	1974	(Rothschild, M)	1979 (5)	55.9	4.0	(5)	eco			2016
23	Pattanaik, PK	1943	IND	Delhi	1968		1978 (10)	55.9	5.0	(7)	eco			
24	Sawa, T	1942	JAP	Tokyo	1971	(Takeuchi, K)	1978 (7)	53.6	3.5	(5)	trics			
25	Radner, R	1927	USA	Chicago	1956	(Savage, LJ)	1961 (5)	52.9	3.2	(5)	eco	1973		
26	Muellbauer, J	1944	UK	Berkeley	1969	(Hall, RE)	1979 (10)	52.9	5.0	(5)	trics			
27	Calvo, GA	1941	ARG	Yale	1974	(Koopmans, TC)	1995 (21)	52.6	6.0	(6)	eco			
28	Schmidt, P	1947	USA	Michigan S.	1970	(Kmenta, Jan)	1988 (18)	51.9	7.5	(9)	trics			
29	Mas-Colell, A	1944	SPA	Minesota	1972	(Richter, M)	1977 (5)	51.9	4.3	(6)	eco	1993		
30	Heckman, JJ	1944	USA	Princeton	1971	(Kelejian, HH)	1980 (9)	51.1	4.0	(5)	trics	2013		2000
31	Deaton, AS	1945	UK	Cambridge	1975	(Stone, JR)	1978 (3)	50.6	4.0	(5)	trics		2009	2015
32	Kamien, MI [†]	1938	USA	Purdue	1964	(Ames, E)	1996 (32)	50.1	3.5	(7)	eco			
33	Starrett, DA	.	USA	Stanford	1969		1975 (6)	48.7	5.0	(5)	eco			
34	Hatta, T	1943	JAP	J. Hopkins	1973		.	47.9	5.0	(5)	eco			
35	Wise, DA	.	USA	Berkeley	1972	(Radner, R)	1986 (14)	47.7	3.0	(5)	eco			
36	Pollak, RA	1938	USA	M.I.T.	1964	(Fisher, FM)	1977 (13)	46.4	3.8	(5)	eco			
37	Wilson, R	1937	USA	Harvard	1963	(Raiffa, H)	1976 (13)	45.9	4.8	(6)	eco	1999		

to be continued next page

⁴⁹That is $10 \sum \sqrt{\frac{\text{pages}}{(\text{average pages})(\text{authors})}}$ where ‘pages’ is the number of pages, ‘average pages’ is the average length of an article in the same journal and year, and ‘authors’ is the number of authors. The sum is over all articles of an author. A single author article with the average number of pages obtains a score of 10.

Rank	Name	Born	Nat	PhD U.	Year	(Advisor)	Fellow ECMA	Score	art/au	(art)	Field	Pr. ECMA	Pr. AEA	Nobel
38	Aoki, M[†]	1938	JAP	Minesota	1967	(Chipman, JS)	2015 (48)	45.6	5.0	(5)	eco			
39	Kelly, JS	.	USA	Harvard	1969	(Arrow, KJ)	.	45.6	6.0	(6)	eco			
40	Chipman, JS	1926	CAN	J. Hopkins	1951	(Machlup, F)	1956 (5)	45.3	3.5	(4)	eco			

Table 3 lists the top 40 most productive theoretical economists according to our citation score.⁵⁰ It also gives some information (collected in 2017) about each of them. Clicking on a name opens a webpage with more information about the author. The dag sign, †, indicates that the person is deceased. For example, [James J. Heckman](#) who is ranked 1st, was born in 1944, is a US citizen, obtained his PhD at Princeton in 1971 under the supervision of Kelejian, H. H. He was elected fellow of the Econometric Society in 1980 (9 years after his Ph.D. completion). His citation score is 506.7. He received 769.1 (10 year) citations normalized by the number of authors, and 9,233 total (as measured in 2017) normalized citations. His broad field is econometrics (as opposed to economics). Finally he was president of the Econometric Society in 2013, but not yet of the American Economic Association, and he received the Nobel Prize of Economics in 2000. The last number in parenthesis indicates the number of publications from which the citations are counted. In Heckman case, he published 5 articles in either *Econometrica* or *Review of Economic Studies* during the 1971-1980 period.

There is also a code color as some names are in dark blue and others in light blue. Dark blue indicates that the person is in the top 5% of authors in terms of the publication score. The light blue indicates that the person is not.

Table 3: Theoretical (i.e. ECMA and RESTUD) Economists, 10 year citations, $T=1971-1980$

Rank	Name	Born	Nat	PhD U.	Year	(Advisor)	Fellow ECMA	Euc_{10}	$\frac{cit_{10}}{au}$	$\left(\frac{cit}{au}\right)$	Field	Pr. ECMA	Pr. AEA	Nobel	Pub
1	Heckman, JJ	1944	USA	Princeton	1971	(Kelejian, HH)	1980 (9)	506.7	769.1	(9233.0)	trics	2013		2000	(5)
2	Tversky, A	1937	ISR	Michigan	1964		1993 (29)	379.0	384.0	(6181.0)	eco				(2)
3	Kahneman, D	1934	ISR	Berkeley	1961	(Ervin, S)	1993 (32)	379.0	379.0	(6174.0)	eco			2002	(1)
4	White, H[†]	1950	USA	M.I.T.	1976	(Hausman, J)	1983 (7)	370.5	412.4	(8551.0)	trics				(3)
5	Hausman, JA	1946	USA	Oxford	1973		1979 (6)	327.0	455.5	(4577.5)	trics				(6)
6	Sims, CA	1942	USA	Harvard	1968	(Houthakker, HS)	1974 (6)	301.4	317.0	(2486.0)	trics	1995	2012	2011	(2)
7	Baily, MN	1945	USA	M.I.T.	1972		.	171.8	224.0	(523.0)	eco				(2)
8	Breusch, TS	1953	AUS	ANU	1979	(Pagan, AR)	1991 (12)	121.8	194.6	(1097.5)	trics				(3)
9	Pagan, AR	1947	AUS	ANU	1972	(Terrell, RD)	1985 (13)	118.9	174.7	(1058.0)	trics				(4)
10	Sen, AK	1933	IND	Cambridge	1959	(Robinson, J)	1968 (9)	117.7	226.0	(1425.0)	eco	1984	1994	1998	(5)
11	Wallis, KF	1938	UK	Stanford	1966	(Nerlove, M)	1975 (9)	112.3	162.0	(318.0)	trics				(4)
12	Myerson, RB	1951	USA	Harvard	1976	(Arrow, KJ)	1983 (7)	107.4	116.0	(704.0)	eco	2009		2007	(2)
13	Gibbard, A	1942	USA	Harvard	1971	(Rawls, J)	1984 (13)	106.5	142.0	(1178.0)	eco				(3)
14	Merton, RC	1944	USA	M.I.T.	1970	(Samuelson, PA)	1983 (13)	104.2	119.0	(1605.0)	eco			1997	(2)
15	Lucas, RE	1937	USA	Chicago	1964	(Harberger, AC)	1975 (11)	104.2	118.6	(1381.5)	eco	1997	2002	1995	(2)
16	Nordhaus, WD	1941	USA	M.I.T.	1967	(Solow, RM)	1984 (17)	97.0	97.0	(907.0)	eco		2014		(1)
17	Barro, RJ	1944	USA	Harvard	1970	(Griliches, Z)	1980 (10)	96.0	144.8	(320.0)	eco				(3)
18	Benassy, JP	1948	FRA	Berkeley	1973	(Debreu, G)	1981 (8)	93.6	109.0	(236.0)	eco				(2)
19	Amemiya, T	1935	JAP	J. Hopkins	1964	(Christ, CF)	1974 (10)	92.3	196.0	(1048.0)	trics				(6)
20	Groves, T	1941	USA	Berkeley	1970	(Radner, R)	1977 (7)	91.4	141.4	(1275.5)	eco				(4)
21	Lancaster, T	1938	UK	Cambridge	1963		1991 (28)	91.0	91.0	(456.0)	trics				(1)
22	Stiglitz, JE	1943	USA	M.I.T.	1966	(Solow, RM)	1973 (7)	90.9	212.5	(961.3)	eco			2001	(8)
23	Grandmont, JM	1939	FRA	Berkeley	1971	(Debreu, G)	1974 (3)	88.5	148.4	(369.5)	eco	1990			(7)

to be continued next page

⁵⁰That is $Euc_T = \sqrt{\sum \frac{(cit_{10})^2}{authors}}$ where cit_{10} is the cumulated number of citations received by an article 10 years after publication and ‘authors’ is the number of authors. The sum is over all publications of one author.

Rank	Name	Born	Nat	PhD U.	Year	(Advisor)	Fellow ECMA	Euc_{10}	$\frac{cit_{10}}{au}$ ($\frac{cit}{au}$)	Field	Pr. ECMA	Pr. AEA	Nobel	Pub
24	Hahn, FH [†]	1925	UK	L.S.E.	1951	(Kaldor, N)	1961 (10)	86.8	141.0 (266.0)	eco	1968			(3)
25	McKelvey, RD [†]	1944	USA	Rochester	1972	(Riker, B)	1994 (22)	86.6	110.0 (370.0)	eco				(2)
26	Mundlak, Y	1927	ISR	Berkeley	1957		1970 (13)	86.0	86.0 (1023.0)	trics				(1)
27	Mackinnon, JG	1951	CAN	Princeton	1975	(Rothschild, M)	1990 (15)	83.4	83.4 (144.5)	trics				(1)
27	Beach, CM	1947	CAN	Princeton	1972	(Fair, R)	.	83.4	83.4 (144.5)	trics				(1)
29	Pesaran, MH	1946	IRAN	Cambridge	1972	(Champerno., DG)	1989 (17)	81.0	122.2 (333.5)	trics				(3)
30	Riley, JG	.	USA	M.I.T.	1972	(Solow, RM)	1983 (11)	80.3	86.4 (322.0)	eco				(2)
31	Wise, DA	.	USA	Berkeley	1972	(Radner, R)	1986 (14)	79.2	133.5 (329.5)	eco				(5)
32	Taylor, JB	1946	USA	Stanford	1973	(Anderson, TW)	1984 (11)	77.4	112.9 (312.0)	eco				(4)
33	Nickell, S	1944	UK	L.S.E.	1970	(Hahn, F)	1980 (10)	75.5	86.0 (240.0)	eco				(3)
34	Nerlove, M	1933	USA	J. Hopkins	1956	(Christ, CF)	1960 (4)	74.9	124.0 (451.0)	trics	1981			(3)
35	Mirrlees, JA	1936	UK	Cambridge	1963	(Stone, JR)	1970 (7)	73.6	95.3 (1260.5)	eco	1982		1996	(4)
36	Radner, R	1927	USA	Chicago	1956	(Savage, LJ)	1961 (5)	73.5	117.4 (513.2)	eco	1973			(5)
37	McCallum, BT	1935	USA	Rice	1969		1992 (23)	72.4	80.0 (254.0)	eco				(3)
38	Ledyard, JO	.	USA	Purdue	1967	(Reiter, S)	1977 (10)	72.3	80.4 (187.5)	eco				(4)
39	Salop, SC	1946	USA	Yale	1972		.	70.3	119.5 (403.0)	eco				(3)
40	Deaton, AS	1945	UK	Cambridge	1975	(Stone, JR)	1978 (3)	69.5	115.0 (291.0)	trics		2009	2015	(5)

Figure 1 puts together Tables 2 and 3. The x-axis is the log of our citation score (column Euc_{10} in Table 3) and the y-axis is our publication score (column Score in Table 2). Any author who is in either table is in the figure. Hence the two black dashed lines: all dots above the horizontal black dashed line are in Table 2 and all dots on the right of the vertical black dashed line are in Table 3. In addition, all authors are represented by a dot (but with no name attached) except for Nobel prize winners whose names are in red. Finally the vertical and horizontal dashed blue lines are just the coordinates of Jean-Michel Grandmont. Interestingly these lines show that only J. E. Stiglitz is above Jean-Michel Grandmont in terms of both citation and publication scores.

References

- Maurice Allais. La théorie des choix dans l'œuvre de René Roy une analyse critique. *Revue d'économie politique*, pages 315–357, 1988.
- Roger E. Backhouse and Mauro Boianovsky. *Transforming modern macroeconomics: exploring disequilibrium microfoundations, 1956–2003*. Cambridge University Press, 2013.
- Paul Beaudry, Dana Galizia, and Franck Portier. Putting the cycle back into business cycle analysis. Working paper, 2017.
- Laurent-Emmanuel Calvet, Jean-Michel Grandmont, and Isabelle Lemaire. Aggregation of Heterogenous Beliefs, Asset Pricing, and Risk Sharing in Complete Financial Markets. *Research in Economics*, 72(1):117–146, 2018.
- David Cass. In memoriam: Yves Younès (1937–1996). *Economic Theory*, 9(1):1–1, 1997.
- Otto A Davis, Morris H DeGroot, and Melvin J Hinich. Social preference orderings and majority rule. *Econometrica*, 40(1):147–157, 1972.
- Gerard Debreu. Excess demand functions. *Journal of mathematical economics*, 1(1):15–21, 1974.
- Pierre Dehez and Omar Licandro. From uncertainty to macroeconomics and back: An interview with Jacques Drèze. *Macroeconomic Dynamics*, 9(3):429–461, 2005.

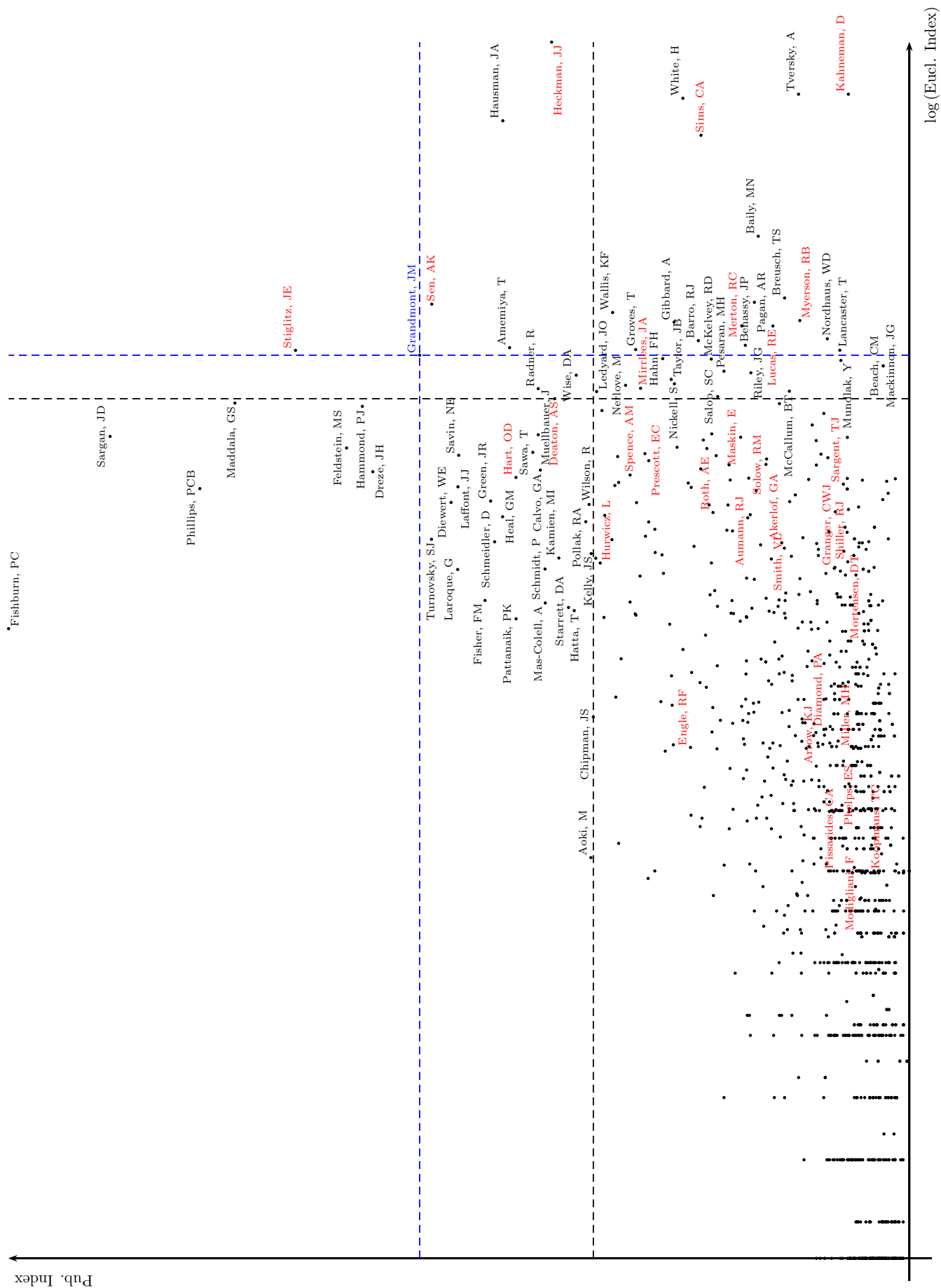


Figure 1: Mathematical economists: articles (1971-80) in *Econometrica* and *Review of Economic Studies*, citations and publications

- Till D  ppe. Gerard Debreu’s Secrecy: His Life in Order and Silence. *History of Political Economy*, 44(3):413–449, 2012.
- Till D  ppe. How modern economics learned French: Jacques Dr  ze and the foundation of CORE. *The European Journal of the History of Economic Thought*, 24(2):238–273, 2017.
- Douglas Gale. Reviewed Work(s): Money and Value: A Reconsideration of Classical and Neoclassical Monetary Economics by Jean-Michel Grandmont. *Journal of Political Economy*, 93(2):430–433, 1985.
- Jean-Michael Grandmont. *Nonlinear economic dynamics:[presented or circulated at a conference held in Paris in June 1985]*. Academic Press, 1987a.
- Jean-Michel Grandmont. Continuity properties of a von Neumann-Morgenstern utility. *Journal of Economic Theory*, 4(1):45–57, 1972.
- Jean-Michel Grandmont. On the short-run and long-run demand for money. *European Economic Review*, 4(3):265–287, 1973.
- Jean-Michel Grandmont. On the short-run equilibrium in a monetary economy. In *Allocation under uncertainty: Equilibrium and optimality*, pages 213–228. Springer, 1974.
- Jean-Michel Grandmont. Th  orie de l’  quilibre temporaire g  n  ral. *Revue   conomique*, 27(5):805–843, 1976.
- Jean Michel Grandmont. Temporary general equilibrium theory. *Econometrica*, 45(3):535–572, 1977a.
- Jean-Michel Grandmont. The logic of the fix-price method. *Scandinavian Journal of Economics*, 79(2):169–186, 1977b.
- Jean-Michel Grandmont. Intermediate preferences and the majority rule. *Econometrica*, 46(2):317–330, 1978.
- Jean-Michel Grandmont. Temporary general equilibrium theory. In *Handbook of mathematical economics*, volume 2, pages 879–922. Elsevier, 1982.
- Jean-Michel Grandmont. *Money and Value: A Reconsideration of Classical and Neoclassical Monetary Economics*. Cambridge University Press, 1983.
- Jean-Michel Grandmont. On endogenous competitive business cycles. *Econometrica*, 53(5):995–1045, 1985.
- Jean-Michel Grandmont. On endogenous competitive business cycles. In *Models of Economic Dynamics*, pages 25–34. Springer, 1986a.
- Jean-Michel Grandmont. Stabilizing competitive business cycles. *Journal of Economic Theory*, 40(1):57–76, 1986b.
- Jean-Michel Grandmont. *Monnaie et valeur*. Economica, 1986c.
- Jean-Michel Grandmont. Distributions of Preferences and the “Law of Demand”. *Econometrica*, 55(1):155–161, 1987b.
- Jean-Michel Grandmont. Rapport sur les travaux scientifiques de Maurice Allais. *Annales d’  conomie et de Statistique*, 14:25–38, 1989a.

- Jean-Michel Grandmont. Local bifurcations and stationary sunspots. In *Economic Complexity: Chaos, Sunspots, Bubbles, and Nonlinearity: Proceeding of the Fourth International Symposium in Economic Theory and Econometrics*, pages 45–60. 1989b.
- Jean-Michel Grandmont. Keynesian issues and economic theory. *Scandinavian Journal of Economics*, 91(2):265–293, 1989c.
- Jean-Michel Grandmont. Report on Maurice Allais’ Scientific Work. *Scandinavian Journal of Economics*, 91(1):17–28, 1989d.
- Jean-Michel Grandmont. Expectations driven business cycles. *European Economic Review*, 35(2-3): 293–299, 1991.
- Jean-Michel Grandmont. Transformations of the commodity space, behavioral heterogeneity, and the aggregation problem. *Journal of Economic Theory*, 57(1):1–35, 1992.
- Jean-Michel Grandmont. Expectations driven nonlinear business cycles. In *Rheinisch-Westfälische Akademie der Wissenschaften*, pages 7–32. Springer, 1993a.
- Jean-Michel Grandmont. Behavioural heterogeneity and Cournot oligopoly equilibrium. *Ricerche economiche*, 47(2):167–187, 1993b.
- Jean-Michel Grandmont. Expectations driven nonlinear business cycles. In *Nonlinear and Convex Analysis in Economic Theory*, pages 67–78. Springer, 1995.
- Jean-Michel Grandmont. Expectations formation and stability of large socioeconomic systems. *Econometrica*, 66(4):741–781, 1998a.
- Jean-Michel Grandmont. Introduction to market psychology and nonlinear endogenous business cycles. *Journal of economic theory*, 80(1):1–13, 1998b.
- Jean-Michel Grandmont. Fiscally stable income distributions under majority voting, Lorenz curves and bargaining sets. In *Advances in Mathematical Economics*, pages 215–230. Springer, 2006.
- Jean-Michel Grandmont. Negishi–Solow efficiency wages, unemployment insurance and dynamic deterministic indeterminacy. *International Journal of Economic Theory*, 4(2):247–272, 2008a.
- Jean-Michel Grandmont. Nonlinear difference equations, bifurcations and chaos: an introduction. *Research in economics*, 62(3):122–177, 2008b.
- Jean-Michel Grandmont. Tribute To Kazuo Nishimura. *Macroeconomic Dynamics*, 16(S1):5–17, 2012.
- Jean-Michel Grandmont. Tribute to Cuong Le Van. *International Journal of Economic Theory*, 9 (1):5–10, 2013.
- Jean-Michel Grandmont. Behavioral Heterogeneity: Pareto Distributions of Homothetic Preference Scales and Aggregate Expenditures Income Elasticities. CREST Working paper, n° 2017-11, 2017a.
- Jean-Michel Grandmont. Countercyclical Endogenous Uncertainty Shocks, Efficiency Wages and Procyclical Precautionary Labor Productivity. CREST Working paper, n° 2017-12, 2017b.
- Jean-Michel Grandmont and Werner Hildenbrand. Stochastic processes of temporary equilibria. *Journal of Mathematical Economics*, 1(3):247–277, 1974.

- Jean-Michel Grandmont and Guy Laroque. [Monnaie et banque centrale](#). *Annales de l'INSEE*, 14: 71–118, 1973a.
- Jean-Michel Grandmont and Guy Laroque. [Money in the pure consumption loan model](#). *Journal of Economic Theory*, 6(4):382–395, 1973b.
- Jean-Michel Grandmont and Guy Laroque. [On money and banking](#). *Review of Economic Studies*, 42(2):207–236, 1975.
- Jean-Michel Grandmont and Guy Laroque. [The liquidity trap](#). *Econometrica*, pages 129–135, 1976a.
- Jean-Michel Grandmont and Guy Laroque. [On temporary Keynesian equilibria](#). *Review of Economic Studies*, 43(1):53–67, 1976b.
- Jean-Michel Grandmont and Guy Laroque. [Stability of cycles and expectations](#). *Journal of Economic Theory*, 40(1):138–151, 1986.
- Jean-Michel Grandmont and Guy Laroque. Economic dynamics with learning: some instability examples. In *Equilibrium theory and applications: Proceedings of the Sixth International Symposium in Economic Theory and Econometrics*, pages 247–73. Cambridge University Press, 1991.
- Jean-Michel Grandmont and Pierre Malgrange. [Nonlinear economic dynamics: Introduction](#). *Journal of Economic Theory*, 40(1):3–12, 1986.
- Jean-Michel Grandmont and Daniel McFadden. [A technical note on classical gains from trade](#). *Journal of International Economics*, 2(2):109–125, 1972.
- Jean-Michel Grandmont and Gérard Neel. [Sur les taux d'intérêt en France](#). *Revue Économique*, 24(3):460–472, 1973.
- Jean-Michel Grandmont and Yves Younès. [On the Role of Money and the Existence of a Monetary Equilibrium](#). *Review of Economic Studies*, 39(3):355–372, 1972.
- Jean-Michel Grandmont and Yves Younès. [On the efficiency of a monetary equilibrium](#). *Review of Economic Studies*, 40(2):149–165, 1973.
- Jean-Michel Grandmont, Alan P Kirman, and Wilhelm Neuefeind. [A new approach to the uniqueness of equilibrium](#). *Review of Economic Studies*, 41(2):289–291, 1974.
- Jean-Michel Grandmont, Guy Laroque, and Yves Younès. [Equilibrium with quantity rationing and recontracting](#). *Journal of Economic Theory*, 19(1):84–102, 1978.
- Jean-Michel Grandmont, Patrick Pintus, and Robin De Vilder. [Capital–labor substitution and competitive nonlinear endogenous business cycles](#). *Journal of Economic Theory*, 80(1):14–59, 1998.
- Cars Hommes. *Behavioral rationality and heterogeneous expectations in complex economic systems*. Cambridge University Press, 2013.
- Guy Laroque. [Tribute to Jean-Michel Grandmont](#). *International Journal of Economic Theory*, 2(3-4):175–179, 2006.
- Robert E Lucas. [Expectations and the Neutrality of Money](#). *Journal of economic theory*, 4(2): 103–124, 1972.
- Robert E. Lucas. [Reviewed Work\(s\): Money and Value: A Reconsideration of Classical and Neo-classical Monetary Economics by Jean-Michel Grandmont](#). *Journal of Economic Literature*, 22(4): 1651–1653, 1984.

- Edmond Malinvaud. [René Roy 1894-1977](#). *Cahiers du Séminaire d'Économétrie*, (19):7–17, 1977.
- Edmond Malinvaud. L'œuvre scientifique d'Yves Younès (1937-1996). *Économie Appliquée*, 52(1): 7–30, 1999.
- Rolf R Mantel. [On the characterization of aggregate excess demand](#). *Journal of economic theory*, 7 (3):348–353, 1974.
- Kazuo Nishimura, Alain Venditti, and Nicholas C Yannelis. *Sunspots and Non-Linear Dynamics: Essays in Honor of Jean-Michel Grandmont*. Springer, 2017.
- Motty Perry and Philip J. Reny. [How to Count Citations If You Must](#). *American Economic Review*, 106(9):2722–41, September 2016.
- Charles R Plott. [A notion of equilibrium and its possibility under majority rule](#). *American Economic Review*, 57(4):787–806, 1967.
- Amartya Sen. Social choice theory. *Handbook of mathematical economics*, 3:1073–1181, 1986.
- Paul B Simpson. [On defining areas of voter choice: Professor Tullock on stable voting](#). *Quarterly Journal of Economics*, 83(3):478–490, 1969.
- Hugo Sonnenschein. [Market excess demand functions](#). *Econometrica*, 40:549–563, 1972.
- Hugo Sonnenschein. [Do Walras' identity and continuity characterize the class of community excess demand functions?](#) *Journal of economic theory*, 6(4):345–354, 1973.
- Stephen E Spear. [An interview with Karl Shell](#). *Macroeconomic Dynamics*, 5(5):701–741, 2001.
- Gordon Tullock. [The general irrelevance of the general impossibility theorem](#). *The Quarterly Journal of Economics*, 81(2):256–270, 1967.
- Yves Younès. [Indices Prospectifs Quantitatifs et Procédures Décentralisées d'Élaboration des Plans](#). *Econometrica*, 40(1):137–146, 1972.