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The Economics of Science

From the Republic of Letters to Incentives, Narratives and Expertise

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About this document

This document gathers lecture notes and references so that students can keep a record of the session of 18 February 2022 of the MEHPERE methodology seminar of the Master ESH (Paris 1). It is not intended for wider circulation.

Introduction

This course is organised around a set of questions about scientific activity, about what economists say about it, or about what they could say about it. In this respect, what we call the economics of science is conceived here in an extremely general, diverse and "cross-border" way. We will go far beyond questions of research funding (even if we will discuss them), and we will look at the organisation of science, in particular through incentive systems, at the circulation of ideas, at how to choose among experts' models, etc. In other words, the word "economics" in the expression "economics of science"

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refers just as much to a substantive point of view—because science contributes to productive and institutional activity—as to a formal point of view—in the sense that rational choice theory may (or may not) be useful for analysing scientific activity. The idea is to present a number of economists' models that deal with questions concerning science and its use. If our approach is cross-border, it is because economics will not be the only discipline called upon here: we will bring the work of economists into dialogue with work from other disciplines.

The general objective of the course is threefold:

- To show and discuss research questions in the making. The aim here is to present work that interests us, that we like, that puzzles us, in order to try to think together about stimulating research questions starting from this work;
- To present and discuss recent research and to give landmarks and anchor points in different literatures;
- By combining different disciplines and different types of work (theoretical and empirical, relying on different methods, etc.), to give an overview of the extreme richness of the ways of approaching similar questions, and to give a taste for (sub-)disciplinary travel.

First, we offer a brief historical discussion of the emergence of the figure of the scientist, of its professionalisation within new institutions, and of its growing involvement in a role of expertise. The aim is, in a sense, to sketch in (very) broad strokes a socio-history of the professionalisation of research that also takes into account the economic conditions of this professionalisation.

Second, we briefly discuss the economics of science as such, that is, the economic literature that claims to belong to the economics of science (even if the label fluctuates), or what the secondary literature (often non-economic) regards as the economics of science. What follows in most of this course breaks away from this narrower view of the economics of science and will blur the boundaries. But it seemed important to us to first offer a partly historicised analysis of where the term comes from and of what it usually designates.

1 Some historical landmarks on the institutionalisation and professionalisation of scientific practice

First, it seems important to us to give a few rough elements of context, in order to understand the evolution of the status of the researcher/scientist, its emergence in history and its professionalisation from the 19th century onwards. Discussing this status of the researcher also means discussing the institutions that hosted it and still host it. It is in particular an opportunity to stress that this figure has varied (and that, at a given time, it can refer to different conceptions, different ideal types of what a researcher/scientist is); that the institutions we associate with research have not always been the same, and that they are diverse. But it is also an opportunity to give a very brief overview of the national differences that existed at given moments in history.

Given how brief this overview is, its main purpose is to give bibliographical landmarks and to highlight important themes put forward by researchers (in particular in the history and sociology of science in recent years).

For a modern science based on experimentation, calculation and the circulation of knowledge to emerge, institutions had to be established that could give stability and relative independence to isolated individuals (Gingras, 2021, ch. 2). Another important condition is the multiplicity of these institutions, which allow researchers to move according to the political context (for example, a tightening of censorship in a country).

The first universities emerged in Europe at the beginning of the 13th century and then gradually

proliferated with urban development. They provided a first framework that facilitated the stability and development of the sciences. However, the "scholars" of the medieval university devoted themselves mainly to the rigorous exegesis of ancient sources "interpreted in the light of the Holy Scriptures" (Shank in Pestre and Van Damme 2019, 44). The practice of scholasticism limited the space for the production of knowledge and made the university an institution under influence (that of the Church). Moreover, the university long remained an institution whose primary vocation was the transmission of knowledge, and it was not until the 19th century and the imitation of the German model that the advancement of research became a full prerogative of the university (Gingras, 2021, ch. 2).

The quintessential institutions of the new science that emerged in the Renaissance were the Academies and other learned societies. This is the case, for example, of the Accademia dei Lincei, which played a crucial role in Galileo's career, as did the court of the Medici and the Grand Dukes of Tuscany (Shank in Pestre and Van Damme 2019, 51). The Royal Society of London was created in 1662 and the Académie Royale des Sciences in Paris in 1666 by Colbert. The latter is characteristic of the growing influence of royal and princely power in the emergence of new institutions with a scientific vocation.[1] These institutions were the first step towards the institutionalisation of scientific research: they paid their members regularly and had funds to build instruments or carry out experiments. These institutions also launched competitions on scientific questions in order to stimulate research on certain subjects. They were also central to the "Republic of Letters" that emerged in Europe at that time.

The economic and industrial development of Western economies from the 19th century onwards also provided growing outlets for researchers, whether through the development of chemistry laboratories, of telecommunications, etc. In the United States, for example, jobs requiring scientific training grew much faster than the labour market as a whole in the first half of the 20th century (Gingras, 2021, 43). At the same time, the university became the privileged space for the legitimate production of scientific knowledge, and the 19th century saw craftsmen, amateurs and self-taught people gradually and definitively relegated outside the domain of science.

What we observe at the end of the 19th century is a growing specialisation of researchers. The figure of the generalist "scholar" disappeared at the beginning of the century. Disciplines became institutionalised by creating professional associations and specialised journals (Gingras, 2021, 49). This process of specialisation intensified in the 20th century with the institutionalisation of "specialities" within the disciplines themselves, which in turn created their own associations and journals, organised their own conferences, etc.

For science, the 20th century was also that of the dominant role of the nation-state (Pestre, 2019, 11–12). Thanks to taxation, states had means out of all proportion to those of the 19th century. In democracies as in authoritarian states, scientific research became an important item of expenditure, whether for war or for the modernisation of society after the war. This funding was not limited to the natural sciences, but contributed greatly to the development of the social sciences (Solovey and Cravens, 2012). Scientific expertise intervened in many contexts to support political decision-making, and key positions opened up for staff with scientific training. This is the case, for example, of economists, who moved into many areas of political or legal decision-making: central banks, parliamentary institutions (Berman, 2022), courts of law, etc.

Since the 1960s, at the global level, we have observed a growing internationalisation and standardisation of research methods, of the publicity given to research and of its evaluation (Gingras, 2002). English has become the dominant language of publication in academic journals, in which it is becoming increasingly difficult to publish in any other language (Fourcade, 2006). Criteria for ranking journals and publications have spread as a way of assessing researchers' productivity.

2 What is the economics of science?

[1] The creation of these institutions resulted in part from the sovereigns' wish to assert their power, notably with respect to the Church (Shank in Pestre and Van Damme 2019, 51).

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3 Organisational regimes of science

The main objective of the scientific institution is to produce new knowledge for various purposes:

- Instrumental purposes: solving technological and social problems, making political ideologies prevail;
- Non-instrumental purposes: knowledge for its own sake, the beauty of a theory, etc.

It is thus natural that economics, defined sometimes by production (cf. Samuelson), sometimes by management (cf. Aristotle), should take a positive interest in the modes of organisation of the scientific institution, and should try, normatively, to grasp their optimality. The questions that come to mind at once concern funding. How are (or should) researchers be paid? Is (or should) basic research or applied research (be) favoured? Who, the public or the private sector, provides (or should provide) the production of knowledge?

If these seemingly disparate questions arise in a unified way, it is because all the ideas developed on this topic rest on a common narrative: since it is uncertain, the production of scientific novelty—and hence risk-taking—can (should) be encouraged, which requires setting up incentive systems specific to science. The value of scientific activities is intimately linked to the notion of uncertainty. First, because in science there can be no value without uncertainty. A research project whose results are known in advance is worthless, because it does not increase knowledge (cf. Popper). Second, because novelty and uncertainty are correlated. The more innovative the results we hope for from a research project, the less knowledge we have about it.

Although it is collectively desirable, the production of radically new scientific knowledge is sometimes far too risky an activity at the individual level. Just as a researcher paid by the discovery will choose safety, a private firm will favour applied research, whose results are relatively assured. Encouraging risk-taking therefore requires determining which of these economic actors should bear the responsibility in the face of uncertainty.

This part will therefore consist of models that deal with this question. It will also be an opportunity to present several important contributions of contract theory. Sometimes called mechanism design, contract theory is undoubtedly one of the major branches of modern microeconomic theory. This theory gives a foundation to the concept of incentive, which is also very present in contemporary political philosophy. To our knowledge, there is almost no work on this theory in the history of economic thought. Someone should do it!

3.1 Notions of contract theory

Contract theory tries to make sense of situations in which information is unequally distributed among different agents. Of course, the structure induced by these situations differs according to the type of information available (information about the agents' types or about the actions undertaken) or according to how this information is distributed. We therefore distinguish three branches:

Three branches of contract theory

1. **Adverse selection** (or *screening*) is a situation in which an agent chooses an action that will have consequences for the utility of another agent, called the principal. The principal, who is therefore interested in the action chosen by the agent, has some ability to influence this decision. He can decide to set up a contract that will pay the agent. For example, an employer can decide on a wage that depends on the action chosen by the agent. However, the incentive effectiveness of the chosen contract is uncertain for the principal, because he does not know

the type of agent he is facing. For example, he does not know the agent's preferences (for a high income), his productivity, or the quality of the product the agent is trying to sell him. Consequently, the principal must take into account that the agent might, in a sense, behave like someone else, to the principal's detriment. For example, the agent might claim to be less productive than he really is in order to obtain a higher wage. The principal will therefore implement a contract that makes it possible 1) to reveal the agent's type (this is what is called the revelation principle) and 2) to maximise his own gains. It follows that the agent earns a rent from his information.

2. **Moral hazard** also links an agent and a principal and reproduces the situation of adverse selection, except that the information asymmetry now concerns the action chosen by the agent. More precisely, the principal and the agent are both uncertain about what an action will yield; they observe ex post what it yields, but only the agent knows which action he chose. The problem, then, is that it is no longer possible to build an incentive contract based on the actions chosen by the agent; the contract must be based on the consequences of his action. The problem is then that if this contract is too generous, it might in fact push the agent to choose an inadequate action, on average. The classic example is insurance: insuring someone means encouraging them to take more risk, since they will be covered if something goes wrong.

3. **Signalling** covers situations in which a sender sends a message to a receiver in order to induce him to choose an action. The sender is better informed, but he does not necessarily have the same interests as the receiver (we say that their preferences are not aligned). The former therefore potentially has reason to lie, and the latter not to follow the message sent.

Since the 1990s, analyses have moreover developed that emphasise the potential incompleteness of contracts. Some economic actors must contract over situations in which the sources of uncertainty are very numerous. Yet it is sometimes extremely costly to specify all the clauses relevant for the future (e.g. two firms that merge). Actors therefore sometimes have an interest in leaving clauses unresolved and in designating someone responsible, who must bear these unforeseen consequences. This perspective gives a function to the notion of ownership in the theory of the firm, the owner being responsible for the unforeseen.

In what follows we will discuss adverse selection, moral hazard and incomplete contracts.

3.2 Monetary incentives

A first question is how researchers' wages are set. Intuition would suggest that the more competition there is in a labour market, the larger the income gap should be. Competition implies disparate incomes and hence a risk, which must be remunerated. This is the case, for example, in the labour market for art. When entering the market, an artist has little chance of living from his work. Besides his vocation, he must therefore be able to hope to earn a lot to compensate for this risk. However, the same cannot really be said of the research market. Unless they work in the private sector, the wage gap between researchers is rarely large. How can we account for this observation?

The model of Holmstrom and Milgrom (1991) may provide an explanation for this phenomenon. It is a moral hazard model.

Model — Holmstrom and Milgrom (1991): multitask moral hazard

In the model of Holmstrom and Milgrom (1991), **the agent** (the researcher) must divide his time between two research tasks. That is, he chooses (t_1, t_2), where t_i is the time devoted to task i. The first task yields certain returns. Think, for example, of an applied economist who takes up the empirical analysis of an existing article and applies it to new data. The second task yields uncertain returns. Think, for example, of the researcher who embarks on a new line of research.

Of course, one could conceive of a continuum between these two tasks. What matters for us is simply that one task yields more certain returns than another.

To model uncertainty, we assume that the outcome of the research carried out by the agent is given by $x(t_1, t_2) = (t_1,\ t_2\,\varepsilon)$, where ε is a random variable uniformly distributed on $[0, 2]$. The agent is thus certain to obtain what he put into the first task. For the second task, on the other hand, nothing is certain. The agent's objective is to choose (t_1, t_2) so as to maximise his wage, which we assume to be linear,

$$w_{\alpha,\beta}(x(t_1, t_2)) = \underbrace{\alpha^T x(t_1, t_2)}_{\text{contingent}} + \underbrace{\beta}_{\text{fixed}},$$

given the cost of each of the tasks, given by $C(t_1, t_2)$.

Note that α gives the share of the wage that is contingent, that is, that depends on the results obtained by the researcher. Conversely, β gives the fixed share of the wage, which he is guaranteed to receive regardless of the results obtained.

For **the principal**, the question is to set the wage—i.e. α and β—so as to maximise his profit $B(t_1, t_2) - \mathbb{E}[w(x)]$. This means that he must solve the following programme:

$$\max_{\alpha,\beta}\ B(t_1, t_2) - \mathbb{E}\big[w_{\alpha,\beta}(x(t_1, t_2))\big] \tag{1}$$

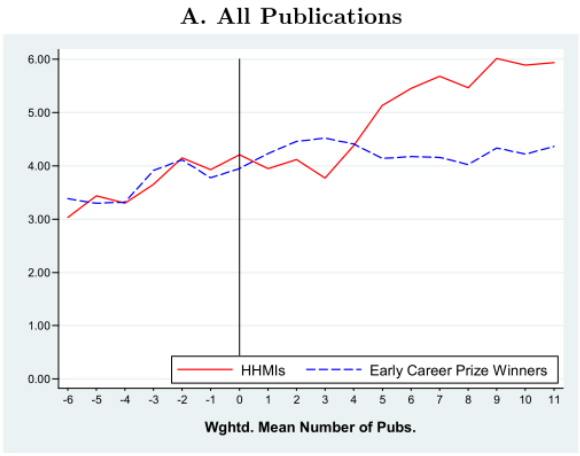
$$\text{s.t.}\ \ (t_1, t_2) \in \underset{(t_1', t_2')}{\operatorname{argmax}}\ \mathbb{E}\Big[u\Big(w_{\alpha,\beta}(x(t_1', t_2')) - C(t_1' + t_2')\Big)\Big] \tag{2}$$

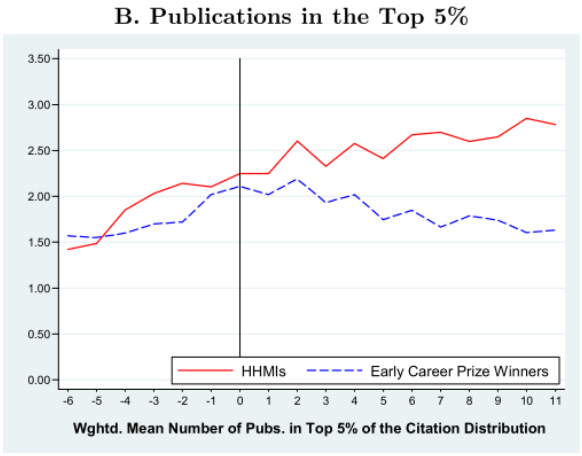
In other words, he chooses the agent's wage so that the latter chooses the task that brings him the most profit. It is a maximisation under an incentive constraint.

Result

Assuming that neither task should be neglected (i.e. B concave) and that the agent is risk averse, Holmstrom and Milgrom (1991) show that it is optimal for the principal to pay the agent a fixed wage (i.e. $\alpha = \mathbf{0}$).

The model of Holmstrom and Milgrom (1991) does not apply only to research. Their example rather concerns education, the question being whether teachers should be paid according to their pupils' results, at the risk of [the sentence is left unfinished in the original]





3.3 Non-monetary incentives

In the world of research, there are several types of non-monetary incentives, i.e. incentives that do not go through the wage. They can be of several kinds. For example, they may concern the length and type of contract, freedom in the tasks undertaken, or symbolic rewards (e.g. the Nobel Prize). We will describe two models that address the first two of these kinds.

The first concerns contractual incentives. In their model, Aghion and Jackson (2016) set out to think about the length of contracts and the conditions for their renewal. The type of question they ask makes it possible to address the issue of the tenure track, for example.

Model — Aghion and Jackson (2016): dismissal and tenure

We assume that there are several periods, researchers and an employer (i.e. a university). Researchers can choose two types of research projects, x and y. In each period, the employer (e.g. the university) obtains payoffs that depend on the action chosen by the researcher and on a state of the world, which can be X or Y. These payoffs—modulo a replacement cost—are given by

	X	Y
x	0	0
y	$-v$	1

A researcher is competent when he knows more or less whether we are in state X or state Y.

The question for the university is which of the following three contracts to choose:

1. **Random Retention Mechanism:** replace the researcher 1) if he chose y, the risky action, and X occurs; 2) with probability $p > 0$ if he chose x;
2. **Probationary Tenure Mechanism:** no replacement in the first period. In the second period, replace him if he chose the risky action y in both periods without success, or replace him with probability $p > 0$ if he chose the non-risky action x in one of the periods;
3. **Immediate Tenure Mechanism:** never replace.

Result

Aghion and Jackson (2016) find that the first contract is always dominated by one of the other two. The choice is then made as follows:

- If the replacement cost is high, the Immediate Tenure Mechanism is optimal: a contract for life, i.e. 3, is optimal.
- If the replacement cost is low, the Probationary Tenure Mechanism is optimal: the tenure track.

We thus find again the idea that risk should be encouraged.

A second type of non-monetary incentive is freedom at work. According to Aghion et al. (2008), academic freedom can have many advantages, in particular for basic research. This notion can thus make it possible to distinguish a more basic type of research, which relies on less investment, is more uncertain and is publicly funded, from a more applied research, which is investment-hungry and is funded more by private funds.

Model — Aghion, Dewatripont, and Stein (2008): academic freedom

To account for this idea, Aghion, Dewatripont, and Stein (2008) use the model of Perotti and Hellmann (2006), according to which the construction of new ideas takes the form of a linear process:

$$I_1 \Longrightarrow I_2 \Longrightarrow \cdots \Longrightarrow I_n.$$

The idea is that the researcher, when free, can choose

- a **realistic strategy** (*sr*): with probability p he reaches I_k;
- an **alternative strategy** (*sa*): he explores other ideas and does not reach I_k.

With probability $1-\alpha$, the researcher suffers a disutility z from choosing *sr*. The researcher's type is not known, and the contract cannot include a means of verifying this type. Here, Aghion, Dewatripont, and Stein (2008) take up the notion of incomplete contract of Grossman and Hart (1986).

However, the disutility of this realistic strategy is potentially offset by a higher wage, i.e. the compensation for the loss of freedom is monetary:

- Academic wage: R;
- Private wage: $R + (1-\alpha)z$.

There is thus the idea that academic freedom can be an additional motivation for the researcher. Besides this additional motivation, the model makes it possible to address the question of the division of research between the private and the public sector.

3.4 Who funds research?

The model of Aghion, Dewatripont, and Stein (2008) also accounts for the fact that applied research (which takes place at the end of a sequence of ideas) is carried out by firms, whereas basic research (which takes place at the beginning of a sequence of ideas) falls to the public sector. The argument is that applied research requires a great deal of upstream research investment. It is therefore desirable that it be carried through to the end, by inducing the researcher working in this area to choose the realistic strategy. It is therefore appropriate to pay him more in exchange for his academic freedom. Conversely, when working in basic research, the researcher will tend to choose the alternative strategy and to find new starting ideas. Note that the incompleteness of the researcher's contract plays an important role in the story told by the model.

Incomplete contracts provide another way of justifying the division between the private and the public sector. By focusing on the question of funding, and on the irreducible risk it entails, Aghion and Tirole (1994) develop a model that explains when a research unit should be independent.

Model — Aghion and Tirole (1994): the management of innovation

They assume that there is a firm (f) and a research unit (u). The role of the firm is to invest capital F to feed a particular line of research, whose results are uncertain; the role of the research unit is to invest a research effort e that also feeds the research. The decisions taken by these two entities are made in three stages.

1. Before starting the research, the firms must choose how the research will be remunerated. They therefore sign an incomplete contract that determines who will hold the property rights at the end of the research, that is, who will profit from the research.
2. Then, depending on the contract chosen, the firm and the research unit decide on their

investment strategy (in effort or in capital). This choice then determines a probability $p(e, F)$ of obtaining research results of value V. Of course, $p(e, F)$ is increasing in both its arguments: the more investment is made, the more likely it is that the research will generate results.

3. In the last stage, the profits are distributed according to the contract established in the first stage.

The results obtained by Aghion and Tirole (1994) are then the following.

- **Contract 1:** if the firm becomes the owner of the research unit, then the research unit makes no profit. It therefore has no interest in investing effort. It thus earns nothing, and the firm obtains the expected utility $p(0, F^*)V - F^*$.
- **Contract 2:** if the research unit remains independent, then it must share its results with the firm, so that its gains are given by $p(e^*, F^*)\frac{V}{2} - e^*$, while the firm's gains are given by $p(e^*, F^*)\frac{V}{2} - F^*$.

Result

It follows from these results that the firm will be the owner if

1. capital investment is more efficient than the effort produced by the research unit. In this case, the firm can do without the research unit. Conversely, if research effort predominates, the research unit will have an interest in remaining independent. This amounts to saying that applied research, which mainly requires capital investment, will tend to be private, whereas basic research, where effort predominates, is public.
2. the bargaining power of the research unit is important (i.e. its ability to assure the investor that it will sell the discovery back to it). If the research unit, when independent, cannot provide the guarantee that it will sell its discovery to the firm, the firm will have an interest in becoming the owner. This fact could explain why we observe more research being done in the private sector than the model predicts. This would stem from an inability of research units to insure firms in case the research fails.

4 The circulation of scientific ideas

Our objective in this section is to present avenues for reflection drawn from research in economics, but also in the philosophy of science, on two main questions:

1. The inter-individual transmission of an idea from one researcher to another.
2. The emergence and circulation of an idea at the macroscopic level, within a community of researchers.

The term "idea" is defined here in a broad sense: it can of course be a theory, but it also includes other forms of knowledge, a simple piece of reasoning, a method, a belief, a technique, an image, or even a particular practice shared by a scientific community.

Although rational choice theory offers many useful insights for understanding the circulation of ideas, it remains, in many cases, insufficient. The researcher is obviously not an isolated optimiser: he takes inspiration from his neighbours, he is driven by collective representations, etc.

We will present here two quite distinct, though related, literatures that can help answer these questions:

- The first looks at the role of conformism in the formation of agents' opinions. We will present a classic model from this literature and applications to the case of research.
- The second concerns the role of narratives in the decision-making of economic agents.

4.1 Conformity

Imitation, herd behaviour and information cascades

In this section, we come back to a selection of models highlighting conformity effects, and to applications to the case of researchers. The analysis of imitative behaviour is as old as the social sciences. At the end of the 19th and the beginning of the 20th century, imitative behaviour and crowd phenomena were extremely popular topics of discussion (e.g. Le Bon, 1900).

In economics, probably the most famous argument put forward in this period is that of John Maynard Keynes in chapter 12 of the *General Theory*, in which he introduces his famous beauty-contest metaphor.

It is an extremely famous type of argument, but one that remained little studied before the 1990s. We then witness the development of models that seek to describe the role of conformity in agents' decision-making: herd behaviour (Banerjee, 1992), information cascades (Bikhchandani et al., 1992).

An example of a herding model

Banerjee (1992). The idea can be understood at first from an extremely simple example. A couple must choose between two newly opened restaurants that have not yet received any customers (let us call the restaurants A and B). The couple has no information about the two restaurants. A second couple arrives and has no information about the restaurants either. They see a couple already seated in A and decide to choose this restaurant as well, since it seems more popular. A third person arrives, notices that one restaurant is empty and the other full, and also decides to go into A, etc. You get the general idea: people do not choose the restaurant according to their own judgement but imitate the choice of others.

The crucial idea behind the model is that agents can observe the choice of others (they went into restaurant A and not into B), and interpret this choice as revealing information that they do not have (they know that A is better than B).

The formal model is applied to finance, and to the case of traders who must select an asset on the basis of their private information and of public information (the choice of others: which assets are bought by the other traders?). Banerjee uses his model of imitative behaviour on financial markets, but one can also use his conceptual framework by replacing the traders with scientists who would have to choose not a financial asset but, for example, a research project for which they anticipate a return (rewards, prestige, etc.). This model can in fact apply to any situation in which it is relevant to use the available public information in addition to one's private information.

Model — Banerjee (1992): herd behaviour

Let $a(i)$ be a set of financial assets with $i \in [0, 1]$ (each asset is indexed by a number between 0 and 1). There is one asset with a return $z(i^*)$ such that $z(i^*) > 0$ and $z(i) = 0$ for all $i \neq i^*$. In other words, there is one asset with a positive return, hence higher than all the others (one could imagine, in the case of scientists, that this asset corresponds to a research project that could earn the Nobel Prize). The problem is that nobody knows which asset brings this positive return.

Each agent may receive, with probability α, a signal that tells them which asset is the profitable asset i^*. Agents know that the others receive a signal but cannot observe it directly; they can only try to guess it through the others' choices. Moreover, this signal is not necessarily true, and

there is a probability $1 - \beta$ that it is false (if it is false, the signal designates an asset at random).

Result

Banerjee shows that from the third person onwards, herd behaviour can appear. If the first two people made the same choice, then the third person imitates the behaviour of the two other agents. Banerjee shows that, whatever the number of players, a player will adopt herd behaviour if his signal does not correspond to any previous choice and at least two people before him chose the same asset.

The essential point in the definition of herd behaviour is not that a person imitates the choice of another person, but that this person does not follow his own signal in making his decision. Note that agents may adopt a herd behaviour that picks the right asset. It suffices that the first person, from whom the herd behaviour stems, actually received the right information. It is also possible, however, that agents follow the choice of a first person who received an erroneous signal (probability $1 - \beta$). Generally, in this type of model, the choice of the first people is obviously crucial, and the optimality of the process is extremely sensitive to the first decisions.

Information cascades and network analysis

Banerjee speaks of herd behaviour, but we also find the notion, perhaps more popular today, of information cascades (see Bikhchandani et al., 1992). In both cases, if imitative behaviour is triggered, it reinforces itself. The action of the individual caught in this mechanism brings no additional information to the collective: it merely reflects the previous decisions. The herding model and information cascades are obviously extreme cases of conformist behaviour, in which conformism does not merely influence the decision but entirely determines it. There are at least dozens of variants of these models, which have been tested in the laboratory (Çelen and Kariv, 2004; Anderson and Holt, 1997).

The decision process of Banerjee's model is sequential, but you can of course apply this type of reasoning to the influence of a person's neighbourhood on his decisions. The agent's decision is then no longer based on the choice of people in the past, but on the choice of those close to him. In this type of application, the information cascade can be modelled by means of a network analysis.

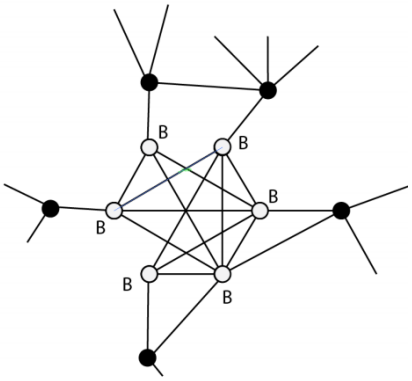


Figure 1 Illustration of a network in Weatherall and O'Connor (2021, p. 4)

As a reminder, a network is a representation that conceives social interactions as links (*edges*) between nodes (*nodes*).

You have already been presented with this type of representation in an earlier session, but from an empirical perspective. You learned how to build networks and to identify communities on the basis of empirical indicators such as similarity, etc. There is also a theoretical counterpart to these analyses,

whose objective is to give a theoretical foundation to what drives agents to conform to the same attitudes and/or beliefs within the same community. Information cascades are used in network analysis to explain the spread of a rumour on social networks, etc., and the formation of opinion (of an agent or of public opinion).

For example, DeMarzo, Vayanos, and Zwiebel (2003) build a model of belief formation. The model emphasises the importance of the repetition of the information received by an agent in the formation of his opinion: an agent tends to let himself be convinced by information he judges irrelevant if this information is repeated to him. With an opinion-formation model of this type, the agent's opinion will obviously be influenced by the people around him who supply him with information. If his neighbours think the same thing and supply him with the same information, the persuasion mechanism based on repetition will ultimately lead him to think the same thing.

Conformism in science: some examples

Brock and Durlauf (1999) model the role of conformity in the choice of a theory. The model was published independently, but it can also be found in the volume on the economics of science edited by Mirowski and Sent (2002).

Model — Brock and Durlauf (1999): theory choice under conformity

For a vector of theories $(W_{i,t})$, the scientist chooses the theory i that maximises his "utility" $\max V_{i,t}(W_{i,t})$:

$$V_{i,t} = \underbrace{u_{i,t}(W_{i,t}) + \varepsilon(W_{i,t})}_{\text{individual}} - \underbrace{E_{i,t} \sum_{j \neq i} J_{i,j,t} \left(W_{i,t} - W_{j,t}\right)^2}_{\text{conformity}}$$

where $u_{i,t}(W_{i,t})$ and $\varepsilon(W_{i,t})$ represent the scientist's private utility. The first component is deterministic, whereas $\varepsilon(W_{i,t})$ is a random variable. The scientist's personal judgement is thus partly determined at random.

$$E_{i,t} \sum_{j \neq i} J_{i,j,t} \left(W_{i,t} - W_{j,t}\right)^2$$

represents a social conformity effect. The scientist values negatively a theory that is "far" from what he anticipates to be the choice of the other scientists. $J_{i,j,t}$ is a weighting factor for this conformity effect.

The scientist will not choose a theory solely according to his personal judgement; he will also choose according to the differences between his theory and the theories chosen by the rest of the community. There would be a lot to say about this model itself, which involves a series of debatable assumptions. For example, it assumes that the scientist is able to compare all existing theories (there is no incommensurability).

Model — Weatherall and O'Connor (2021): conformity in scientific networks

Weatherall and O'Connor (2021) use a conformity model of this kind in a simulation of a network of researchers. Researchers choose between two actions, A and B. Let us imagine that this is the choice between two theories. The choice between these two theories will depend on the experiments carried out by the researchers and on the choice of their neighbours. The expected payoff u_i^A of a scientist i associated with action A is:

$$u_i^A = \underbrace{\mathbb{E}[A]}_{\text{individual}} + \underbrace{k(a-b)}_{\text{conformity}}$$

Symmetrically, the expected payoff of action B is:

$$u_i^B = \underbrace{\mathbb{E}[B]}_{\text{individual}} + \underbrace{k(b-a)}_{\text{conformity}}$$

with $k > 0$ the conformity coefficient, a the number of neighbours who chose A, b the number of neighbours who chose B, and $\mathbb{E}[A]$ and $\mathbb{E}[B]$ the researcher's personal belief, stemming from his experiments, in the payoffs brought by A (and by B).

The payoff of a researcher associated with action A will depend positively on $\mathbb{E}[A]$, his personal judgement about A, positively on the number of neighbours who chose action A ($k \cdot a$), and negatively on those who chose action B ($-k \cdot b$). The action chosen by the researcher depends on his personal beliefs, and also on the actions of his neighbours.

Main consequence

The researcher may choose an action (a theory) $\neq$ his individual belief (from his own experiments).

To simulate a network, the authors specify the distribution associated with $\mathbb{E}[A]$ and $\mathbb{E}[B]$. At the beginning of the simulation, each agent associates a beta distribution with the payoff of actions A and B and is able, in each round, to update this distribution according to the results of his own experiments and of those of his neighbours.

Three possible stable states of the simulation:

- Consensus (similar actions across the whole network).
- Disagreement (heterogeneity of actions).
- Polarisation (local consensuses).

The results of the simulation depend on the strength of conformist behaviour k and on the structure of the network (Figure 2), and in particular on the way researchers are connected. Are they perfectly inter-connected? In other words, does each researcher have the same number of links with all the other researchers in the network? Are the links symmetric (if researcher 1 is connected to 2, then 2 is connected to 1)? In this paper all links are symmetric.

For example, Figure 3 describes the theoretical example of a local community in which agents choose action A (the white nodes) even though they prefer B and B is chosen by the rest of the network.

One could of course tackle network analysis in a more empirical way. In another session of this course you have already seen tools that allowed you, for example, to build networks (of researchers, articles, institutions, linked by co-citations, coupling, co-occurrences). Network analysis can be used, for example, to estimate the influence of an article on one or several communities of researchers (i.e., bibliometric coupling).

Conformity and imitation are one form of social interaction among others that can influence researchers. Equivalently, social interactions within a network do not rest solely on conformity mechanisms.

Restricting researchers' decisions to pure imitation effects nonetheless remains unsatisfactory. There is a more recent literature that regards rationality as a relative notion, that focuses on agents' collective representations, and for which we also find applications in the history and philosophy of economics.

4.2 The economics of narratives

In this section we look at the concept of "narratives", which is increasingly popular in economics.

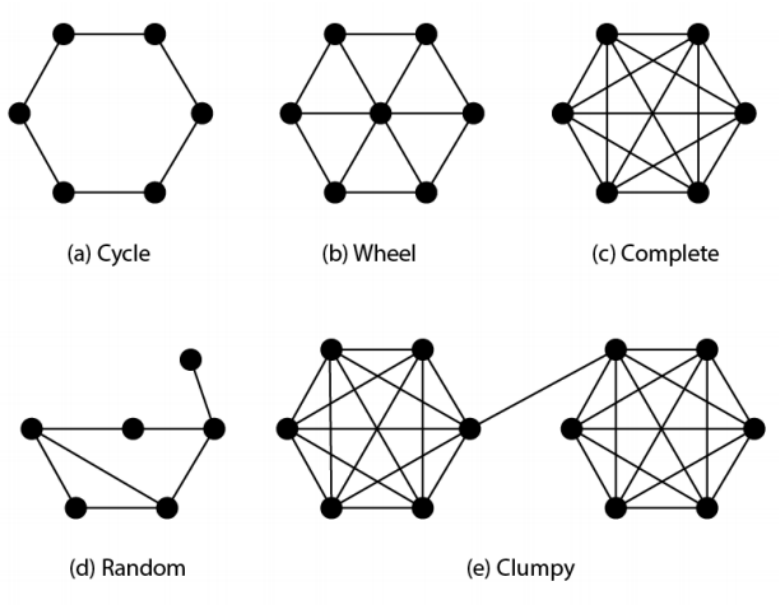


Figure 2 Weatherall and O'Connor (2021, p. 10)

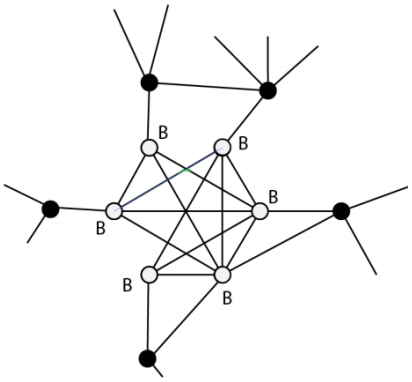


Figure 3 Erroneous local consensus, Weatherall and O'Connor (2021, p. 4)

Narrative

A narrative is defined as:

> *a story or representation used to give an explanatory or justificatory account of a society, period, etc. [. . .] A story may also be a song, joke, theory, explanation, or plan that has emotional resonance and that can easily be conveyed in casual conversation (Shiller, 2020).*[2]

This is extremely recent research, research in progress. Research that interests a great many researchers. We find Robert Shiller (2017) and Shiller (2020), Bénabou, Falk, and Tirole (2018), Akerlof and Snower (2016). Rodrik, Ash, and Mukand (2021) make a similar use of the concept of "meme". It is a literature that is exploding and that applies these questions to varied fields and methods, such as finance, macroeconomics, decision theory, behavioural and experimental economics. It would be difficult to treat this whole literature exhaustively, and in any case it is not the purpose of this course. Just keep in mind that this is research in the making, not stabilised textbook knowledge.

One of the leading figures of this new literature is Robert Shiller. I think you already know Shiller, winner of the 2013 Sveriges Riksbank Prize in Economic Sciences, mainly known for his critique of the efficiency of financial markets.

He is currently developing a research programme on the importance of "economic narratives". This framework draws more on other scientific disciplines than on economics itself, in particular neurology, psychology, sociology, anthropology and epidemiology. The concept of narrative is in fact already popular in the other social sciences (Figure 4).

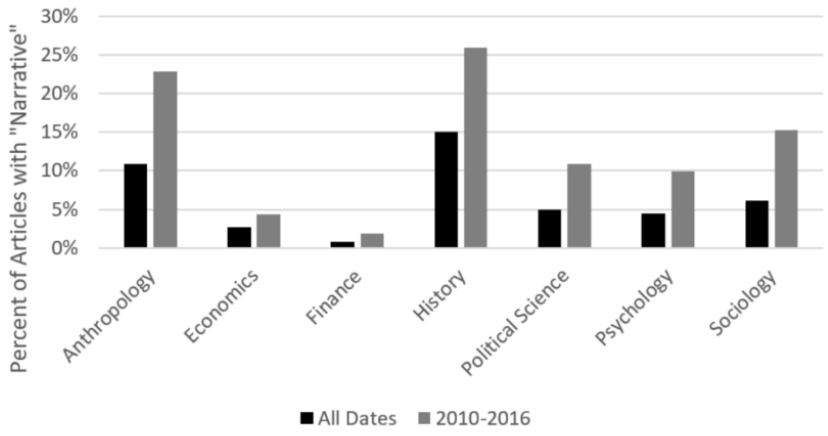


Figure 1. JSTOR counts by field of articles containing the word "narrative" as a percent of all articles in the field, entire database left and the years 2010-2016 only, right.

Figure 4 Shiller (2017, p. 6)

Narratives help agents in their decision-making. For Akerlof and Snower (2016), narratives are a means of sorting, connecting and ordering events by attributing causal links to them. They fulfil several functions, which are studied with more or less attention by the social sciences:

- **Interpreting an event.** Narratives offer simple models, which attribute causal relations between different events, etc. Narratives make it possible, in particular, to understand present situations in terms of past events. The narratives an agent adopts determine both the events and the causal

[2] See chapter 1: "The word narrative is often synonymous with story. But my use of the term reflects a particular modern meaning given in the Oxford English Dictionary: 'a story or representation used to give an explanatory or justificatory account of a society, period, etc.' Expanding on this definition, I would add that stories are not limited to simple chronologies of human events. A story may also be a song, joke, theory, explanation, or plan that has emotional resonance and that can easily be conveyed in casual conversation."

relations that he deems relevant.

- **Enabling prediction and action under uncertainty.** The causal relations associated with narratives help us predict the future implications of our actions, and thereby reduce the difficulty, and the anxiety, of uncertain decision-making.
- **Understanding one's social environment.** The causal relations contained in narratives determine our motivations, allow us to attribute a social role to individuals and to ourselves, to set ourselves goals, to interpret power relations, social norms, etc.

In the case of economic decisions, theories and ideas from the economics discipline play a major role in the construction of these narratives, which in turn influence agents and, more generally, public opinion.

An example: the Laffer curve

The Laffer curve relates tax revenue to the level of taxation. The central idea is that beyond a certain level, raising the level of taxation becomes counter-productive and contributes *negatively* to tax revenue.

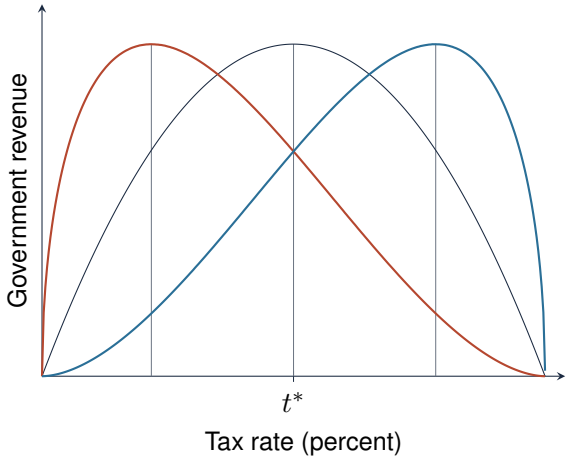


Figure 5 Laffer curve

Its conception is attributed to Arthur Laffer, an American economist, who during a dinner in 1974 with two American politicians (Dick Cheney and Donald Rumsfeld) is said to have drawn this curve on their tablecloth. The story is told in a *Wall Street Journal* article, and the Laffer curve became a central weapon for conservatives in the public debate of the following decades. Laffer would be an adviser to Reagan during both his terms, and the top marginal income tax rate fell from 70% to 28% over the same period (Shiller remains rather vague, however, about the role played by this curve in the public debate).

The tablecloth in question is on display at the National Museum of American History. The problem: the tablecloth story is false; Laffer himself denied it. But the Laffer curve rests on a simple and powerful idea, and the storytelling—the restaurant, high-ranking personalities, the eccentricity of the interaction in which Laffer manages to convince them with a pen and a tablecloth—considerably helped Laffer spread his argument.

The journalist who told this story argued that the United States was on the inefficient part of the curve, and the idea spread along with the story, despite the fact that several renowned economists, including James Tobin and Robert Solow, testified before Congress that this argument rested on no data from research (cf. Mirowski, 1982).

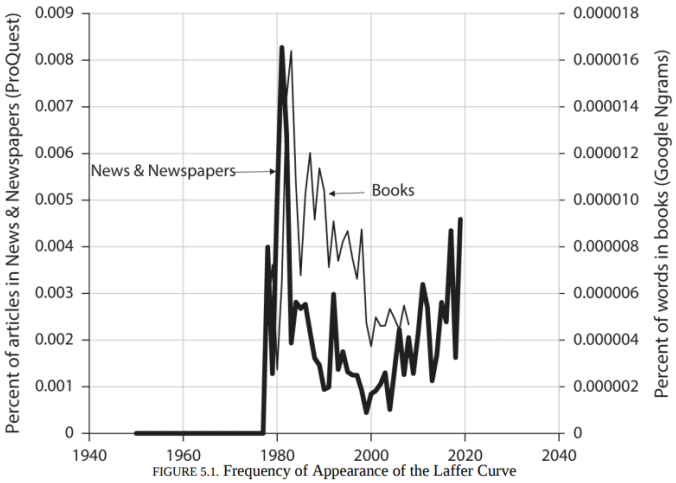


Figure 6 (Shiller, 2017, p. 91)

Economics itself as a discipline, and the other sciences, also work through the emergence and spread of narratives, and one can study science, and its history, through the lens of this concept.

Narrative science

The attachment of a scientific community to a narrative does not mean that scientists act irrationally. One can consider that conformity and imitation correspond to a form of rationality of agents who, in situations of radical uncertainty, attach themselves to narratives, to collective representations, which represent an island of stability (Orléan, 2011).

The point is not to be relativist and to consider that logical argumentation, empirical analysis—in short, attachment to methodological rigour—is not essential to convince a scientist. While these elements are necessary, they are not sufficient to explain the popularity or the lack of credit of a theory. Even mathematics, which rests on a formal and purely logical language, uses narratives to justify or illustrate an argument (think of the urn stories used to explain probability theory). Moreover, narratives are increasingly seen as an integral part of methodological rigour: they are an epistemological object that takes part in the explanation produced by the researcher.

This course itself uses narratives to convey an idea. If you had to re-explain Banerjee's model, you would probably think instinctively of the purely fictional thought experiment of the restaurant. Yet this is not really the model itself. Similarly, Keynes's beauty contest takes up only a few lines in chapter 12 of the *General Theory*, but this metaphorical narrative is probably the best-known and most-cited passage of the *General Theory* (Banerjee opens his own article by citing Keynes's beauty contest). In both cases, it is fundamentally a story, less sophisticated, but one that captures the essence of the explanation, and that in fact helps the model itself spread within the discipline.

There is flourishing research in the history and philosophy of economics on the importance of narratives in science. This is in particular the current research project of Mary Morgan. You may already know Mary Morgan for her history of econometrics (Morgan, 1990) and her books on models in economics (Morgan, 2012). She currently leads a project on the role of narratives in scientific models (the project's website).

The narrative is therefore an epistemological object in its own right, which makes it possible to improve our understanding of how science works and of scientists' practice. For Morgan, a narrative is not only an illustration or a rhetorical tool used by scientists, but a means for scientists to relate their materials to one another. The narrative is a means for the scientist to sort, connect and order his materials (data,

logical arguments) in order to build an explanation. In the same way as a writer creates a narrative by ordering plot events, the narrative is a means for the scientist to order his materials.

According to Morgan, there are two essential steps in the construction of a scientific narrative. First, **colligation**, that is, according to Morgan:

> *the way a scientist both brings together, and assembles, a set of similar elements framed under some overall guiding conception, or categorization schema. (Morgan, 2017, p. 89)*

A classic example from the social sciences is the concept of *street corner society* of the sociologist William Whyte, who describes life in the working-class Italian neighbourhoods of the North End of Boston in the 1950s. He notably gives a description of the life of what he calls *corner boys*, a term designating the Boston youth who do not go to school, gather at street corners and monopolise part of the public space. Whyte uses a category here to gather under a single coherent label individuals until then regarded as deviant and as not belonging to the same social class.

And second, **juxtaposition**, which:

> *[comes] not – as in colligation – from locating separate or isolated elements that might naturally fit together, but rather from understanding that many elements initially presented in the social field don't appear to fit together [. . .] presenting a kind of puzzle that has to be unravelled. But because they are found in the same social field, they give the social scientist good reason to think that they should fit together – in some way or other – rendering disparate and even oppositional matters into a narrative explanation. (Morgan, 2017, p. 88)*[3]

Morgan also takes as an example a famous analysis of cockfights on the island of Bali in Indonesia by the American anthropologist Clifford Geertz (2000). In this essay, Geertz argues that cockfights are a micro-moment representative of Indonesian society and its social hierarchy. To do so, Geertz first describes participation in cockfights as apparently irrational behaviour, in which the population often bets at a loss on animal fights. This way of presenting the fights allows Geertz to construct a problem, a research question: "why is such irrational behaviour so popular?", a question he answers himself by stressing that participation in this event is a mark of prestige reserved for the most politically influential men; the money won or lost is secondary in this event. Likewise, the competition is not between animals but between men who delegate their fight to the cock, etc. Geertz's analysis here rests entirely on a work of juxtaposition, of contrasting materials in order to create a research question. It is the process of juxtaposition, the construction of a problem or a paradox to be solved, that lends credibility to narratives.

Besides solving a problem, a scientific narrative must both meet criteria of internal and external coherence and claim generality. In absolute terms, these criteria of credibility, coherence and generalisation are determined by, and specific to, a scientific community.

A narrative explanation, if convincing, is generalisable and will potentially circulate beyond the content of the narrative itself:

- The narrative proposed by Whyte is, for example, a classic form of reasoning in sociology, in which what appear to be dispersed and disorganised individuals represent a homogeneous social group that deviates from the dominant norms of a given society.

[3] "So, this alternative process of configuring comes not – as in colligation – from locating separate or isolated elements that might naturally fit together, but rather from understanding that many elements initially presented in the social field don't appear to fit together. That is, the elements of social research are already found in juxtaposition, and are therefore ordered so in the narrative – presenting a kind of puzzle that has to be unravelled. But because they are found in the same social field, they give the social scientist good reason to think that they should fit together – in some way or other – rendering disparate and even oppositional matters into a narrative explanation" (Morgan, 2017, p. 88).

- Equivalently, taking a micro-event as representative of a given society or period is a classic form of reasoning in anthropology and in history.

4.2.1 Applications to the history of economic thought

These reflections can be useful to you if you work on the history of economic thought, in at least three different ways.

1. The first is obviously to use these reflections to improve your writing, that of your research dissertations. You already use narrative explanations in your dissertations, even implicitly, and these reflections can help you make them explicit, improve them, etc. You are probably at a stage where you are gathering information and trying to organise it around a research question, etc. And sorting and ordering this information, making an outline, etc., is precisely to build what Morgan calls a "narrative explanation".

2. If you are more interested in the philosophy of economics, you can of course place yourself in the continuity of Morgan's work. This research is obviously ongoing, and in any case it is interesting to follow. It offers you a possible reading framework for doing work in the history of economic thought.

3. Accounting for economists' narratives.

   - The narratives of economists, taken individually. The concept of narrative can help you put words on an economist's thought that was hard to pin down until then (the example of Biddle).

   - Deconstructing the narratives of a community of economists about their own history. Aurélien can tell you more about this than I can. Recent research in the history of macroeconomics has set out to deconstruct macroeconomists' narratives about their own history, which they describe as a succession of revolutions and upheavals, etc.—a history that generally serves to legitimise the current state of the field.

   - Tracing a narrative. You can also use this analytical framework to study for yourself the emergence and evolution of narratives within the economics discipline: to what extent, and through which economists, an idea, a concept or a technique was transmitted between economists, etc.

On this last point, this is already, in a sense, what Shiller (2020) does when he traces the history of the Laffer curve. It is a history of economic thought, with a rather cursory historical analysis because that is not the purpose of the book, but it is nonetheless an analysis of the development and spread of economic ideas in society. Shiller also traces the history of the Great Depression and argues that it has been interpreted and reinterpreted by a succession of economists over time. Shiller uses quantitative tools that are also readily available to you for your dissertation; I am thinking in particular of the analysis of the occurrences of a term in a bibliometric database (Figure 6).

A quick example of a possible project on narratives

Finally, I would like to give you a quick presentation of a research project I am currently conducting, which tries precisely to trace the evolution and circulation of an economic concept through history. It is not at all a finished project—quite the contrary, it is a project barely begun, in progress—but it seems interesting to present it because it draws directly on the work I have just presented and illustrates the place that historians of economic thought can occupy in these discussions.

This research project concerns tulipmania and the way economists have perceived this event over the centuries. What is tulip mania? It is the story of a speculative episode on tulip bulbs in Holland where, at the peak of this speculation in February 1637, the price of some tulip bulbs reached more than ten times the annual wage of a local craftsman. I think everyone here knows this episode, or has already heard of it. And the mere fact that this is the case is already exceptional in itself: the whole audience

here knows this story, which took place almost 400 years ago and concerned at most a hundred or so people (and not particularly politically important people). This raises a whole set of extremely broad questions:

- Where does the story begin? Who popularised this idea?
- How has the collective memory of this episode evolved over the centuries? Has the interpretation of the narrative evolved through history? How?
- Who are the main actors in the spread of this narrative, in particular among economists?

A simple way to get a first idea of the overall evolution of this narrative is to search for occurrences of the term:

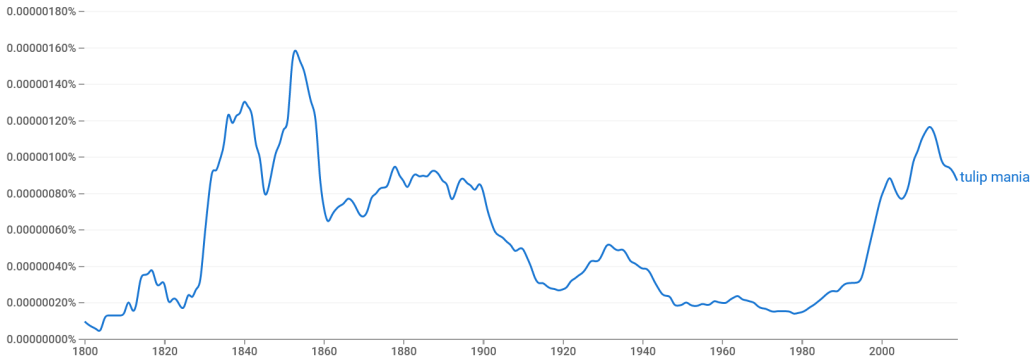


Figure 7 Documents containing “tulip mania” between 1800 and 2019 (smoothing: 3). Source: Google Books

This graph already gives us an idea of long-term trends, but it remains a very preliminary analysis. It is more an exploratory method, which allows us, for example, to zoom in on a particular period in order to conduct qualitative research. The starting point of the story is a journalist, Charles Mackay, who published in 1842 a book entitled *Memoirs of Extraordinary Popular Delusions and the Madness of Crowds*, which massively popularised the narrative in European intellectual circles. At the beginning of the 20th century, economists began to use this narrative unanimously as a typical example of the excesses of speculation. In 1961, Samuelson introduced the narrative into his famous textbook and contributed greatly to its spread in economics. At the end of the 1990s, by contrast, economists debated the more or less rational character of this episode.[4]

One can also consider using much more advanced quantitative methods. To be much more rigorous, one would first have to refine the keyword search and extend it to other existing databases. Eventually, one could consider (1) studying the evolution of the discourse of the documents that use tulipmania (term frequency, co-occurrence). Does the discourse around tulipmania become more economic and use terms from the discipline such as “rationality”, “fundamental values”, etc.?

Here is an example of such a search from the Constellate databases (which notably include the JSTOR database).

I could also try to distinguish the different communities that use this narrative (using network analysis or supervised and unsupervised classification tools). This would mean, for example, distinguishing the different communities that spread and perpetuate this story, or distinguishing between scientific documents and press articles.

A central issue in the circulation of scientific ideas is their spread into social fields other than scientific ones. In particular, a central question concerns expertise, that is, the way an idea can affect political decision-making.

[4] See for example Garber (1990), Kindleberger and Aliber (2005) and Thompson (2007).

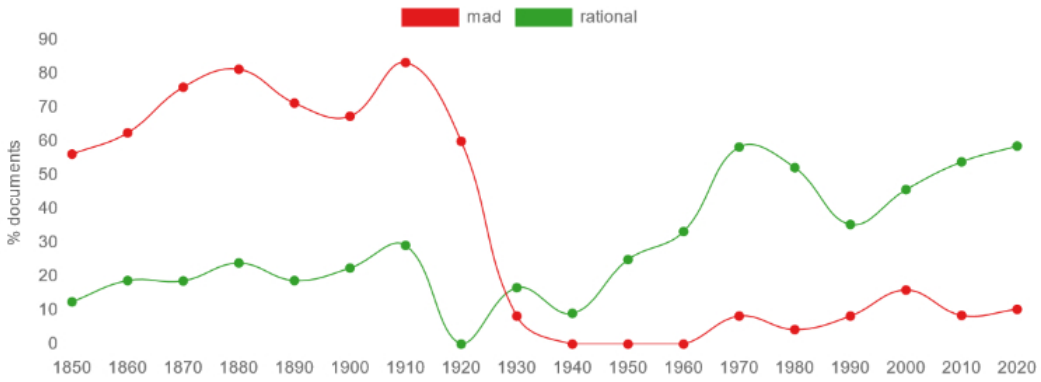


Figure 8 Share of documents containing "tulip mania" between 1841 and 2022 that mention "mad" and "rational". Source: constellate.org

5 Political economy of ideas and expertise

In this fifth part, we will step outside the domain of science as such, to take a closer look at its interactions with the rest of society. More precisely, we will look at its role in political decision-making. True to the common thread of the course, we draw on the work of economists that allows us to question the influence of scientific expertise on political decisions, and the problems that political decision-makers face when taking this scientific expertise into account.

First, we will make a small detour to broaden the scope of our reflections and move a little away from science and researchers. We will look at the influence of ideas (whatever they may be) on political decision-making (in fact, in all these sections, we will focus mainly on economic policy).

Second, we will look at the contribution of this work to thinking about a political economy of expertise and of the role of science in political decision-making.

5.1 The political economy of the influence of ideas on economic policy change

The question of the influence of ideas on economic policy change is addressed and conceptualised in two disciplines: economics and political science.[5] Of course, disciplinary boundaries being what they are (especially on the economics side, Fourcade, Ollion, and Algan 2015), these are distinct and distant bodies of work, even though one can find some bridges and crossings at certain fringes of these two disciplinary corpora.

The (recent) political economy of economists

In economics, the question of the impact of ideas is found in a literature with blurred and winding boundaries, which takes up the old term of political economy while attaching it to the identity of the discipline in the 20th century: thus, in English, one speaks of "Political Economics" rather than "Political Economy" (see Persson and Tabellini, 2002, 2). According to Persson and Tabellini, the objective of political economics is to explain cross-country variations in the types of economic policies implemented (for example, explaining different levels of public spending and of compulsory levies). They thus look at the origin of this field of research through three lenses:

- political economics would be the result of importing the concept of rational expectations into the field of macroeconomics and economic policy, which led to the results of Kydland and Prescott (1977) and Calvo (1978) on time inconsistency. If the decision-maker has an interest in abandoning in the future the policy he has committed to follow, then this policy is not credible. This idea was taken up in the 1990s to explain that the Federal Reserve's policy in the 1970s was not credible, thus leading to an

[5] Of course, this question can also be found in work that rather claims to belong to history or sociology.

"inflationary bias". It seems to us that work on the political dimension of business cycles (Nordhaus, 1975) also belongs to this literature: can variations in the inflation rate and in unemployment be explained by elections, and what differences are there depending on the majority in power? A whole literature on central bank mandates and the question of their independence subsequently developed as well.

- the work of the Public Choice school, in particular the work of Buchanan and Tullock. This work rather focuses on questions of public economics, the funding of certain public goods, and questions of regulation of certain markets, with a strong pro-market and pro-liberalisation tendency.
- Persson and Tabellini put forward a third literature: the literature of rational choice and formal analysis in political science, which originates in the work of Riker. Here we are rather in the theory of voting and of political systems.

This vast literature thus lies at the intersection between economics and political science (even if, once again, disciplinary boundaries mean that the economists who produce this literature tend to cite economists). And it is in this literature that one can find a certain interest in the role of ideas in economic policy change.

Work in this direction includes Bénabou (2008), on the role of ideology and differences in the weight given to the state and to the market, Alesina and Fuchs-Schündeln (2007) on the differences in preferences between East and West Germans regarding the place of social policies, and Bisin and Verdier (2001) on the cultural transmission of preferences through socialisation and institutions. This work rather offers a view of how certain beliefs persist over time, and thus explains (more or less implicitly) the success or failure of certain ideas.

There is also work on the impact of economic transformations on elections: for example, Autor, Dorn, Hanson, and Majlesi (2020) look at the consequences of the rise in imports from China and at how the electoral districts most exposed to international competition have tended to polarise since 2002 (depending on whether they were initially Republican or Democratic). Strömberg (2015) offers a literature review of the various empirical works in economics on the impact of the media on the circulation of ideas and its consequences for voting. Finally, there is work that looks more directly at the strategic use of ideas (for example in an electoral process) to transform certain policies in a more targeted way.

One of the starting points when thinking about the influence of ideas on political decision-making (whether in economics or in political science) is to understand how they articulate with interests (of individuals, social groups or social classes). In other words, is it possible to give ideas a role that allows them to matter independently of material interests?

Model — Rodrik, Ash, and Mukand (2021): ideational politics

Rodrik, Ash, and Mukand (2021) tackle this question directly. They start from a model with an incumbent and a challenger. The incumbent's policy is determined by the interests of the median voter (who, by assumption in this model, is poor). Politicians can affect the perceived gains of a given policy by introducing ideas. Imagine a challenger who belongs to the rich minority and therefore advocates policies favouring the richest. How can he convince the median voter to vote for him when the policies he would implement are very likely to have a negative effect on this voter? To do so, the candidate engages in "ideational politics", in two different ways (which can be substitutes or complements):

- **Worldview politics**: convincing people that a policy favouring the rich is in fact beneficial to the whole population. This is often what think tanks and other liberal/libertarian foundations devote themselves to. More generally, this refers to a point that is also important in the political-science literature on the influence of ideas: it is not a given whether a particular policy is in the interest

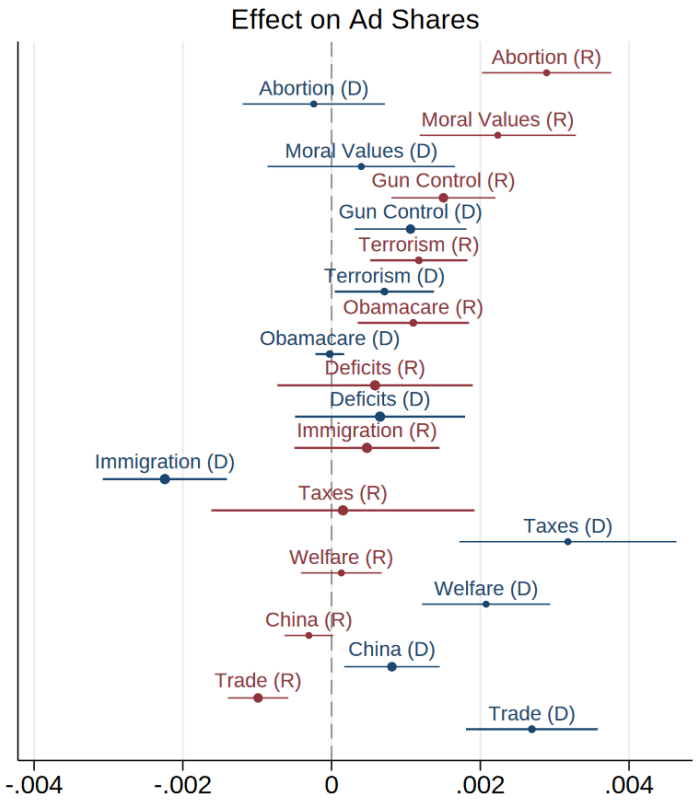
of an individual or a social group. Ideas also serve to determine what the interests of different groups are. There are thus battles of ideas to interpret and analyse economic phenomena and policies, and thereby to determine what individuals' interests are.

- **Identity politics**: appealing to one of the voter's identity affiliations to attract his vote. Individuals have a multiplicity of identities, more or less salient at certain moments in time. The objective of identity politics is to activate one or several of the voter's identities in order to attract his vote independently of his material interests.

The candidate then strives to find "memes" that will serve as catalysts for his political strategy. Rodrik, Ash and Mukand define a meme as a combination of narratives, talking points and symbols that feed a communication strategy to activate an identity and/or transform the voter's worldview. The authors then model the dynamics through which memes are discovered and the interaction between the two types of politics (substitutes or complements?).

The article ends with an empirical study of the model. The first question that arises from this perspective is how to distinguish between a policy motivated by an interest and one motivated by ideas. The starting hypothesis of the empirical strategy is that a rise in unemployment and inequality should create different incentives, in terms of searching for memes, for parties with a different core electorate. China's entry into the WTO in 2001 went hand in hand with a rise in unemployment in the regions of the United States where industry was most exposed to trade with China. Unemployment rose there, wages fell and inequality widened. These differences make it possible to study the supply of political messages in local media by the Republican Party and the Democratic Party. Starting from the hypothesis that this rise in inequality can increase the demand for redistributive policies, the Republican Party has a greater interest in engaging in ideational politics in the regions most affected by the "China shock", and this engagement will rather take the form of identity politics.

The authors use a database of political television advertisements. The tags of the advertisements show the topics they address and make it possible to distinguish between issues linked to material interests and the others. Following the shock of rising unemployment, we observe an increase in Republican Party advertisements on abortion, moral values and gun control in the regions concerned.



The role of ideas and political scientists' discursive institutionalism

The interaction between ideas, interests and economic policies has been intensely discussed and conceptualised in political science for at least thirty years. The study by the political scientist Peter Hall (1992) of the monetarist turn in the United Kingdom is the major influence of this literature. Hall looks at the interaction between beliefs, ideas, interests and transformations of the economic environment, and at the impact of these factors on institutional change (or continuity). Hall shows how the oil shock and wage inflation weakened the Keynesian consensus, and how monetarism gained popularity in the Conservative camp and in the media. It came with a certain intellectual legitimacy, without being shared by more than a minority of economists in the academic field and in economic policy institutions.[6]

This analytical framework was taken up, for example, by Mark Blyth (2002), who applies it to the transformations of economic policy in the United States with the election of Reagan in 1981.[7] He adds to Hall's framework the notion of uncertainty: in a situation of economic crisis, debates of ideas start in order to understand the causes of the crisis (and hence to understand the possible solutions). In other words, under uncertainty, the material interest of social groups is not given or obvious, and ideas make it possible to understand economic events and to make these different social groups better perceive where their interests lie. Of course, this process of interpretation is not unidirectional, and several ideas can come into conflict to make sense of a particular economic situation. Depending on which ideas prevail at that moment, the institutional solutions proposed will differ.[8]

More recently, a literature has developed that aims to conceptualise more closely the different facets of the influence of ideas and discourse on institutional change (Schmidt, 2008, 2011; Schmidt and Thatcher, 2014; Carstensen, 2010, 2011; Carstensen and Schmidt, 2016, 2018). For example, Carstensen and Schmidt (2016) distinguish:

[6] Which would later explain, among other factors, the thwarted implementation of Thatcher's policy (Best, 2020).

[7] See also his more recent book on austerity, Blyth (2015).

[8] Another point emphasised by Blyth in his 2002 book is the need to study how employers' organisations and think tanks take part in this debate of ideas and influence it.

- "power through ideas": the capacity to convince and persuade through a strategic use of ideas;
- "power over ideas": the capacity to define the set of ideas open to discussion;
- "power in ideas": the tools and concepts that agents use (must use) to debate ideas (for example, GDP).

So far we have only discussed analyses that consider ideas in a relatively general way. What will interest us now are particular ideas: the ideas that come from research and from the work of scientific experts.

5.2 Some avenues for a political economy of expertise

Here again, by speaking of expertise we touch on an extremely vast field. Hirschman and Berman (2014) offer a rich multidisciplinary literature review on the question of the influence of the economics discipline on policy.[9] They identify three points on which the literature on the subject agrees:

- Economists are more likely to be influential in situations deemed technical or in situations where uncertainty forces decision-makers to find new solutions;
- The indirect influence of economists is as important as their direct influence;
- The influence of economists must be understood in a broader dimension, linked to the professionalisation of the discipline and to the extension of its legitimacy into many fields.

They also distinguish three ways in which economists can influence policy:

- Through "professional authority": the status of the discipline and the legitimacy of economic discourse;
- Through institutional positions: the presence of economists in many organisations and in elite networks;
- Through "cognitive infrastructure": economics imposes "styles of reasoning" and "conceptual apparatuses" of its own, which frame the way certain subjects are discussed.

Finally, Hirschman and Berman distinguish two different types of questions for analysing the influence of economists and of economics as a discipline:

- How were the three types of influence mentioned above obtained (socio-)historically, and what role did economists play in this process?
- What is the impact of these types of influence on the type of political decisions taken?

Hirschman and Berman's analytical framework is rich, while making it possible to rank what we are interested in and the different questions we ask of our object when we are interested in the influence of economists. The article by Ash, Chen, and Naidu (2019) that we discuss below fits entirely (and unintentionally) within this analytical framework.

A second approach seems important to us for providing tools to analyse and frame the study of the influence of ideas and experts: "social epistemology" as defined by Goldman (2001) and Goldman and McGrath (2015). Social epistemology aims to think of the quest for knowledge as a process that is above all collective. What interests us more particularly in this social epistemology, here, is what Goldman calls "the epistemology of testimony". How can, and how should, the layperson judge the work of an expert? On many subjects, the layperson, and more precisely the political decision-maker,

[9] Claveau and Prud'homme (2018) also offer a more general introduction (in French), both rich and accessible, to the various questions raised by the study of expertise (scientific or non-scientific).

is not able to make a technical/analytical judgement on an expert's testimony. Imagine a complex macroeconomic forecasting model whose results are presented to different individuals. What capacity can these individuals have to challenge these forecasts? At best, these individuals will themselves be economists (for example, some members of the Monetary Policy Committee discussing the forecasts of the Bank of England staff on the basis of their official forecasting model; see Acosta et al. 2021), but at what level of detail will they be able to discuss the forecasts, without themselves having access to the equations, to the modellers' parameterisation choices, etc.? To a certain extent, belief in an expert's testimony is partly blind and implies a certain trust in the process through which this expertise is produced.

But recognising the validity of an expert's testimony faces several problems:

- the limits (and the overstepping) of the field of expertise of a testimony. The expert may tend to offer an opinion and recommendations on a domain that goes beyond his field of expertise, and one must then assess where these limits lie;
- the absence of consensus in the scientific/expert domain on a subject. Whom should one believe when testimonies are multiple and contradictory?
- consensus may in fact be the result of groupthink (*group thinking*) and of a silo effect (*silo effect*, Tett, 2015).

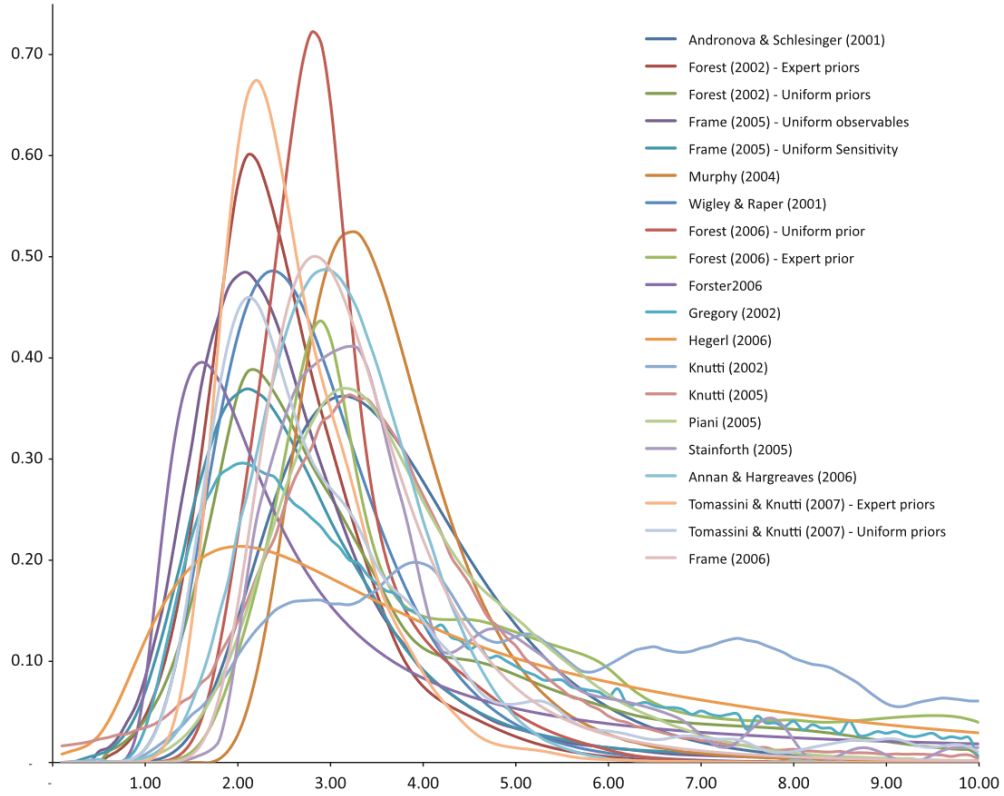
We will focus on the last two problems, once again by presenting an article by economists related to these two problems, and by turning to political science and sociology to complement these questions.

The role of expert consensus

Millner, Dietz, and Heal (2013) tackle the question of evaluating optimal policies (in terms of economic costs) to reduce climate change. Such an evaluation in economics often rests on the expected-utility principle. But the authors start from the argument that, when information about the world is incomplete, inconsistent or non-existent, it is no longer rational to describe our state of knowledge with a single probability distribution over the different possible states of the world. What the authors describe here is a situation of uncertainty, as opposed to a situation of risk, to use Frank Knight's distinction.

In the context of global warming, the validity of cost–benefit analyses thus depends on the state of our beliefs about the functioning of the climate system itself. In other words, what do we know about the change in the Earth's average temperature as a function of a given quantity of CO_2 emitted? If this knowledge is imprecise, insufficient or contrasted, what are the consequences for the analysis of optimal policies for reducing global warming?

The authors then look at a set of estimates of climate sensitivity to a doubling of the CO_2 concentration:



Given the great diversity of these sensitivity estimates, they consider that we are here in a situation of uncertainty. One can also say that we face ambiguity. Two arguments can then be put forward in the face of this situation:

- Why not aggregate the different estimates to obtain a single probability density? But these models rest on different specifications of physical processes, different parameter choices, different estimation methods. These models are therefore to some extent incommensurable, and there is no reason why aggregating them should give better information.
- Why not choose the best estimate? But these models are already estimated on historical data, so how can they be evaluated in this way?

The consequence of this for the authors is that favouring any aggregation method, or giving greater weight to a particular model, is necessarily a largely subjective decision.

The authors distinguish three types of ambiguity in the case of policies to fight climate change:

- “scientific” ambiguity: uncertainty about the exact effects, in terms of temperature increase, of the increase in the CO_2 concentration;
- “impact” ambiguity: what consequences for the economy of global warming and of a temperature increase of x degrees?
- “technological” ambiguity: uncertainty about the costs of reducing CO_2 emissions.

The third ambiguity works in the opposite direction from the first two. The first two sources of ambiguity give a strong overall exposure to ambiguity in the case of low emission reductions (which will have terrible welfare consequences in the case of high temperature sensitivity and of a strong impact of this temperature rise on the economy), whereas the third ambiguity matters mainly in the case of policies of large abatements of CO_2 emissions. Of course, the first two sources of ambiguity, given the extent of their potential consequences, are likely to be more important than the third. The authors carry out

welfare calculations with Nordhaus's DICE model using the twenty or so estimates of the probability distribution of climate sensitivity (shown in the graph).

> **Result**
>
> They conclude that neglecting ambiguity is very likely to lead to drastically underestimating the welfare gains of emission reductions.

The authors thus offer a way of responding to the existence of ambiguity (an absence of consensus) about the effects of climate change.

From a rather different perspective, one can look at the way the absence or existence of a consensus is an important parameter in the relationship between experts and decision-makers, and at how both groups can also make strategic use of consensus or dissensus.

The political scientists Farrell and Quiggin (2017) looked at the relationship between professional economists and political decision-makers on the question of Keynesian stimulus at the time of the 2008 economic crisis. This kind of question creates proximity and intensifies interactions between professional economists and decision-makers. The latter pay attention to the opinion of the former because i) it helps them manage certain specific problems and ii) it can give legitimacy to their action. The consequence of this interaction is that the contours of agreements and disagreements within the field of economists will be found among decision-makers, but at the same time, agreements and disagreements among decision-makers will affect the debates among economists.

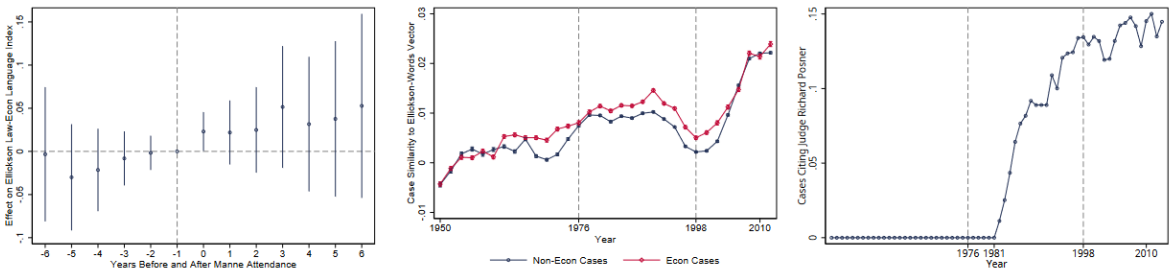
Farrell and Quiggin look at the consensus/dissensus dynamics among economists. Decision-makers who agree with the economists' consensus try to take advantage of it. Conversely, decision-makers who disagree try to destabilise this professional consensus and to put forward the ideas of groups of dissenting economists. These groups of economists also try to take advantage of this political legitimacy within the professional field. In other words, the idea here is that consensus in a scientific discipline is not entirely independent of the expert discourse that comes from the discipline and of the resulting interaction with politics, which further complicates the question of validating testimony.

Experts trapped in groupthink?

Groupthink can be seen as a set of heuristics or a certain framing for analysing a problem. It reflects a certain form of rationality, since groupthink can provide a basis for discussion, normalise judgements and facilitate the work of analysing a problem. At the same time, groupthink leaves aside certain interpretations of a problem, certain problems themselves, and leads to certain types of consequences. Groupthink creates a set of "blind spots".

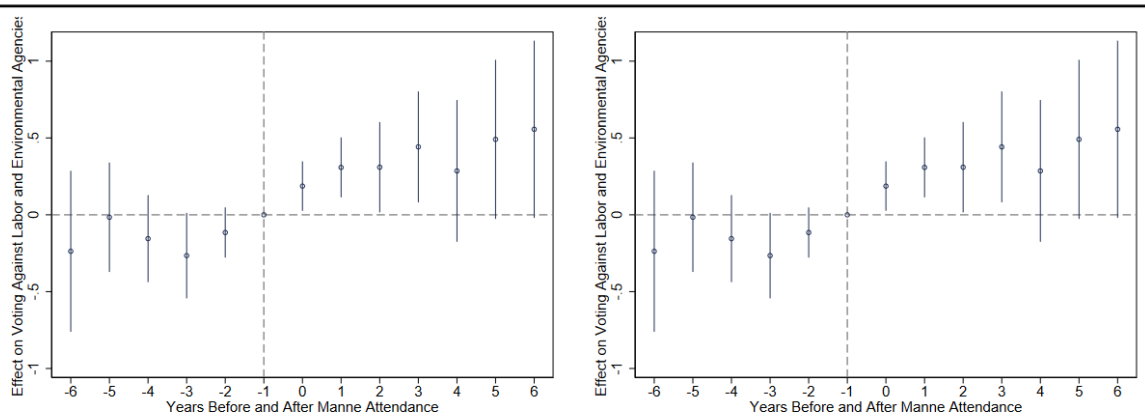
Ash, Chen, and Naidu (2019) study the impact on court decisions in the United States when judges are trained in the legal theory of the economic analysis of law (*law and economics*). The article uses data on 380,000 court cases (information on the judges, information on the cases, text of the judges' opinions, etc.). The authors look at judges who attended the Manne programme, an economics training programme funded by conservative foundations and large firms. According to them, this programme is biased towards a certain type of economics: systematic use of cost–benefit analysis, emphasis on the perverse consequences of economic regulation policies, treatment of crime with a Becker-style conceptual apparatus, in which criminals are regarded as rational agents. The authors then estimate the impact of attending the training on the language used by judges and on their decisions (judges who did not attend the training serve as the control group).

The authors build a *Law and Economics* corpus and construct an index from the vocabulary used in this corpus. They can then compute the proximity of each court decision to this index.

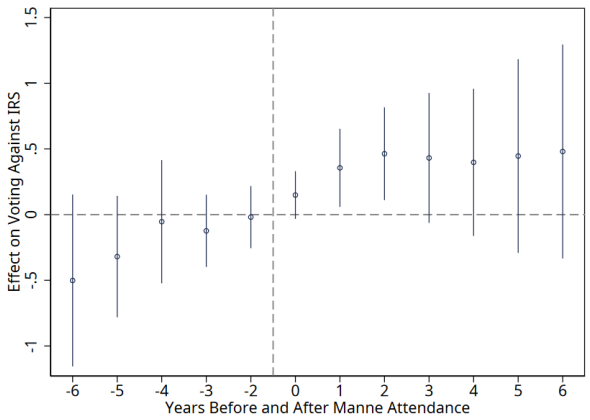


Notes. Average Ellickson phrase frequency (left panel), similarity to Ellickson words vector (middle panel), and cases citing Judge Richard Posner, plotted by biennium and separately by economics cases (regulation and labor) and other cases. Error spikes give standard error of the mean.

While it seems clear that attending the programme tends to transform the judges' mode of reasoning, what consequences does this have for the decisions taken? For regulation cases, the authors take as a proxy the votes for or against the position defended by environmental and labour organisations and agencies, assuming that voting against these institutions very likely means that the judges are voting against a regulation. In tax cases, they look at votes against the Internal Revenue Service, the agency in charge of tax collection in the United States. Here again, the results are clear, and going through the Manne programme leads judges to take more "conservative" decisions:



Notes. Event study effects on voting against government agency on labor and environmental issues, relative to year before attendance at Manne economics training. Regressions include judge and circuit-year fixed effects. Right panel also includes elastic-net-selected controls interacted with year dummies. Error spikes give 95% confidence intervals.



Notes. Event study effects on voting against the IRS, relative to the year before attendance at Manne economics training. Regressions include judge fixed effects, circuit-year fixed effects, and elastic-net-selected controls interacted with year dummies. Error spikes give 95% confidence intervals.

In the last part of the article, the authors look at questions that bring us back to the fourth part of this course: the circulation and contagiousness of ideas. The authors show that i) judges who went through

Manne are “influential”, since judges who sat on a panel with a Manne-trained judge subsequently use more economic language; and ii) economic language is contagious, since if it is used in economic cases, it gradually also comes to be used in non-economic cases (criminal cases).

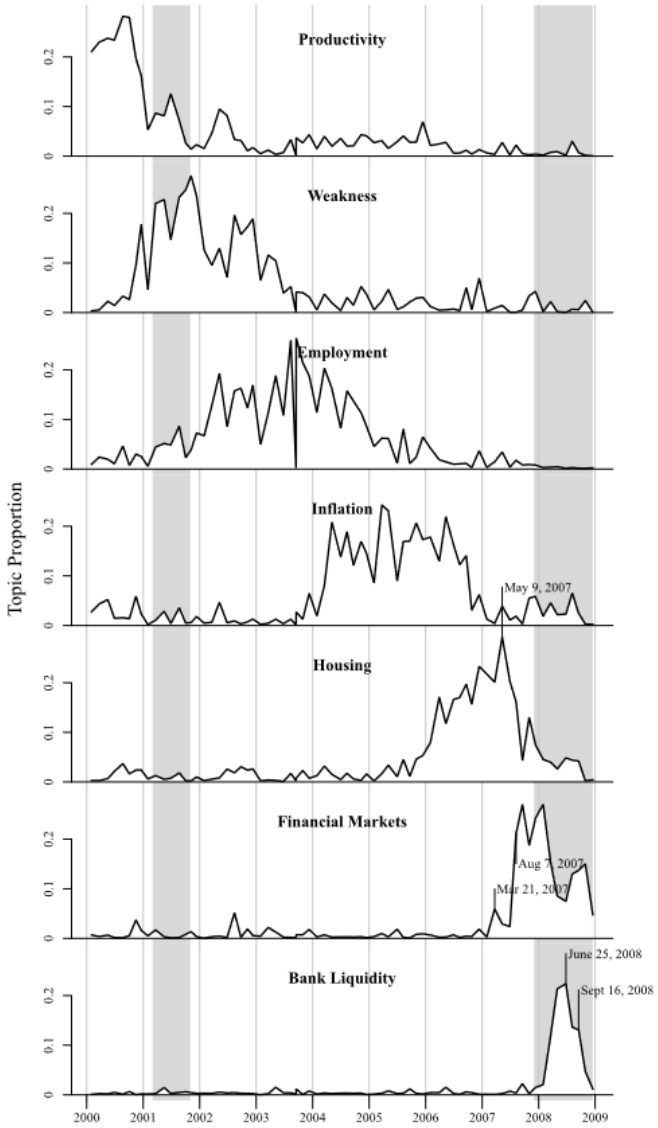
The article by Ash, Chen, and Naidu (2019) highlights the processes through which “groupthink” emerges and its practical consequences. From a different disciplinary perspective, we will now look at the blind spots of groupthink and at their consequences.

The article by Fligstein, Stuart Brundage, and Schultz (2017) looks at the forecasts of the Federal Open Market Committee (FOMC) in the years and months preceding the financial crisis. The FOMC is the committee in charge of steering monetary policy within the Fed in the United States. It turns out that the FOMC systematically underestimated the risks weighing on the US economy in this period. The authors take up Goffman’s (1986) concept of *frame*: interactions and communication within groups rest on a common “framing”. Thinking in terms of framing could explain the FOMC’s attitude in three different ways:

- a frame is a filter through which a group will understand and analyse a problem;
- a cultural and/or organisational tendency to ignore discordant/out-of-routine information;
- the content of a frame explains what will be overestimated or underestimated.

The authors analyse the textual content of the 73 FOMC meetings between 2000 and 2008, and propose a topic-modelling analysis to identify the FOMC’s dominant frames. They show that macroeconomics is the FOMC’s main framing, whereas financial questions are only secondary.

Bank Liquidity	Housing	Inflation	Financial Markets	Productivity	Employment	Weakness
April	housing	prices	credit	productivity	employment	easing
commodity	inflation	inflation	financial	slowing	improvement	weakness
options	section	energy	institutions	growth	hiring	sales
prices	forecast	increase	risk	supply	productivity	spending
facility	moderate	pace	market	nairu	growth	September
inflation	core	core	loans	labor	business	investment
primary	president	pass	banks	inflation	dollar	decline
June	growth	measures	downside	treasury	gap	cut
Lehman	subprime	pause	cut	demand	expansion	economy
pdcf	thank	higher	turmoil	year	output	sector
system	trend	costs	losses	acceleration	recovery	consumer
stress	bit	tightening	cdo	rise	job	manufacturing
headline	public	oil	mortgage	wage	spending	attacks
tslf	construction	compensation	deterioration	tightening	tax	ulus
institutions	uncertainty	pressures	tranches	trend	ten	tech
repo	language	expectations	capital	stock	recommendation	fiscal
dealers	alternative	language	auction	increase	disinflation	November
party	residential	data	liquidity	tight	pickup	auto
banks	labor	statement	housing	pressures	payroll	recession
financial	past	remove	October	workers	recent	inventory
Stearns	comfortable	accommodative	asset	prices	labor	equity
voluntary	think	path	January	tech	deflation	weakening
dis	narrative	meeting	sheet	higher	low	recovery
stigma	laughter	neutral	swap	unemployment	data	Argentina
sec	mortgage	China	lending	technology	pick	industry
collateral	home	move	commercial	rate	inventory	rebound
March	utilization	year	agencies	dollar	equipment	downside
Reserve	builders	contained	senior	electricity	gains	travel
loop	vince	rise	insurance	euro	capital	capital
failure	want	graphs	paragraph	believe	orders	negative



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