10. Additional ideas

1. The fallacy of composition

The fallacy of composition occurs when it is automatically presumed that what is true at an inferior or small scale (for individuals or parts of an economy) is true at a superior or larger scale (for groups of individuals or the entire economy).

• **Example 1.** A seller who reduces prices may sell more products. But if all sellers reduce their prices, it is not likely that all of them would sell more products.

• **Example 2.** If just one driver leaves home earlier to avoid a traffic jam, he will avoid it. If everybody leaves home earlier, then the jam is no avoided but merely brought forward.

2. The fallacy of division

The fallacy of division occurs when it is automatically presumed that what is true at at superior or aggregate scale (a large group of people, the economy) is true at some inferior or smaller scale (individuals, parts of the economy).

• **Example 1.** A cell is a living entity, but the cells that make up the cell are not living entities.

• **Example 2.** Conscience emerges from the brain's activity, despite the fact that the neurons that constitute the brain are not conscious entities.

3. Emergent property

A property or phenomenon is emergent if it arises out of lower level constituents but cannot be reduced, explained, or predicted from them. The existence of emergent properties explains the fallacies of composition and division: when going from one scale to another, the property emerges or vanishes. The fallacy is created by applying the same reasoning when the property is present and when it is absent.

• **Example 1.** Life and consciousness both appear to be emergent properties.

• **Example 2.** If one firm suffers losses, then the firm has a problem. If all the firms of an economy incur losses, then it is the economy that has a problem. If one student fails, then the student has a problem. If all the students fail, then the instructor has the problem.

4. Simpson's paradox

Simpson's paradox occurs when a property true for different groups is false for the combined group. The table below shows the taxes paid by three groups in two periods, their income, and the corresponding tax rate (taxes in relation to income). The tax rate of each group diminishes from $t = 1$ to $t = 2$. Surprisingly, for the aggregate group, the tax rate rises from $t = 1$ to $t = 2$.

	period $t = 1$			period $t = 2$		
	taxes	income	tax rate	taxes	income	tax rate
group 1	5	100	**5%**	2	50	4%
group 2	150	1,000	**15%**	63	450	14%
group 3	40	200	**20%**	255	1,500	17%
all groups	195	1,300	15%	320	2,000	**16%**

5. The *cum hoc ergo propter hoc* fallacy

The *cum hoc ergo propter hoc* ('with this, therefore because of this') fallacy consists in inferring causality from the proximity of events. One commits this fallacy when the presence of a statistical association between two variables is considered enough to declare a causal connection between them. Statitiscal correlation does not imply (nor proves) causality.

- **Example 1.** Students attending the classes typically pass the course. This, however, does not imply that coming to class guarantees that the course will be passed.

- **Example 2. Common factor.** Suppose people suffering from anxiety tend to smoke more than the rest of people. Though it is tempting to conclude that anxiety causes smoking, it could be that some genetic factor predisposes a person to simultaneously smoke and suffer from anxiety.

- **Example 3. Reverse causality.** Imagine that event B is observed whenever event A occurs. The conclusion that A causes B is not guaranteed because it is B that could cause A. For instance, is a country poor because it has a large population or it has a large population because it is poor? Does the government budget deficit worsen because the economy stagnates or the economy stagnates because the deficit has increased?

6. The *post hoc ergo propter hoc* fallacy

The *post hoc ergo propter hoc* ('after this, therefore because of this') fallacy consists in attributing causality to the order of events. This fallacy presumes that, if event A precedes event B, then A causes B. To sustain the causal claim, one must identify the connection (mechanism, process) leading from A to B.

- **Example 1.** A reduction in the unemployment rate following a change in the law regulating labour contracts does not endorse the conclusion that the legal reform lowered unemployment.

- **Example 2. Chicken-egg problems.** As, in a economy, most likely everything eventually affects everything, it is difficult to separate cause from effect. Are there more workers hired because firms sell more or firms sell more because more workers have been hired? Are prices going up because consumers spend more now or consumers spend more now because prices are going up (and they expect them to rise further in the future)?

- **Example 3. Superstitions.** Superstitious behaviour is an expression of the *post hoc* fallacy. Why Friday 13th is supposed to be an unlucky day? How keeping fingers crossed can make wishes come true? On which grounds is it unlucky to deny a pregnant woman her cravings? Why fear speak ill of the dead? Why new clothes are not to be worn to a funeral? Are you really protected from evil spirits by standing inside a circle? What makes breaking a mirror so unlucky? Or having horseshoes hanging above the doors of homes so protective? Is it lucky or unlucky to see a black cat? Why is it bad luck to walk under a ladder? (Superstitions taken from Chloe Roads, *A book of old-fashioned superstitions*, 2012).

7. The *petitio principii* fallacy

The *petitio principii* ('begging the question' or 'assuming the initial point') fallacy is committed when a proposition that has to be proved is (implicitly or explicitly) assumed without proof. The fallacy is a form of circular reasoning.

• **Example 1.** In textbooks on the orthodox kind demand side policies turn out to be ineffective to increase GDP (economic activity) in the medium run. But this conclusion has actually been assumed because one of the premises of the model is that medium run GDP remains constant.

• **Example 2.** Some answers given to exam questions illustrate the *petitio principii* fallacy: the answers just reformulate the question with different worlds. "Q: Why is the GDP growth rate positive? A: The GDP growth rate is positive because GDP increases."

8. How to exhibit two realities with the same data

The second row of the table below shows the values of a certain cumulative variable (like production or employment) quarter by quarter. The annual value V of the variable is the sum of the values in four consecutive quarters. The government decides to make public V every two quarters: at the beginning of quarter t, $t+2$, $t+4$… the government announces the sum of the values in the previous four quarters $t-1$, $t-2$, $t-3$, and $t-4$. Though V oscillates, the government may induce people to believe that V grows by choosing to report V in an odd quarter. The value anounced are then 40, 41, 42, 43, 44… The opposition may reply that the government is lying by reporting V in an even quarter: 39, 38, 37, 36…

quarter	1	2	3	4	5	6	7	8	9	10	11	12	13
value	10	10	10	10	9	12	7	14	4	18	3	19	…
V	–	–	–	–	40	39	41	38	42	37	43	36	44

9. The Tinkerbell effect

The Tinkerbell effect (after the fairy from the Peter Pan stories) refers to phenome-na that exist just because they are believed to exist (in the Peter Pan 1904 play, the death of Tinkerbell is prevented by the audience's belief that she shall not die).

• **Example 1.** Money is what it is believed to be money: the euro, money in Spain, not in China.

• **Example 2.** If all believe a bank to be solvent, the bank is solvent. If all believe a bank to be insolvent, clients will withdraw their deposits, other banks will refuse to lend to the bank, and the bank will most likely turn insolvent.

• **Example 3. *Consensus gentium* fallacy.** This is the fallacy of postulating that something is true because everybody believes it is true. The scientific community seems to be a constant victim of the fallacy. Once scholars held that the Sun made orbits of the Earth. Copernicus' alternative view took generations to become accepted. The story repetead itself with Alfred Wegener's theory of continental drift, proposed in 1912 and accepted in the 1950s. If all mathematicians believe correct the proof of a theorem, then proof and theorem are both regarded correct.

10. The reverse Tinkerbell effect

The reverse Tinkerbell effect (suggested by David Post, 2003) is the phenomenon of having the truthness of hypotheses or theories depend inversely on the number of people that believe them: the hypotheses or theories become more true as more people believe them to be false, and vice versa. The reverse Tinkerbell effect implies that:

(i) the fewer the people holding the hypotheses or theories, the more true they become (what people believe becomes more true as fewer people believe them to be true);

(ii) the more people accept them, the less true they become (what people believe becomes less true as more people believe them to be true);

(iii) with more people believing something to be false, the less false it becomes.

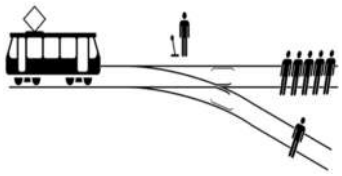
• **Example 1. Self-defeating prophecies.** The more people believe that some undesirable event (like the Y2K effect) is going to happen, the more they will try to prevent the outcome.

• **Example 2. Attractive destinations for tourists.** The more people believe that some place is a good destination to spend the holidays, the more likely the place will cease to be attractive.

• **Example 3. Charity.** The more people believe that some person or organization is in need to be funded, the less need of funds.

11. The trolley problem

https://en.wikipedia.org/wiki/Trolley_problem



A runaway empty trolley is heading towards five persons. The only way of saving their lives is to pull a lever that will divert the trolley to another track, but at the cost of killing another person. Would you turn the trolley? Should it?

• **Solution 1: consequentialism.** Consequentialism is the ethical doctrine that judges (the morality of) actions by their consequences. The Spock character in the Star Trek franchise was consequentialist: "The needs of the many outweigh the needs of the few or the one," *Star Trek II: The Wrath of Khan* (1982). Since having five deaths seems a worse consequence than having only one, consequentialism recommends pulling the lever to divert the trolley.

• **Solution 2: deontological ethics (deontology).** Deontology is the ethical doctrine that judges actions by their by conformity with pre-established rules: moral actions should conform to duty. It is not only the consequences of actions that matter but also the principles that govern them. If people abide by the Decalogue, the commandment 'Thou shalt not kill' forbids pulling the lever.

• **Example 1. Alternative scenarios of the trolley problem.** You are on footbridge with a fat man just above the track leading to the five persons. The only possibility of saving them is to derail the trolley by pushing the fat man and making him drop onto the track. Should the man be sacrificed? In another scenario, you do not know whether the trolley is going to kill five or one, but you have the power to force the outcome. Will you intervene to force an outcome or will you let the trolley randomly decide whether one or five persons will be killed?

• **Example 2.** The design of economic policies faces trolley problems. Alternative policy measures lead to different economic outcomes. In general, some outcomes are favourable to some people and, simultaneously, detrimental to other people. A high interest rate is more beneficial to lenders than a lower one, as they receive more for lending money. Yet, borrowers are worse off with a higher than with a lower interest rate, since they have to pay more for getting a loan of money.

12. The law of unintended consequences

The 'law of unintended consequences' refers to the observation that decisions and actions in general tend to have consequences not desired nor anticipated. Macroeconomic outcomes are the result of the aggregation of people's decisions. But people may make certain choices aiming at some outcome and the opposite of what was intended may come out. This creates a problem: how could one explain a result no one intended to achieve? Moreover, from the standpoint of the design of economic policy, how could one prevent the occurrence of unintended events?

• **Example 1. A positive unintended consequence: Adam Smith's invisible hand.** "By preferring the support of domestic to that of foreign industry, he [every individual employing his capital or labouring] intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. […] By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it." *Wealth of nations*, Book IV, Chapter 2. "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest." *Wealth of nations*, Book I, Chapter 2.

- A side effect of an action is an effect the action did not intend to generate. Side effects could be positive (favourable) or negative (unfavourable).
- A revenge (boomerang, blowback) effect of an action is an effect contrary to the one pursued when the action was taken. Side and revenge effects occur because new possibilities, devices, systems… interact and react with people in unforeseeable ways.

• **Example 2.** Imagine a drug helping to reduce weight. If the consumption of the drug in effect lowers the weight but, at the same time, changes the skin's colour, then the skin colour change is a side effect. If consuming the drug under stress turned out to accelerate weight gain, then that would constitute a revenge effect of the consumption of the drug.

• **Example 3.** Home washing machines were publicized as a means to free time for houseviwes. The widespread adoption of homewashing machines apparently created a side effect: the number of commercial laundries decreased. This forced housewives to do more washing at home, thereby generating a revenge effect: rather than reducing the time housewives spent on washing, washing machines increased it.

• **Example 4.** (An apparently well-planned project leading to a surprising adverse result; Helen Margetts et al. (2010): *Unintended consequences of public policy reform*). Eighteenth-century German scientific foresters recommended growing trees in seried ranks, to render the forests easily countable. But in creating forests without disorderly clusters and without fallen trees among the living ones, the ecosystem needed for healthy forest growth was destroyed. So the foresters unintentionally killed the forests they were attempting to manage.

• **Example 5.** "The only way to control unanticipated events is to have Washington [= the government] do as little as possible." Milton Friedman, quoted in W. A. Sherden (2011): *Tyranny of unintended consequences and how to avoid them*, p. 1. [Among the most radical of the orthodox economists, unintended consequences are attributed to public authorities, as if private agents were free from the sin of making decisions causing unintended effects.]

13. Prisoner's dilemma

A prisoner's dilemma type game is a game situation in which cooperation between the participants yields a better result to all of them than selfish competition. The model of strategic, interactive decisions called 'game' consists of three elements. First, the agents (called 'players') that must make the decisions. Second, for each player, the set of decisions (called 'strategies') available to him and among which one must be chosen. And third, for each player and for each profile listing the strategies that each player picks, a numerical evaluation for the player (called his 'payoff') of the consequences arising from the implementation of the strategies in the profile.

• **Example.** The game on the right represents a prisoner's dilemma type-situation. There are two players, 1 and 2. Each player chooses between strategies a and b. What the strategies stand for is irrelevant. The first entry in each vector of numbers is player 1's payoff; the second, player 2's. For instance, if player 1 plays strategy and player 2 plays strategy, then player 1 gets payoff 3, whereas player 2 obtains a zero payoff (payoffs may represent anything: measures of welfare or happiness, money, market shares, exam scores, years of prison, costs, profits…).

		player 2	
		a	b
player 1	a	**2 2**	**0 3**
	b	**3 0**	**1 1**

• **Analysis.** For each player, b is a strongly dominant strategy: by choosing b, no matter what the opponent chooses, the player gets a higher payoff. Take, for example, player 1. If player 2 chooses a, the best for player 1 is to choose b; and if player 2 chooses b, the best for player 1 is also to choose b. Therefore, b is a dominant strategy. If both players pick their dominant strategies, the outcome is (1, 1). Nonetheless, there is an outcome which is better for both players: the outcome resulting when both select a instead of b.

• **Lessons of prisoner's dilemma games.** **Lesson 1**. They illustrate the limits of presuming that self-interested individuals make decisions that maximize the collective welfare: the invisible hand is not just invisible, but non-existent. **Lesson 2**. As players will try to develop institutions helping them to cooperatively obtain outcome (2, 2), prisoner's dilemma games also make evident that trying to explain macroeconomic outcomes only in terms of the behaviour of self-interested individuals may prove unsuccessful. **Lesson 3**. Unintended consequences of individual behaviour may be pervasive: by playing a dominant strategy, no player intended to reach an inefficient (improvable) collective outcome, but the outcome (1, 1) reached is inefficient.

14. The tragedy of the commons

The tragedy of the commons (tragedy of freedom in a commons) refers to the tendency to overexploit a free, shared resource: the maximization of individual gains comes at the expense of the exhaustion of the source of the gains whenever the interaction of individuals when they exploit the resource is unregulated. The tradedy is then that "Freedom in a commons brings ruin to all." Garrett Hardin (1968): "The Tragedy of the Commons," *Science* 162, p. 1244.

• **Example 1.** The tragedy may also appear if, instead of using a resource, the issue is the disposal of a waste (as in pollution problems, where costs are discharged on the commons, like the air).

• **Example 2.** As a prisoner's dilemma type-situation, the tragedy questions the assumption that the decisions made by individuals pursuing their own benefit constitute decisions that are desirable from a social or collective point of view. What is good for individuals is not good for society since the selfish, mutually independent actions by the individuals generate an unintended consequence: a negative externality.

15. Goodhart's law

Named for Charles Goodhart, a former chief advisor to the Bank of England, it was originally formulated in 1975 as "Any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes."

- Marilyn Strathern's formulation is "When a measure becomes a target, it ceases to be a good measure." Mario Biagioli ("Watch out for cheats in citation game," *Nature* 535 (7611), 201) states it as "When a feature of the economy is picked as an indicator of the economy, then it inexorably ceases to function as that indicator because people start to game it."
- Goodhart's law expresses for the social world what the Heisenberg principle expresses for the phyical world: the act of measuring reality changes reality. By Goodhart's law, an empirical regularity tends to vanish when it is used to control the evolution of the variables involved in the regularity.

• **Example 1.** Imagine that it is an empirical regularity that the students attending more than, say, 85% of the classes pass the course. To avoid the cost of setting and correcting exams, a teacher may use this regularity to, by controlling attendance, give a pass to those students coming to at least 85% of the classes. If students knew that policy, attendance would no longer be a good measure of the students' performance. Are you perverse enough to realize why?

• **Example 2. The Lucas critique.** Formulated by Nobel laureate Robert Lucas, Jr., the critique points out that changes in policies may alter the coefficients in macroeconometric models used to formulate the policies, so policies designed to have effects on one reality (the one without the policies) could end affecting a different reality (the one where the policies are applied). Therefore, when policies are designed, it should be taken into account how the policies alter reality.

• **Example 3.** Exams are indicators of knowledge. Exams are not the end, but a means. Yet, the very existence of exams induces students to focus on passing exams rather than to learning the subject evaluated.

• **Example 4.** Traditionally, relevant and important scientific contributions obtain many citations. Hence, citations could be selected as an indicator of the quality of scientific research. This may encourage researchers to do whatever they can to inflate their citations and disregard the quality of their research.

- By Goodhart's law, when some empirical regularity as a policymaking instrument, the regularity will tend to disappear. Empirical regularities link variables (course attendance and course performance in Example 1, citations and research quality in Example 4). If one of the variables is taken as target (performance, quality), the other variable (attendance, citations) may act as indicator. But taking the indicator as a measure of the target invalidates the indicator: controlling the indicator instead of the target destroys the empirical regularity, since people will tend to base their decisions on the indicator not the target.
- Goodhart's law expresses the idea that an economy is not invulnerable to politics.

• **Example 5.** "The most famous example of Goodhart's law should be the soviet factories which, when given targets on the basis of numbers of nails, produced many tiny useless nails and, when given targets on basis of weight, produced a few giant nails. Numbers and weight both correlated well in a pre-central plan scenario. After they are made targets (in different times and periods), they lose that value."
http://lesswrong.com/lw/1ws/the_importance_of_goodharts_law/

16. Frédéric Bastiat's good and bad economist

"In the economic sphere an act, a habit, an institution, a law produces not only one effect, but a series of effects. Of these effects, the first alone is immediate; it appears simultaneously with its cause; *it is seen.* The other effects emerge only subsequently; *they are not seen;* we are fortunate if we *foresee* them. There is only one difference between a bad economist and a good one: the bad economist confines himself to the *visible* effect; the good economist takes into account both the effect that can be seen and those effects that must be *foreseen*. Yet this difference is tremendous; for it almost always happens that when the immediate consequence is favorable, the later consequences are disastrous, and vice versa. Whence it follows that the bad economist pursues a small present good that will be followed by a great evil to come, while the good economist pursues a great good to come, at the risk of a small present evil." F. Bastiat (1801-50) "What is seen and what is not seen"
http://www.econlib.org/library/Bastiat/basEss1.html#Chapter%201

17. Short-termism

Short-termism is the tendency to see or focus only on immediate effects of decisions and overlook longer and indirect consequences. It is a prevalent feature of human decisions: policy makers tend to prefer immediate effects to those taking time to become evident. But what is right or convenient in the short run may not be right or convenient in the long run. Spain has some airports without airplanes: construction companies and politicians seemed more interested in building the airports (short-term profits) than in operating them (long-run profits).

18. Hazlitt's economics in one lesson

"The whole of economics can be reduced to a single lesson, and that lesson can be reduced to a single sentence. *The art of economics consists in looking not merely at the immediate but at the longer*

effects of any act or policy; it consists in tracing the consequences of that policy not merely for one group but for all groups." Henry Hazlitt (1988): *Economics in one lesson*, p. 5

19. 80/20 rule

Suggested by Vilfredo Pareto, the 80/20 rule (80/20 principle, Pareto principle, or Pareto law) states that, in many cases, approximately 80% of the effects (outcomes) stems from approximately 20% of the causes (inputs). Pareto inferred the rule from his finding that most of the wealth and incomes in many countries and many periods was owned and earned by a small minority (for instance, 80% of Italian land was in the hands of 20% of the population). Typically, most wealth in an economy is owned by a minority: wealth is not uniformly distributed.

• **Example.** For the world wide web, 5% of sites attract some 75% of visits; for movies, 1% of the movies account for 80% of the box office (Richard Koch, *The 80-20 Principle and 92 other powerful laws of nature*, 2013).

20. Sturgeon's law

Sturgeon's law (Ted Sturgeon, 1953) holds that 90% of everything is trash. Sturgeon's law could be viewed as a refinement of the Pareto law: rather than 20% of inputs accounting for 80% of the value at least, it is at most 10% that accounts for the full 100%.

• **Example 1.** 90% (at least) of what you will be told in this macroeconomics course is trash. 90% of everything you are going to do, eat, read, see, hear… in your life will be trash.

• **Example 2.** Scientific research, in general, and macroeconomic research, in particular, are also subject to Sturgeon's law. In "Why most published research findings are false," PloS Med 2: e124 (2005), John P.A. Ioannidis contends that this is in part due to the non-replicability of most empirical studies, which mechanically apply statistical methodology. Vested interests and prejudices also play their part.
http://reason.com/archives/2016/08/26/most-scientific-results-are-wrong-or-use

• **Example 3.** The Ig Nobel Prize (http://www.improb able.com/ig/). This prize is awarded each year to ten achievements that 'first make people laugh, and then make them think.' One of the 2012 prizes went to research showing that even a dead salmon has brain activity. The Economics prize in 2001 went to researchers holding that "Evidence from estate-tax returns suggests that some people will themselves to survive a bit longer if it will enrich their heirs." ("Dying to save taxes," *Review of Economics & Statistics* 85(2), 2003). In 2016, a prize was awarded for assessing the perceived personalities of rocks ("The brand personality of rocks," *Marketing Theory* 14(4), 2014).

21. The problem of silent evidence

The problem of silent evidence is that the information typically available to understand a phenomenon/result is biased in the sense that it has been diminished or filtered out by the phenomenon/result itself (selection effect).

• **Example 1. Survivorship bias.** Imagine someone wants to estimate whether praying makes people survive a plane crash. The problem: one can count only those passengers who prayed and surived but not those who prayed and did not survive. The latter constitute the silent evidence.

• **Example 2. Explaining professional success.** It is customary to explain the success of very rich people by listing the characteristics and behaviour of those people: they are hard-working, never give up, attempt new ways of doing things… The point is that millions of other individuals do the same but do not end up rich: that is the silent evidence. Consequently, one cannot ascribe success to those traits: it simply happened that, among the millions of individuals having those characteristics, a handful became rich (who could be considered black swans).

• **Example 3. Fallacy of confirmation.** In his "What is seen and what is not seen", Bastiat notices that one can see what governments do, but not the alternatives that they refuse to follow, which remain unseen. Despite the fact that the policy chosen may have alleviated the problem at which it was aimed, some alternative could have yielded a better result.

• **Example 4. Abraham Wald.** During WWII, the British Air Ministry attempted to improve the protection of bombers flying over enemy territory. Returning aircrafts were inspected and bullet holes recorded. It was found that the vital parts of the aircraft did not suffer the greatest damaged; rather, the damage was concentrated on the extremities of the planes. This evidence suggested adding armor to the extremities. Hungarian-born mathematician Abraham Wald recommended instead to add it on the bullet-free areas. The reason is that data was not compilled from the planes that crashed. And why did they crash? Because they were hit on engines and core fuselage areas. The data missing could be as important as the data present.
http://digitalroam.typepad.com/digital_roam/2006/03/the_hole_story_.html