

I. Questions

1. **Definition.** What is globalization? Mainly an outcome? Mainly a process?
2. **What is new?** Is the current globalization process essentially similar to previous globalization processes or is to a large extent a new phenomenon?
3. **Nature.** Why is the world globalized? Is globalization a spontaneous (in the long run, inevitable) phenomenon or the result of political decisions?
4. **Globalization and capitalism.** Are globalization and capitalism the same thing? Can one not occur without the other?
5. **Reversibility.** Is globalization reversible? Is deglobalization to be expected?
6. **Depth and extension.** What is the scope of globalization? Is there anything unaffected by globalization? What is the physical reach/geographical limit of globalization? Will outer space be globalized?
7. **Drivers.** What ultimately drives globalization? Are they subject to control? By whom?
8. **Effects.** Which are most relevant effects caused by globalization on societies, economies, governments and people?
9. **Convergence/divergence.** Which aspects converge under globalization and which ones do diverge?
10. **Sustainability/stability.** What processes/outcomes produced by globalization are globally sustainable and stable?
11. **What we really know.** The data on economies and how they work are extensive. Yet no consensus has emerged concerning the best theories to understand economies or the best policies and practices to regulate/control them.
12. **Economic focus.** Although globalization involves the environment, global climate change, cultural identities, labour laws, global courts, international mobility, mass media, global governance agencies, civil societies, national security, global weapons, global poverty, health, ecology, social protection, geopolitical stability, global events... why is discussion focused on economic globalization?
13. **Economic theory.** Is current economic theory well suited to solve practical problems through economic policies?
14. **How immature is economics?** Economics seems a field that has not yet reached an interconnection of sufficient information to produce objectively valid claims about the economic reality. Is economics like medicine before the germ theory (that microorganisms are the cause of many diseases) or biology before genetics? A stockpile of facts without solid unifying principles nor clear connections to the principles of other sciences.
15. **Addressing the challenges of globalization.** Can a sound investigation of those challenges be conducted when solid economic, technological, political and sociological theories are lacking?
16. **Science.** Is science the only truly global culture (as it transcends boundaries of nationalities and faiths)?
17. **Globalization and free markets.** From a social and an environmental perspective, is globalization better left unregulated, uncontrolled? Do markets take good care of people and the environment?
18. **Global government.** Globalization is creating a world economy. Will in parallel the world be united under a single government?
19. **China.** Will China rule the world? (Rise of China = most significant geopolitico-economic event in the last decades?)
20. **Mineral dependence.** How critical is to the globalization process the dependence of the world economy on mineral resources (metals, fossil fuels, mineral fertilizers)?
21. **Limits to growth.** Are there insurmountable limits to global economic growth? Has humanity already overshoot the Earth's carrying capacity (surpassed the global ecological constraints)?
22. **Is everything a bubble?** All expansionary social and economic phenomena (production growth, price increases, debt accumulation, population growth, technological development, extension of democracy...) are created by self-reinforcing processes (those based on positive feedback: expansion fuels further expansion) that are not sustainable in the long run in a finite environment (the processes eventually are governed by negative feedback).

- 23. Concentration.** Is there a universal tendency to wealth concentration under capitalism? Does capitalism create wealth at the expense of inequality and social tension?
- 24. Is there no alternative?** It is easier to imagine the end of the world than it is to imagine the end of capitalism (Fredric Jameson and Slavoj Žižek).
- 25. Complexity and globalization.** Is globalization a mechanism to increase social and technological complexity? Or just a result of social and technological complexity? What is the interaction between complexity and globalization?

II. Claims, observations, hypotheses and relationships

- 26. Globalization 1.0, 2.0, 3.0** (Friedman, 2007). Globalization 1.0 (1492-1800) hinged on the ability of states to mobilize resources. Multinational companies were the key agents in Globalization 2.0 (1800-2000), which involved the integration of labour and good markets. Individuals are the key agents in Globalization 3.0 (since 2000), who are being empowered by a convergence of digital technologies. Will Globalization 4.0 come from the integration of humans and machines?
- 27. Rise of the West/Great Divergence.** The 'Rise of the West' refers to the economic and political preeminence achieved globally by Western Europe (and British colonies) after (and thanks to) the Industrial Revolution. The 'Great Divergence' is the counterpart of the Rise of the West: while the West entered the regime of modern economic growth (sustained growth in real income), 'the Rest' diverged in relative terms with the West in income levels.
- 28. The Needham puzzle** (Joseph Needham). Having China made so many fundamental technological innovations (printing, compass, gun powder, paper), why did modern science not first develop in China?
- 29. North-South divide.** Fact that most rich and developed countries lie above the equator and most of the least developed and poor countries lie below. In part, the divide is legacy of the Great Divergence.
- 30. Little Divergence.** Expression that refers to the divergence in economic development within the Western countries during the nineteenth and early twentieth centuries: a richer European north against a poorer European south.
- 31. Kishore Mahbubani's 'Great Convergence'.** "Everything that rises must converge."
- 32. The elephant curve.** The gains from globalization in the last three decades do not appear to be evenly distributed. The main beneficiaries in relative terms are people situated slightly above the 50th percentile of the global income distribution (mainly, the Asian poor and middle classes). The main beneficiaries in absolute terms are the richest 5% of the world population.
- 33. The Kuznets curve: prosperity vs inequality.** The Kuznets curve establishes that the level of inequality is low at low income levels, then rises as income grows (as the economy develops), and eventually falls for sufficiently high income levels.
- 34. The Kuznets wave (or cycle).** The Kuznets wave concept is an extension of the Kuznets curve: as income grows, the inequality level oscillates, going up and down, up and down... The conjecture is that the initial impact of technological revolutions is to increase inequality and income; and that, as the new technologies spread over the economy, income continues to grow but inequality decreases.
- 35. Globalization and wages.** Globalization has driven down wages in the economic sectors of the developed countries facing strong competition from the same sectors in developing countries. These sectors employ mainly unskilled workers.
- 36. Drivers behind the globalization of labour markets: more workers, better educated, with better technologies.** (1) 'The great doubling' of the global labour force due to the entry of China, India and the ex-Soviet Union into the global capitalist system. (2) The expansion of higher education in developing countries. (3) The transfer of modern technology to developing countries.
- 37. Asymmetry of globalization.** Rich countries are in a better position to rip the benefits and exploit the possibilities offered by globalization. This makes rich countries richer and makes more costly for poorer countries to benefit from globalization (as the most profitable activities are taken by the rich countries, who add obstacles preventing the poorer countries to have access to such activities). Globalization is not just an economic game but mainly a political one (and poor countries also simultaneously politically weak in the international arena).
- 38. The Matthew effect.** The rich, big or strong tend to become richer, bigger, stronger.

- 39. Development requires industrialization.** Empirical evidence suggests that development requires industrialization. By encouraging poorer (non-fully industrialized) countries to specialize in the production and trade of primary goods (agricultural products and natural resources), globalization makes development difficult to spread over all economies.
- 40. The paradox of power.** Contradicting the Matthew effect, the paradox is that initially poorer, smaller or weaker contenders often end up improving their wealth, dimension or strength relative to richer, bigger or stronger contenders. An explanation is that the initially weak are motivated to make more effort, fight harder, invest more... to improve their position with respect to the strong. The Matthew effect appears to dominate when the rich or strong are sufficiently motivated, which typically occurs when the conflict is decisive.
- 41. The 'paradox of our times'** (David Held, 2006). The collective issues that have to be addressed increasingly go beyond national borders but the means used to deal with them are located at the national and local levels.
- 42. Rodrik's central dilemma of the world economy** (Dani Rodrik, 2007). Tension between the economic reality (the global nature of many markets) and the political reality (the local nature of the institutions under which markets operate).
- 43. Rodrik's trilemma: the clash between politics and hyperglobalization.** "The fundamental political trilemma of the world economy: we cannot have hyperglobalization, democracy, and national self-determination all at once." A fully globalized economy forces the government to preserve the economic globalization and satisfy the needs and expectations of international traders and investors. When there is a conflict between the needs of the people and the needs of these agents, the government must give priority to the latter.
- 44. Globalization and policy.** Globalization has reduced the capacity of governments to regulate their economies.
- 45. Yates' dilemma** (Michael Yates, 2016). "It is impossible to create a society that is both just and capitalist." In a capitalist economy, capital rules: "Losses are always socialized, and gains are always privatized."
- 46. Yunus' three zeroes** (Muhammad Yunus, 2017). The current capitalist economic system suffers from three big failures: persistence of poverty, unemployment, environmental degradation. The system must be redesigned by pursuing three goals: zero poverty, zero unemployment, zero net carbon emission.
- 47. Globalization and risk.** Globalization appears to make humanity vulnerable to global catastrophic risks (climatic changes, volcanic eruptions, pandemic infections, biodiversity losses, cosmic hazards, nuclear accidents, worldwide tyrannies, out-of-control scientific experiments, financial crises, economic downturns, food crises).
- 48. Big threats to the 21st century world economy.** (1) The threat of scarcity associated with ecological catastrophe and the future of life on Earth. (2) The threat of abundance associated with automation and the future of work.
- 49. The Malthusian view** (Robert Malthus). Assuming that population tends to grow if unchecked and that there is a limit to the increase in agricultural productivity, it is not possible for an economy to enjoy population growth and real income growth: population growth is always constrained by food supply.
- 50. The Neo-Malthusian view.** All economies are ultimately constrained by the carrying capacity of the Earth.
- 51. The Boserupian view** (Ester Boserup). Population growth is not constrained by food supply, because population growth causes improvements in agricultural productivity and technology: an increasing population leads to the intensification (more labour invested) in the use of existing resources (land).
- 52. The Jevons paradox** (William Stanley Jevons, 1865). All efforts to maintain the resource and energy base of an economy are eventually futile. New technologies that improve the efficiency of resources or sources of energy lead to an increase (not a decrease) in the consumption of the resources or the energy sources (coal, oil, electricity...). Since technological improvements make the use of resources cheaper, more of the resources will be used.
- 53. Ambivalence of technology.** (1) All technical progress has its price. (2) At each stage it raises more and greater problems than it solves. (3) Its harmful effects are inseparable from its beneficial effects. (4) It has unforeseen effects.
- 54. The industrial revolutions.** First industrial revolution: mechanical production, factory, carbon as fuel, railroad, steam engine. Second: mass production, electricity, oil, combustion engine, chemicals, assembly line. Third or digital revolution: semiconductors, mainframe computing (1960s), personal computing (1970s and '80s) and the internet (1990s). In the fourth industrial revolution (Industry 4.0, Internet of things) virtual and physical systems of manufacturing globally cooperate with each other in a flexible way (smart and connected machines and systems) and information goods gain importance. What is really new is the confluence/fusion of these technologies (gene sequencing, nanotechnology, renewables, quantum computing) and their interaction across the physical, digital and biological domains. The fourth industrial revolution is expected to have a monumental impact on the global economy.

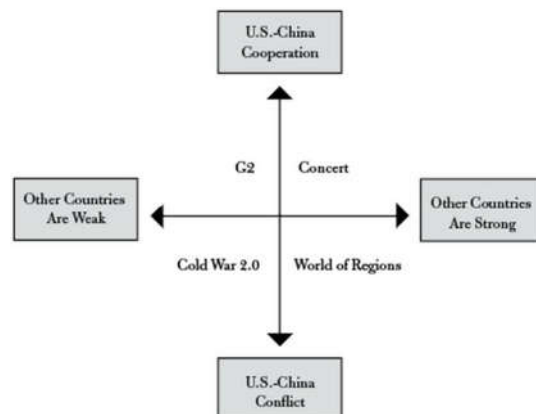
- 55. Abundance paradox.** Abundance may be harmful: “A wealth of information creates a poverty of attention.” (Herbert Simon, Nobel Prize in Economics in 1978).
- 56. Paradoxes of the free market.** (1) Is the free market institution self-destructive? The functioning of free markets tend to distort and destroy those aspects that presumably lead the markets to operate efficiently and benignly: intense competition is prone to lead to concentration and destroy competition. (2) Short-run gains of specialization may become long-run losses. Trade is likely to turn less mutually beneficial if a group of economies specialize in economic activities having higher productivity gains than the activities in which the remaining group specializes. (3) Free market economies may generate economic contractions so severe that government intervention may be necessary to reverse the business cycle.
- 57. Zero-sum view of the world.** Any increase in wealth enjoyed by one person necessarily comes at the expense of a decrease in wealth by someone else.
- 58. The Seneca effect** (Ugo Bardi, 2017). “Increases are of sluggish growth, but the way to ruin is rapid.” (*Nunc incrementa lente exeunt, festinatur in damnum*, Lucius Anneus Seneca.) The Seneca effect captures the idea that growth and development (the rise) are slow, whereas contraction and collapse (the fall) are fast.
- 59. Taxonomy of collapses.** (1) Black elephants (evident but chosen to be ignored, like pyramid schemes); (2) gray swans (the frequency of occurrence can be known but specific occurrence cannot be predicted, like earthquakes); (3) dragon kings (conceivable, unpredictable, explainable after occurrence, like why a specific big city become big); (4) black swans (unknown unknowns, like a massive terrorist attack).
- 60. X events.** These are high-surprise, high-impact events that unravel systems (political revolutions, virulent strain of a virus, explosion of a supervolcano, the collapse of globalization, world oil supplies dry up, breakdown of the global food supply, global financial crashes). X-events are driven by the increasing complexity gap between government and civil society. The underlying cause of X-events is attributable to the increasing complexity of the global society and by the fragility of complex infrastructures (transportation, communication, food and water supply, electrical power, health care). Higher technology means higher complexity and hence more vulnerability to X events.
- 61. The Red Queen effect** (Leigh van Valen, 1973). Members of a system of adaptive, evolving organisms are forced to evolve just to avoid extinction, pressed by the competition of the rest of members. The result is that the system becomes more complex until it cannot grow more complex, at which point the system collapses.
- 62. The tragedy of the commons** (Garrett Hardin, 1968). “Freedom in a commons brings ruin to all.”
- 63. Butterfly effect.** Complex systems may be extremely sensitive to apparently minor changes.
- 64. Main players in the world economy.** Big states, large private financial institutions, industrial multinationals.
- 65. Crises.** The capitalist system has gone through many generalized crises at the national level, with associated large human costs. Since the global capitalist system appears to replicate national capitalist systems, generalized crises at a global scale are most likely.
- 66. Neoliberalism.** Ideology claiming that essentially all the economic and social problems can be solved by some free market process. And even if the market solution is not absolutely satisfactory, there is the presumption that any solution articulated by public authorities will fare worse than the market solution.
- 67. Paradox of neoliberalism.** Neoliberalism, an ideology meant to ensure individual freedom above all, has created a situation (the 2008 financial crisis and the Great Recession) that called for a massive government intervention.
- 68. Washington Consensus** (John Williamson, 1990). Economic (neoliberal) agenda for globalization (economic liberalization and global market integration) based on adopting such measures as: free trade; capital market liberalization; flexible exchange rates; market-determined interest rates; market deregulation; privatization (transfer of assets from the public to the private sector); balanced government budget; tax reforms stimulating investment and production; secure property rights; protection of intellectual property rights (let free market regulate the economy).
- 69. Poverty traps.** Conditions and processes that prevent poor economies to develop. Paul Collier identifies for such traps: the conflict trap, the natural resources trap, the trap of being landlocked with bad neighbors, and the trap of bad governance in a small country. Globalization has created new ones stemming from the rich countries enforcing international institutions that favour them.
- 70. In-built tendency of economic systems to collapse.** Economic institutions and solutions that are successful in the short run are most likely to fail or create fatal environmental problems in the long run, as those institutions and solutions did not anticipate all the environmental changes that they themselves will cause.

- 71. Tainter's theory of collapse** (Joseph Tainter, 1988). Investment in complexity is a problem-solving strategy for societies. The cost of maintaining complexity (in terms of resources and energy) increases with the complexity level. But complexity exhibits decreasing marginal benefits: the return to additional complexity is each time smaller. As a result, for a given technology level, there is some amount of complexity beyond which the cost is insurmountable and society cannot sustain the complexity level and collapses.
- 72. A lesson of history?** The parallelism of ideas, processes, and developments in different civilizations from the past suggests that, in the presence of certain general conditions, human societies tend to grow bigger, more complex and more environmentally demanding.
- 73. The price of progress** (or the price of not collapsing). "Each time history repeats itself, the price goes up" (Ronald Wright, 2011). Progress allows civilizations to become bigger. More people may indeed be needed to run a more complex civilization and make it more durable. But then, when it fails, more people is affected (the fall of the first civilization, Sumer, affected hundreds of thousands; the fall of Rome, millions; ours, billions).
- 74. Herman Daly's impossibility theorem.** "It is impossible for the world economy to grow its way out of poverty and environmental degradation. In other words, sustainable growth is impossible".
- 75. Corollary to Daly's Impossibility Theorem of unlimited economic growth in a limited environment** (Fred Magdoff and John Bellamy Foster, 2011). "The continuation for any length of time of capitalism, as a grow-or-die system dedicated to unlimited capital accumulation, is itself a flat impossibility."
- 76. Any good systems eventually goes bad (institutional diseases).** There is always the danger/temptation that institutions could be used for purposes different from the ones that motivated their creation. People in charge of powerful institutions may be tempted to abuse the power bestowed on the institutions. How could that be prevented? As any good institution may be turned bad, it is not just having good institutions but also preventing them from abuse.
- 77. The Peter Principle** (Laurence J. Peter, 1969). "In a hierarchy every employee tends to rise to his level of incompetence. Work is accomplished by those employees who have not yet reached their level of incompetence."
- 78. The paradox of development** (Ian Morris, 2010). "Rising social development generates the very forces that undermine further social development (...) Success creates new problems; solving them creates still newer problems."
- 79. Paradoxical nature of democracy** (David Runciman, 2013). Democracy is trapped by its own success. Democracies have been proved capable of winning wars, recovering from economic depressions, addressing environmental issues, handling social discontent, stimulating technological progress, outperforming rival political systems... Yet, no matter how successful democracies have been, there are always constant worries that the system is in crisis and about to be replaced by some rival. "The factors that make democracy work successfully over time— the flexibility, the variety, the responsiveness of democratic societies— are the same factors that cause democracies to go wrong. They produce impulsiveness, and short-termism, and historical myopia. Successful democracies have blind spots, which cause them to drift into disaster. You cannot have the good of democratic progress without the bad of democratic drift. The successes of democracy over the past hundred years have not resulted in more mature, far-sighted, and self-aware democratic societies. Democracy has triumphed, but it has not grown up."
- 80. Moravec's paradox** (Hans Moravec) or the paradox of robotic progress. "It is comparatively easy to make computers exhibit adult-level performance on intelligence tests or playing checkers, and difficult or impossible to give them the skills of a one-year-old when it comes to perception and mobility."
- 81. Technological unemployment.** Unemployment by machines being able to do any job people can but cheaper, faster and better. It is the result of a new division of labour between people and machines/computers: people now are restricted to take jobs that machines or computers cannot do rather than vice versa.
- 82. Skill-biased technical change.** It is the one favouring the employment of skilled workers. It simultaneously tends to decrease the employability of unskilled workers and widen the gap between what skilled and unskilled workers earn.
- 83. Race between technology and education.** Income inequality between workers tends to fall when education levels increase, whereas it tends to grow in the presence of rapid technological change (of the skill-biased type).
- 84. Moore's law** (Gordon Moore, 1965): computing power doubles approximately every 18 months. (Intel's smallest transistors up to mid-2017 was the 14 nanometer Skylake model, a human hair being 100,000 nanometers thick.)
- 85. Technological singularity.** It is commonly associated with the emergence of the first artificial general intelligence, that is, machines capable of performing any intellectual task that an adult human can. The optimistic view of the singularity holds that a superintelligent artificially could solve all the problems humanity faces, so that we would live happily ever after.

86. Calum Chace's economic singularity. An event likely to occur before the technological singularity, consisting in the replacement of capitalism (and probably liberal democracy) as a result of the unfolding of the digital revolution (one of its consequences being technological unemployment of a hitherto unknown magnitude).

87. The Thucydides trap (Graham Allison, 2017). "It was the rise of Athens and the fear that this instilled in Sparta that made war inevitable." When a rising power threatens to displace a ruling power, armed conflict becomes the most likely outcome. Now China and the United States appear to be have fallen into the trap.

88. Ian Bremmer's G-Zero world. "A world order in which no single country or durable alliance of countries can meet the challenges of global leadership." Bremmer does not regard G-Zero durable and offers the four geopolitical scenarios shown on the right, where 'Concert' is a situation where something like the current G20 actual works, G2 is US+China and 'World of Regions' defines a multipolar world.



89. Ian Bremmer's G-Subzero world. A world in which "leadership weakens and power fragments inside individual countries, control is divided between local and central leaders, and competition arises among power brokers within individual states."

90. Convergence. Presumption that technological progress forces social changes, that those changes are inevitable and that (regardless of history, cultural particularities, national ideologies and practices) societies will become more alike in their basic organization and convergence also in standards of living. The only difference is the speed at which societies reach the common destination.

91. Free trade myth. Developed (high-income) countries have not adopted free trade policies to become developed but protection: development has been sponsored by the state. Only after having developed the economy that free trade policies have been supported.

92. Death of conflict. Idea that the adoption of a core of values and principles will bring social conflict/tensions to an end. Societies become like markets, where interaction/competition is peaceful. The 'rationality' of technology spreads to the social world: social problems can be solved 'technically', technocratically. In the end, a stable social order is reached and the interests of all the groups are reconciled. Globalization is said to dissolve the sources of social and political conflict.

93. The Anthropocene (Paul Crutzen and Eugene Stoermer, 2000). A geological epoch (beginning around 1750 with the start of the Industrial Revolution and coming after the Holocene) defined by the ability of humans to modify the global environment significantly even in the short-term.

A Fermi Question: How Many Communicating Civilizations Exist?
 Represent the number of communicating ETCs in the Galaxy by the symbol N . To estimate N we first need to know the yearly rate R at which stars form in the Galaxy. We also need to know the fraction f_p of stars that possess planets and, for planet-bearing stars, the number n_e of planets with environments suitable for life. We also need the fraction f_l of suitable planets on which life actually develops; the fraction f_i of these planets on which life develops intelligence; and the fraction f_c of intelligent life-forms that develop a culture capable of interstellar communication. Finally, we need to know the time L , in years, that such a culture will devote to communication. Multiplying all these factors together will provide us with an estimate for N . We can write it as a simple equation:

$$N = R \times f_p \times n_e \times f_l \times f_i \times f_c \times L.$$

94. The Drake equation (Frank Drake). Displayed in the box above, the equation is an attempt to estimate for the number of extraterrestrial technological advanced civilizations with which we could communicate.

95. The Fermi paradox (Enrico Fermi). On Earth life has shown a tendency to expand everywhere and become increasingly more complex. Presuming extraterrestrial life to have this same tendency, after billions of years of existence, our galaxy should be full of technologically advanced civilizations. Yet we see no evidence that such civilizations exist or have existed. The paradox appears to be that we are alone in the universe.

96. Challenges of globalization. (1) Challenges from the material-technological side (automation, resource exhaustion, environmental degradation, sources of energy). (2) Challenges from the socio-political side (ideologies, inequality, divergence, global governance). These challenges also emerge from the tension between material sustainability (the economic reality moves forward, is restless, accepts change, sees no limit) and social stability (the socio-political reality tries to rest, do not move, avoid or prevent change, be conservative). The future of the global economy and the planet appears to depend on the ability of two fields to co-evolve: science/technology and politics. It seems that we have learned to have some control over nature but remain incapable of controlling ourselves.

97. The ultimate question. The point is not just what is technologically possible but rather what is socially sustainable.