1ST « CLIOMETRICS AND COMPLEXITY » CONFERENCE
ECOLE NORMALE SUPÉRIEURE DE LYON 9-10 JUIN 2016

IS ECONOMIC GROWTH BIOLOGICALLY DRIVEN?

A HISTORICAL ANALYSIS OF RECENT DEVELOPMENTS IN CLIOMETRICS OF GROWTH

Pierre LEVIAUX
Université Lumière Lyon 2
Laboratoire Aménagement Economie Transports

June 10, 2016

Contact: pierre.leviaux@laet.ish-lyon.cnrs.fr

Introduction

- Historically, exchanges between Biology and Economics have been numerous, and a great source of controversy.
- This controversy continues today through the work of two cliometricians, i.e. Robert William Fogel and Oded Galor.
- These exchanges have taken different forms which have mainly been described as "analogies", "metaphors" and "reductionism" (Hodgson, 1997; Khalil, 1998).
- One of the main characteristics of both Fogel's and Galor's most recent theories of economic growth is that they lean on biological explanations. **They both try to understand how biological factors can have an influence on economic development and growth.**

Outline

Objective: Understand the genesis of these two approaches and to analyze the epistemological stances which support them.

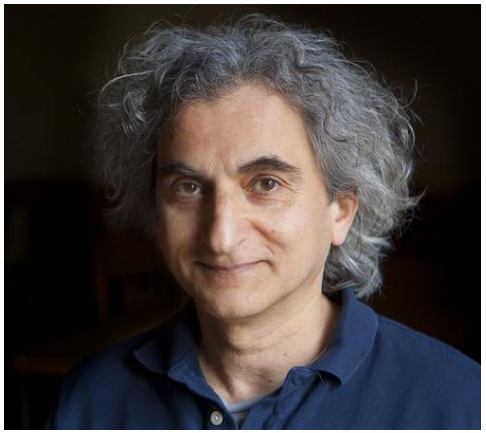
5 sections:

- Presentation of these two authors and of the similarities of their approaches and some of the challenges that are associated with them.
- Main elements that can be drawn from the history of their work.
- What does this analysis tell us about the **epistemological stances** of Fogel & Galor? Can it help to understand some of the limits that we identified in previous work?
- Does it tell us something about **some of the practices in economic history that we may reflects upon**?
- Concluding remarks.

Fogel and Galor : two major cliometricians

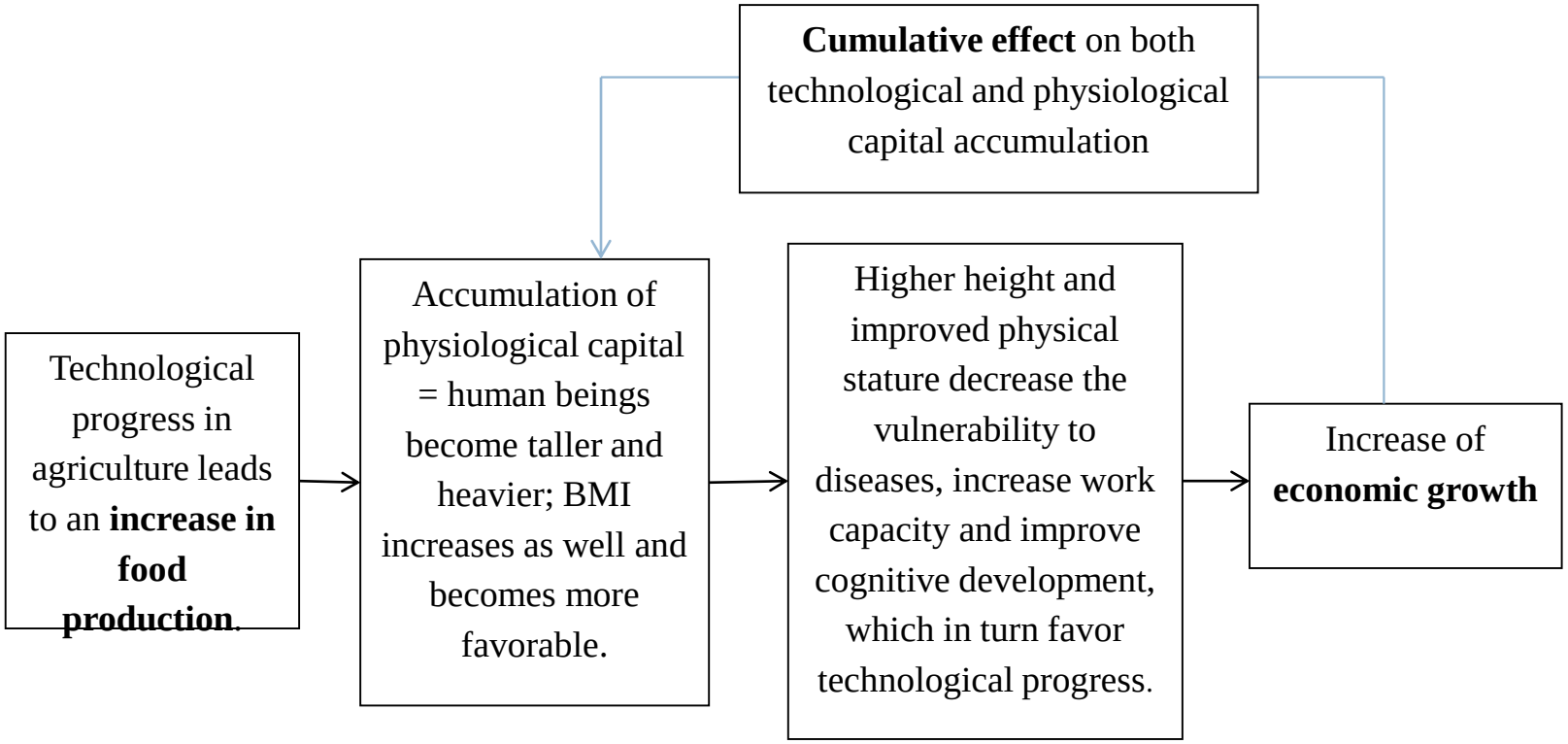
- **Robert William Fogel (1926-2013)**
- Nobel Prize in Economics in 1993 (along with Douglass North), for his pioneering work in cliometrics.
- Three main periods in his academic career:
  - « Railroads » period (1960-1968)
  - « Slavery » period (1968-1989)
  - « **Nutrition and living-standards** » period (1982-2013)

- **Oded Galor (1953-)**
- First and foremost a theorist, but he is increasingly present and influent within the field of cliometrics.
- Founder of the *Unified Growth Theory* .



Fogel's physiological approach

Simplified diagram illustrating the "Technophysio evolution" process (Fogel et Costa, 1997)



Fogel's physiological approach (2)

- Fogel's biological assumptions:
  - (1) The height of an individual reflects his nutritional past, and the mean height of a population reflects its past nutritional experience (Fogel, 2012, pp. 72–73). This means that height measurements, at both individual and group levels, are primarily used as a **proxy for nutrition**.
  - (2) The relationships between height, weight, BMI and both the prevalence of infectious and chronic diseases and life expectancy suggest that the movement towards an optimal height and BMI can be used as a **good proxy for health improvement.**
  - (3) **Metabolism** primarily **depends on an individual's size.** Hence, if height data are not available, it is possible to estimate them based on agricultural production data. Reciprocally, if food production levels and the mean-height of the population are known, one can deduce the amount of energy that was available for work.

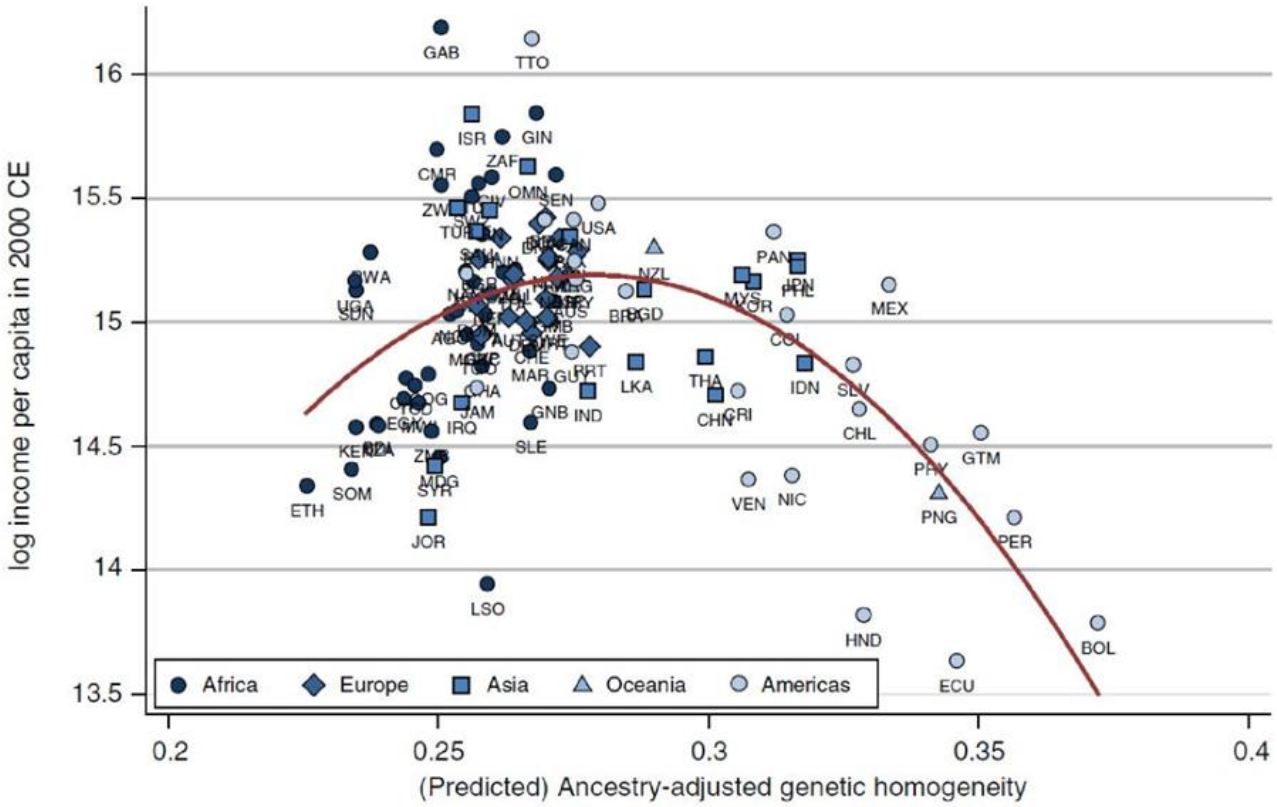
Galor's genetic approach

- Ashraf & Galor, « *The 'Out of Africa' Hypothesis, Human Genetic Diversity and Comparative Development* », *AER*, 2013.
- They seek to understand **whether the observed differences between countries in terms of economic growth can be explained by differences in genetic diversity.**

- Ashraf & Galor's data :

- Levels of genetic diversity of non-coding DNA sequences for each countries,
- GDP per capita,
- An indicator of conflict: « interpersonal trust »,
- An indicator of innovation: « scientific articles ».

Galor's genetic approach (2)



The hump-shaped effect of genetic diversity (abscissa: lower values represent higher genetic diversity) on income per capita (ordinate)

Source: Ashraf & Galor 2013

Galor's genetic approach (3)

- Genetic diversity of non-coding DNA sequences is then considered as a major determinant of economic growth, through two channels:
- Firstly, **higher genetic diversity** tends to have an adverse effect on economic development, for it favors conflict and distrust, hence diminishing productivity. On the other hand, higher genetic diversity favors innovation.
- On the other side of the spectrum, **lower genetic diversity** also affects economic development for it reduces innovation and technological advances, hence damaging productivity. However, lower genetic diversity favors trust and cooperation (Ashraf & Galor, 2013, p.2-3).
- Given **the existence of these conflicting effects** of genetic diversity on economic growth and development, Galor concludes that there is a trade-off between beneficial and harmful effects. In other words, **there exists an optimal level of genetic diversity which mitigates these conflicting effects and leads to the highest levels of economic growth** (see Ashraf & Galor, 2013, p.7 and 42)

Methodological critique (Leviaux & Parent 2015)

- **Fogel: too many approximations**
  - Height, weight and BMI are very complex traits (genetic factors, nutritional factors, personal history, etc.)
  - It is impossible to infer the health status of an individual through the sole examination of his anthropometric measurements.
  - Current knowledge in biology challenges the three major approximations which support the theory of *technophysio evolution*.
  - Finally, since humanity is characterized by both important phenotypic variability and plasticity, Fogel's mechanisms can hardly be generalized to all human populations, neither to all historical periods.
- **Galor: a biological inaccuracy**
  - Galor's reasoning does not lean on any established genetic mechanism: there is no functional link between phenotypic traits and the diversity of non-coding DNA sequences.
  - *A fortiori*, the same diversity cannot be associated with more complex traits such as conflict abilities, innovative capacities or the contribution to economic growth.
  - Another problem: lack of data (his genetic data are predictions).

Historical analysis

- **Methodology**: primary literature and interviews with some of the scholars who worked extensively with Fogel (i.e. Deirdre McCloskey, Robert Margo, Richard Steckel, Dora Costa and Stanley Engerman), and an interview and email exchanges with Oded Galor.
- **Objective**: understand how this work emerged and develop, and what some of the epistemological conceptions of the authors are. In other words, can we explain part of the construction of these two approaches as resulting from the epistemology of their authors?
- On the epistemological side, 2 main questions:
  - What are their respective positions towards the exchanges between economics and biology?
  - What is their conceptions of empirical approaches and of what it means to build a scientific approach of empirical studies.

Main results

- Genesis of the work:
  - Fogel: really influenced by his previous work on slavery. His interest in height started at the time of the huge debate around *Time on the Cross* (1974). At the beginning he only thought about height as a proxy for mortality and rather quickly for nutrition. The economic growth theory of techno-physio evolution came much later, from 1994 onwards.
  - Galor: wanted to test a previous hypothesis he had on the role of cultural diversity as a determinant of the differences observed between Europe and China in terms of economic growth and development (Why Europe prior to China?). He thought that one possible way to test this hypothesis was through genetic diversity. He has now engaged in a deepening of this research.

Main results

- Epistemological stances
  - Towards scientific reasoning and empirical studies:
  - Fogel's approach to empirical analysis is based, to a certain extent, on evidential pluralism (see Reiss 2015). Dora Costa: "*he always tried to be the master of constituency, i.e. having every piece of evidence showing the same thing*". Moreover, the range of academic journals that Fogel subscribed to was extremely large, in history, economics and applied mathematics, and to a lesser extent biology.
  - Galor's approach is basically based on a technical mastery of statistical methods. According to him, he has a theory, he tested it and it is very robust. "*Economists are really trained to think about identification, and we are thinking very seriously about the issue of the separation between correlation and causation*. […] *I wish that the scientific disciplines will treat empirical research as we do in economics"* (Galor, personal communication).

Main results

- Epistemological stances
  - Relationship between economics and biology: none of them has a very sophisticated stance with regard to that question. For instance none of them considers himself as a heir of the long tradition of exchanges between the two disciplines (neither in Darwin/Malthus terms, nor in Darwin/Spencer terms, nor Marshall's Mecca, nor Hirschleifer/Tullock/Becker attraction to Wilson's sociobiology).
  - Towards interdisciplinary research:
    - Fogel has a open-minded view: he often rest upon the expertise of biologists and epidemiologists (James Tanner, Nevin Scrimshaw or Ray Martorell), even if he does not always get a full understanding of the biological aspects (Steckel, personal communication).
    - The case of Galor is somewhat different: his conception of what could be a useful and desirable cooperation between biologists and economists is actually based on a division of labour. According to him, biologists, as historians, are "in some sense producing data" (Galor, personal communication". "[they] have a comparative advantage in uncovering the data, and we [economists] have a comparative advantage in using the data to theorize about the world" (Galor, personal communication).

Concluding remarks (1)

- Galor's approach is much more problematic than Fogel's approach.
- The main problem with Galor's view is that he does not seem to understand that the way in which one defines his research topic is absolutely decisive as for what one will be able to think about it.
- In other words, scientific questions always emerge in a constructed environment, i.e. an existing configuration of knowledge.
- This means that Galor is actually right when he highlight that evolutionary biologists and economists do not have the same insights, but the real interesting question is rather which insights are likely to be the most relevant, should one plans to study the relationship between the diversity of non-coding DNA sequences and social and economic traits such as the propensity to conflict, innovation or cooperation.
- With regard to the neutrality of statistical methods: Galor relies much more on the use of tests of statistical significance than Fogel. It does not necessarily tells us a lot about economic significance of the mechanisms supporting these theories (see Ziliak & McCloskey 2008 and recent ASA's statement on p-values which was released in February 2016)

Concluding remarks (2)

- Two last points that can be raised from this historical analysis of Fogel's and Galor's empirical approaches
- The **use of proxies**:
  - Height as a proxy for nutrition and for health status (Fogel)
  - Genetic diversity as a proxy for cultural diversity (Galor)
  - It has been hard to find a relevant literature or even guidelines about what the characteristics of a good proxy should be (correlation? Stability over time? Validity for different population? Necessity of a known mechanism?)
  - "*The major obstacle to the resolution of most of the issues in history and economics […] is the absence of data rather than the absence of analytical ingenuity or credible theories*" (Fogel, quoted by McCloskey).
- The **question of policy-making or political recommendations**:
  - The results can be used as a justification to certain policies (emphasis on nutritional education rather than better access to healthcare in the case of Fogel).
  - It raises the issue of the responsibility of economists: do we have a particular responsibility towards the society?
  - Our view is that we should always keep in mind that any endeavor in economic history has its forces and weaknesses. Therefore it is necessary to remain cautious when trying to interpret the results as justifications for policy-making.

Conclusion

- This research track down the genesis of the biological approaches of the dynamics of economic growth established by Fogel and Galor, and highlight the epistemological stances which support them.
- It proposes an explanation of the limits of the respective approaches of Fogel and Galor.
- It can provide useful insights to those interested in the exploration of the biological basis of economic phenomena.
- **Finally, it tends to argue that the resort to biological mechanisms, tools or concepts is not harmful in itself, but it requires specific skills. Otherwise it can lead to misinterpretations and abusive conclusions.**

- Thank you very much for your attention!
- All comments, critics, remarks are welcome and can be addressed to:

pierre.leviaux@let.ish-lyon.cnrs.fr