

SELECTION OF ONE PROFESSOR (LEVEL 1 - PROFESSORE ORDINARIO), FOR THE ACADEMIC RECRUITMENT FIELD 13/C1 STORIA ECONOMICA – ECONOMIC HISTORY (SECS-P/12 STORIA ECONOMICA) AT THE INSTITUTE OF ECONOMICS - ACADEMIC CLASS OF SOCIAL SCIENCES, RESERVED, PURSUANT TO ART. 24, SUBSECTION 6, OF ITALIAN LAW 240/2010, FOR ASSOCIATE PROFESSORS AND RESEARCHERS EMPLOYED AT THE SCUOLA SUPERIORE DI STUDI UNIVERSITARI E DI PERFEZIONAMENTO SANT'ANNA OF PISA, ISSUED BY RECTOR DECREE NO. 446/2017 DATED 16/07/2017.

FINAL REPORT

The year 2017 the 23rd day of the month of October at 3 p.m. met in a room of the Sant'Anna School to review the selection process for the recruitment of one level professor for Academic Recruitment Field 13/C1 Storia Economica – Economic History at the Institute of Economics – Academic Class of Social Sciences of the School, reserved for researchers employed at the School pursuant to art. 24, subsection 6 of Italian law 240/2010, the Committee nominated by the Rector with Decree No. 494 dated 15/09/2017, made up of:

- Prof. Anna Loretoni,
- Prof. Giovanni Federico;
- Prof. Steve Broadberry;
- Prof. Dan Bogart;
- Prof. Andrea Colli;
- Prof. Kerstin Enflo.

The Committee completed its work on the following days:

Preliminary meeting: on September, 25, 2017 via teleconference

Second meeting: on October 23, 2017 Proff. Loretoni, Colli, Federico in a room of the Sant'Anna School, Proff. Bogart,. Broadberry and Enflo via teleconference



The Committee held a total of 2 meetings, and began its work on September, 25, 2017 and concluded it on October 23, 2017.

In the preliminary meeting, the Committee nominated the President and Secretary. It was noted in the minutes that each member had declared that they had no kinship or affinity up to the fourth degree inclusive, either with each other or the candidate Prof. Alessandro Nuvolari. The Committee established the date by which their work would be concluded, the criteria for the assessment of the candidate.

In the second meeting the Committee examined the publications, the CV and the didactic activity of the candidate, and after a comprehensive discussion, by an absolute majority votes declared the following candidate to have won the position: Prof. Alessandro Nuvolari.

Read, approved and signed.

THE COMMITTEE

Prof. Giovanni Federico	President	
Prof. Anna Loretoni	Member	
Prof. Steve Broadberry	Member	
Prof. Dan Bogart	Member	
Prof. Kerstin Enflo	Member	
Prof. Andrea Colli	Secretary	

**ANNEX 1 – MINUTES OF THE SECOND MEETING
INDIVIDUAL ASSESSMENT**

CANDIDATE: ALESSANDRO NUVOLARI

S. BROADBERRY

See attachment (a)

K. ENFLO

See attachment (b)

D. BOGART

See attachment (c)

A. COLLI

See attachment (d)

G. FEDERICO

Alessandro Nuvolari got his PhD from the Eindhoven University of Technology in 2004 and Associate professor of Economic History at the SSSUP since 2009. His dissertation deals with the development of steam engines, with a doubly innovative approach. First, it stresses the collective and incremental nature of the innovation process, in contrast with the 'traditional' view of the innovation as the outcome of the individual genius (and thus to be rewarded with a patent). Second, and even more relevantly, it buttresses his view with a detailed quantitative analysis of the changes in the efficiency of engines and their causes. His research agenda has coherently developed from this brilliant start. He has published his main results in articles in economics and economic history journals (most notably his EHR 2009 article) and then he has branched in the analysis of innovation process in other countries and sectors. He has tackled the thorny issue of quality of patents by using the number of quotations in technical literature, he has measured the level of protection to plants breeding and its determinants in the last fifty years, and in more recent years he has worked on innovation in liberal Italy, publishing three important co-authored papers on independent inventors, on the geographical distribution of innovations, its causes (thus the role of education) and its effects on industrialization and on the quality of Italian technology. The overall quality of the work by A.Nuvolari is high: it shows a well-balanced mix of intensive research, reasonable hypotheses taken from economics literature without excessive technical modelling, and econometric testing when appropriate. This is the hallmark of good international practice. Indeed, this personal assessment of mine is supported by strong evidence. His international reputation as scholar of innovation is shown by participation to all major international conferences in economic history in recent years and by invitations to give papers and lecture in many universities all over the world. It is further confirmed by bibliometric parameters.



They are not very high if compared to other subjects, as economic history is a small field, with comparatively few papers and few quotations. Nuvolari's parameters are comparable to those of top international economic historian of his age cohort and are much higher than those of almost any Italian colleague. For all these reasons, I have no doubt he fully deserves a promotion to Professor (Professore di Prima Fascia).

A. LORETONI

Professor Loretoni, who does not belong to the academic discipline 13-C1, states that the qualities of the candidate are fully consistent with the criteria of excellence set by the Scuola Superiore Sant'Anna.



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22 October 2017

3151 Social Science Plaza
University of California
Irvine, CA 92697-5100

To the review committee of Alessandro Nuvolari:

I am happy to recommend Alessandro Nuvolari for promotion to professor. Alessandro's research has taught us much about the process of technological innovation and technological adoption during the British Industrial Revolution. Technological change is central to why the economic growth started in western Europe. Yet technological change is notoriously difficult to explain and many economic historians have given up trying to understand it. Alessandro is one of the few scholars that has relentlessly examined the process of technological change and provided new insights.

One of my favorite papers is on collective invention in high pressure steam engines. Alessandro argues that innovators freely exchanged information on how they made high pressure engines perform better. The free exchange arguably contributed to improvements in average engine performance in Cornwall. Such behavior is hard to explain. Alessandro identified an interesting possibility where innovators collectively owned assets whose value rose with greater innovation. It is a fascinating case study. I have taught this paper in my courses for over a decade and it is a huge hit with my students.

Alessandro has written several excellent papers on the British patent system. There is great debate in the literature on why inventors chose to patent and what patent statistics tell us about technological change in the economy. Alessandro has shown in his case study of the Brewing industry that many innovations are not patented and that patents are just as likely to be used to forestall entry by competitors. Alessandro argues that secrecy was more effective in generating returns to brewing inventors. The paper using Bennet Woodcroft's compendium of patents is also excellent. It is well known that counts of British patents increased sharply after 1750 and continued to grow thereafter. There is debate on exactly what this implied for technological change because patents can differ greatly in value. Alessandro and co-authors found a clever way of quantifying the value of patents using Woodcroft. The analysis supports the view that the mid-eighteenth century marked a significant turning point in the rate of *valuable* technological change.

Another important area of research concerns technology adoption. Here Alessandro has made contributions by studying the adoption of high pressure steam engines originating in Cornwall. The dominant view is that coal prices determined adoption of the engine. Essentially only areas with low coal prices could profitably use the early fuel hungry engines. Moreover, areas with low coal prices had no incentive to adopt more expensive high-pressure engines which saved on

coal. Alessandro's research questions these views. One paper uses the location of engines adopted between 1700 and 1800 and finds that coal prices only affected the adoption of early steam engines (the Newcomen type) and not later steam engines. There is also some evidence that mechanical skills were important in later engine adoption. Another paper shows that despite low coal prices in northern manufacturing areas, it was profitable to adopt high pressure engines. The fact that northern manufacturers did not adopt and retained the older low-pressure engines suggests that the process of technological adoption is imperfect and likely driven by a variety of local factors. Alessandro explores these local factors in much of his work.

Alessandro's also has several papers on innovation in Italy. I am less familiar with these works, but they are published in very good journal and are likely to be just as insightful.

In summary, I think Alessandro has shown research excellence. Explaining technological change is quite difficult and has challenged economic historians for a long time. Alessandro's research has expanded our understanding of this issue greatly.

Sincerely,
Dan Bogart,
Associate Professor,
Department of Economics, UC Irvine
dbogart@uci.edu





Assessment of Alessandro Nuvolari's research teaching and service achievements

Alessandro Nuvolari holds a PhD released by the Eindhoven University of Technology in 2004. He was appointed Associate Professor at the Scuola Superiore Sant'Anna, Pisa, starting in 2009.

Alessandro is a productive and promising scholar in the broad field of the history and economics of technology and innovation, a field which is expanding in the broader area of economic history. His main contribution in this area, which makes him close also with themes of social history, is to stress the collective dimension of the innovation process, in contrast with the widespread idea of the "individual geniality", which is, instead, seen as the product of a social environment. In Alessandro's research on collective invention, condensed in a number of influential papers (e.g. HER, 2009), the process is the outcome of social interaction and exchanges, which determines what is possible to define as a collective, open, and incremental process of innovation.

Starting from these intuitions, Nuvolari's research activity has assessed the issue of collective invention, and more in general, the history of innovation practices, in several industries and countries, in a very much coherent way. The outcome of this has been a consistent publication stream of articles and book chapters, published with prestigious presses.


Nuvolari's research method brings together the traditional analysis of archival sources and the capability of mastering quantitative analysis of large datasets. He is also able in providing generalizations, and opening new, and thoughtful avenues of research for other scholars, in this making a great service to the economic history field in general.

I know Nuvolari personally and I share with him the attendance in many scientific international avenues, without being his direct co-author; I can testify that Alessandro is a well respected member of the international economic history community for the quality of his work. In bibliometric terms, Alessandro Nuvolari is by far among the components of the top cohort of young economic historians at international level. With 1229 citations (October 2017) in Google Scholar he is by far among the most cited economic historians of his generation, in Italy and at the international level.

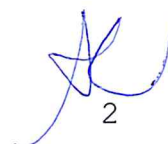
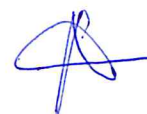
I have no direct information about his capabilities as teacher, but having attended a number of his presentations, I have no doubts about his capabilities. I have also had direct contacts with his former students at SSUP who confirm my understanding of his qualities.

For these reasons, I fully endorse his promotion to Full Professor (Professore di Prima Fascia).

Andrea Colli



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Lund 2017-10-18

LUNDS
UNIVERSITET

Department of Economic History
Kerstin Enflo
Associate Professor

Candidate Alessandro Nuvolari

Dr. Nuvolari has contributed to the international academic community with several highly original and methodologically rigorous publications. The articles are published in top-ranked economic history journals as *Journal of Economic History*, *Explorations in Economic History* and *Economic History Review*. Dr. Nuvolari has also published in high ranked journals outside of the field Economic history, such as *Research Policy*. This shows the high impact of Nuvolari's research both within and outside the field. Nuvolari has contributed with novel methods, for example in assessing patents citations in historical data. He shows remarkable methodological skills in that he has created databases on patents, steam engines and has constructed growth indexes by using demand-side approaches. He is one of the most renowned experts on British economic growth and technical change, a core topic of analysis for economic historians since "why Britain industrialized first" is one of the most challenging and important questions to researchers in our field. But Nuvolari also demonstrates a broad knowledge in several aspects of the history of technological development for Italy and France. His research is independent and highly novel and original and having worked with several different countries and period, he has the ability to compare results between regions and gauge the importance of various factors using comparative methods. Nuvolari has also collaborated with several researchers on the international scene, which demonstrates his strength as an international scholar and should be highly valued. Nuvolari is a driving force in such collaborations and has contributed with substantial input in his collaborations. Nuvolari is a regular participant in the main international conferences, where he participates with presentation of utmost quality and contributes to the academic scholarly environment in many aspects. Dr. Nuvolari has more than 1000 citations at Google Scholar, which is a considerable number for an economic historian. Again this documents the strong research profile of Nuvolari's work.

His research fits perfectly with the consistency of the themes of research (Economic History) for which the post has been called.

Do not hesitate to contact me should you have any questions.

Kerstin Enflo
Associate Professor in Economic history
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8 October 2017

Assessment of Alessandro Nuvolari

Alessandro Nuvolari is one of the world's leading economic historians of innovation and technological progress, who easily meets the criteria for promotion to professor in the field of economic history. He has an excellent record of publication in the "top 5" leading international journals of economic history, including the *Journal of Economic History*, *Economic History Review*, *Explorations in Economic History*, *European Review of Economic History*, and *Cliometrica*. He has also published a number of influential papers in the leading journals of innovation policy, including *Research Policy*, *Economics of Innovation and New Technology*, *Industrial and Corporate Change*, and *Journal of Evolutionary Economics*, demonstrating his ability to relate his historical research to contemporary issues.

Nuvolari's articles are based on an impressive mixture of quantitative economic methods and detailed historical knowledge. This is well illustrated by his most highly cited article, on "Collective invention during the British Industrial revolution: the case of the Cornish pumping engine", published in the *Cambridge Journal of Economics*. Often, sustained technical progress is thought to require patent protection to provide the incentives for research and development, but Nuvolari shows that in the case of the Cornish pumping engine in the first half of the nineteenth century, mining engineers shared information amongst themselves to produce a period of increasing efficiency. This dynamic period of collective invention followed a protracted legal dispute with Boulton and Watt over high patent fees. This important paper has garnered 326 citations on Google Scholar, while Nuvolari has accumulated a total of 1224 citations, 758 since 2012.

Alessandro Nuvolari is highly respected amongst the international economic history community. He is managing editor of *Rivista di Storia Economica*, and also an associate editor of several other international journals. He has also organised, as well as attended, a large number of conferences. In short, he is a great scholar who deserves to be promoted to full professor.

Yours sincerely

Stephen Broadberry
Professor of Economic History, Oxford University

or *St.* *St.*

ANNEX 2 – MINUTES OF THE SECOND MEETING

COLLECTIVE ASSESSMENT

Alessandro Nuvolari holds a PhD released by the Eindhoven University of Technology in 2004. He was appointed Associate Professor at the Scuola Superiore Sant'Anna, Pisa, starting in 2009. There he has taught courses in the Age of Revolutions, Economics and law and Italian Economic History for School students, Economic growth in history (MsC Economics), Economic history for the PhD program of the School, which he is co-ordinating. Nuvolari's courses have been highly rated by the students and this shows the quality of the candidate's teaching skills.

Nuvolari's research has taught us much about the process of technological innovation and technological adoption during the British Industrial Revolution. Technological change is central to why the economic growth started in Western Europe. Yet technological change is notoriously difficult to explain and many economic historians have given up trying to understand it. Alessandro is one of the few scholars that has relentlessly examined the process of technological change and provided new insights.

He started his highly innovative research agenda in his PhD dissertation on the development of steam engines. He published his most highly cited article (326 citations on Google Scholar as of now), "Collective invention during the British Industrial revolution: the case of the Cornish pumping engine", in the *Cambridge Journal of Economics* in 2004. He shows that mining engineers shared information amongst themselves to produce a period of increasing efficiency. This stress on the collective and incremental nature of the innovation process, in contrast with the 'traditional' view of the innovation as the outcome of the individual genius, is a major result in the history of innovation. It raises doubts about the conventional wisdom about the need for patent protection to provide the incentives for research and development. Indeed the period of collective invention could start only after the end of a protracted legal dispute with Boulton and Watt over high patent fees. In another paper from his dissertation, co-authored with B. Verspagen and published in the *Economic History Review* (2009), Nuvolari succeeded to measure the improvement in efficiency of engines and its causes.

After the dissertation, Nuvolari has continued to investigate technical progress in England and elsewhere in the world. He has measured the quality of patents by using the number of quotations in technical literature in his paper with V. Tartari (*Explorations in Economic*

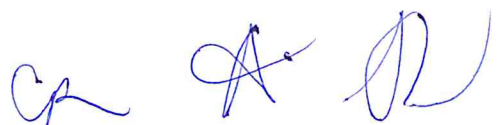
History 2009). In a very recent paper with M.Campi (*Research policy 2015*) he has estimated the extent of protection to plant breeding technology in the last fifty years and he has explored its determinants. In more recent years, Nuvolari has started to work on innovation in liberal Italy. He has already published three important co-authored papers on independent inventors, on the geographical distribution of innovations, its causes (thus the role of education) and its effects on industrialization and on the quality of Italian technology. Other works are on-going.

Nuvolari's research is independent and highly novel and original; having worked with several different countries and period, he has the ability to compare results between regions and gauge the importance of various factors using comparative methods. Thus he is now among the World's leading economic historians of innovation and technological progress. Overall, he has an excellent record of publication in the "top five" leading international journals of economic history, the *Journal of Economic History*, *Economic History Review*, *Explorations in Economic History*, *European Review of Economic History*, and *Cliometrica*. He has also published a number of influential papers in the leading journals of innovation policy, including *Research Policy*, *Economics of Innovation and New Technology*, *Industrial and Corporate Change*, and *Journal of Evolutionary Economics*, demonstrating his ability to relate his historical research to contemporary issues. He is also prolific writer of books chapters, published with prestigious presses. Many of these papers are co-authored: he has been a driving force in such collaborations, contributing with substantial inputs. The extent and geographical scope of his collaborations show Nuvolari's strength as an international scholar and should be highly valued in his collaborations. He is highly respected amongst the international economic history community. Nuvolari is a regular participant in the main international conferences, with presentation of utmost quality and contributes to the academic scholarly environment in many aspects. He has received several international grant, most notably the 6th Framework program and ISI growth innovation for the 2020 Horizon program. Last but not least, is managing editor of *Rivista di Storia Economica*, and also an associate editor of several other international journals. His international standing is also confirmed by the fact that Alessandro has been also awarded by a Marie Curie fellowship, and several other prizes.

His impact on the field is shown by his Google Scholar quotations. The total (1224 citations, 758 since 2012) may not seem high if compared to other subjects, but economic history is a small field, with comparatively few papers and few quotations. Nuvolari's parameters are comparable to those of top international economic historians of his age cohort.



For these reasons, this Committee fully endorses his promotion to Full Professor (Professore di Prima Fascia).

Three handwritten signatures in blue ink, arranged horizontally from left to right. The first signature is a cursive 'CP', the second is a stylized 'A', and the third is a cursive 'D'.