

**ERC Advanced Grant 2016  
Research proposal [Part B1]**

**Did elite human capital trigger the industrial revolution?  
Insights from a new database of scholars from European  
universities and academies**

**UTHC**

**David de la Croix**

**Université catholique de Louvain**

**Proposal duration in months: 60**

**Field: SH1\_14 Quantitative economic history; institutional economics;  
economic systems**

Our aim is to determine whether elite knowledge and upper tail human capital (UTHC) were critical in triggering the rise of the West. We propose to build a database of a large sample of university professors and members of academies in Western and Northern Europe over the period 1400CE-1850CE. This database will integrate and harmonize the existing university specific databases, include the information available from published books and from electronic resources, and be completed by in depth research in universities for which the data is not yet available. To measure quality of scholars we will match this database with the existing databases of published books and historical biographies.

Second, we will exploit the variation in the density, composition and quality of UTHC across time, space, fields, and the variation in longevity and migration of UTHC to measure the correlation between UTHC and the adoption of new techniques and better institutions, and the development of cities. We will perform causal identification using both instrumental methods and exogenous variations in the creation of universities and in the density of UTHC.

Third, we will develop and test a new theory of the complementarity between elite knowledge and artisanal techniques, in order to identify departures from the efficient allocation of talents in the short and long-run. A second new theoretical model will be devoted to revealing the dynamic interactions between conservative and modern forces within universities and learned societies; the key trade-off here is between keeping the old thinking (satisfying vested interests) and developing new approaches and fields, allowing scholarly elites to change culture and promote economic development. We finally measure the relative importance of these theoretical mechanisms and how intellectual elites and society interact with our database.

Finally, the resulting database will be made openly available to researchers and the civil society.

### **Section a: Extended Synopsis of the scientific proposal**

The industrial revolution in Europe unleashed an economic and social transformation never experienced before by any society since the Neolithic Revolution. What happened around 1800 was deeply rooted in history. Many authors have searched for the profound causes of the “Rise of the West”: Landes (1998), Maddison (2001), Clark (2007), Mitterauer (2010), Galor (2011), Mokyr (2009, 2016), among others. For most of them, self-reinforcing dynamics of technological progress played a key role. The outstanding debate concerns the key forces that made these virtuous circles possible.

The degree to which the long march of history is driven by a “vital few”, such as emperors, religious leaders, and great inventors is disputed. It is particularly controversial as far technological progress is concerned. Were individuals such as Newton, Galileo, Kepler, and Vesalius really needed for the industrial revolution to finally happen? Is it true, as Mokyr (2016) wrote, that in a market economy it is the few that drag along the many?

In this project the objective is **to analyze in a quantitative way whether elite knowledge and upper tail human capital (UTHC) were critical to the triggering of the rise of industrialization in the West**. This is currently actively disputed in the literature. One view leans towards considering innovation as being driven essentially by UTHC – those scientists and mathematicians, who pushed the envelope of propositional knowledge, which is then applied. For example, Mokyr (2002) suggests that a small group of at most a few thousand people became the main actors, who showed the way for the Industrial Revolution. This view is shared by Jacob (2014) and Wootton (2015). The opposite view sees innovations as being driven by artisanal knowledge, which gets improved over time through learning-by-doing and the occurrence of improvements through trial-and-error and serendipity. Formal and codified knowledge plays no role in this model. For example, pre-modern cathedrals were built with heuristic rules of thumb rather than by using pre-established plans and engineering calculations (Epstein, 2013). This view suggests that the seedbed of revolution rests with craftsmen rather than with scholars, in university-less London rather than in Oxford, or in Lyons, not in Paris etc... (Porter 1996). The rising artisanal skill levels and the high level of innovation among the most sophisticated craftsmen alone are seen as having fostered the Industrial Revolution, without the help of elite, codifiable, knowledge and formal science. A third approach promotes the importance of the indirect effect of Elite knowledge. The latter triggered a cultural change in the period 1500-1700, which made the population, or at least part of it, ready to invent, accept, and promote the modern world. This thesis is defended in the recent book by Mokyr (2016): the Enlightenment in the eighteenth century was pivotal in driving the economic growth in the nineteenth century, but it was not a mass phenomenon. *"It was an Elite phenomenon, confined to intellectuals, scholars, ..."*

There are currently no global quantitative analyses of the historical effect of UTHC on the dynamics leading to the industrial revolution. Country level studies include Squicciarini and Voigtländer (2015) and Dittmar, and Meisenzahl (2016). Squicciarini and Voigtländer (2015) show that the number of people who subscribed to the Diderot’s and d’Alembert’s Grande Encyclopédie in eighteenth century France predicts economic development later on, both at the city and the county level. Dittmar and Meisenzahl (2016) show that German cities, who adopted better institutions following the Reformation, displayed more people recorded as famous in the German biography database and grew faster at the same time. Although very innovative, these studies are confined to either France or Germany and rely on only limited data.

To take the debate to a new level, we propose, in a first step, to build a database of a large sample of university professors and members of scientific academies in Western and Northern Europe from the creation of the first universities to the Industrial Revolution. Eventually, the database will be used to develop new theory and undertake empirical studies that will be used in combination with each other to address the same questions. This database will be unique, as it will link scholars to the places where they actually worked and interacted (universities and academies). The current state of the art either uses databases on a selection of people from the elite (often mixing scholars in with a large group of famous or noble people), or on university institutions, like Cantoni and Yuchtman (2014), or on the production of books, like Baten and van Zanden

(2008), who use data on book production as a proxy for the development of human capital.

The establishment of such a database will enable us to exploit the variation in the composition, density and quality of UTHC across time, space, and key fields **to establish the nature and extent of the correlation between UTHC and the adoption of new techniques and better institutions, and the development of cities**. It will also make it possible to perform causal identification by exploiting exogenous variations in the creation of universities and in the density of UTHC. But before going to the exploitation of the database, let us discuss the feasibility of the project.

Over the period 1500-1800, the number of universities in Europe rose from around eighty medieval universities to nearly two hundred (Frijhoff, 1996). This alone stresses the relative risk of the project, as we do not fully control ex ante how much time will be needed to gather a significant amount of data. But obtaining a coverage rich enough to evaluate and test significant variability across places, times and fields, and to identify mobility patterns, would already be a substantial achievement. We will limit the database to universities active during the period 1400-1800, and the database will include all professors in these universities born before 1800. We will start with Northern Europe, where a wealth of information is already available. We can quickly (in a few months) establish data for 10,000 professors by integrating and harmonizing existing data within a new structure that will make new lines of analysis possible. Indeed, for some universities, such as Groningen, Leiden, Leipzig, Rostock, and Utrecht, the list of professors has been established recently and has been made available on the web. This shows the interest of these universities themselves in looking at their past cultural and economic impacts in a more systematic way. Some universities have not yet established the list of their professors, but some authors, sometimes a century ago, have independently published a biography of them. This is true in Cambridge, Jena, Oxford, and Strasbourg, for example. A third category of universities has neither a ready-to-use website nor a published biography of their professors. Here we will need to undertake in depth research, combining knowledge from books written on their history with material based on their archives, such as *matricula* (persons registered at a given university) and *chartularia* (containing transcriptions of original documents related to the historical events of a university). Based on archive inventories, we will also occasionally get data from specific archives (for example, on nominations to courses).

Once the intermediary goal of reaching 10k scholars is achieved, we will then proceed in two directions (1) completing the database further by increasing the number of scholars covered from the core group of universities, and (2) enriching the database by incorporating data from other existing sources (such as on books published). Having reached this intermediate stage may require adjustments in the project planning, by either enlarging or reducing the space covered by the project. Ideally, we will enlarge the geographical range to the South in order to encompass Bologna and Padua (which were key at the end of the Middle Ages).

Universities only cover a subsample of the scholars and *litterati*. Worse, they were often accused of being an obstacle to modernity or of being completely irrelevant for the scientific revolution, as exemplified by Manuel (1968) about Cambridge and Newton: “*an intellectual desert, in which a solitary man constructed a system of the world*”. Examining the evidence for England more closely, Porter (1996) still found that a high proportion of the great names of early modern science made their career as professors in university employment. An exodus of scientists from the universities is well documented (Pedersen, 1996). Hopefully, we will find many of them contributing to the development of the newly created Academies. Initiated in Florence, the movement gained momentum in Northern Europe with the creation of the Académie Française (1635) and the Académie des Sciences (1666), the Royal Society of London (1662), and the Academia Leopoldina (1677). These Academies formalized in a way the Republic of Letters, which linked together small bands of intellectuals through a very effective network of publications. This transnational organization is viewed by Mokyr (2016) as a key engine of cultural change. Gathering information on all members of these academies since their inception is a feasible task as the information is readily available from the web. Merging all these records and adding the members of the learned societies in the core database, with special attention being paid to their field, will enable us to capture the shifts in focus following the humanistic revolution.

An important aspect of the core database will be the inclusion of data on the field of study. When universities emerged, there were four faculties, arts, law, medicine, and theology, each serving a particular sector of the society. Later on, when the needs of the society increased, some universities expanded the realm of their ex-

pertise, while others did not and became more and more obsolete. Humanism, directly followed by Protestantism, induced an expansion of the faculty of arts. Encoding properly the field of scholars will make it possible to quantify and map these changes in a very precise way and also to identify the ability of the various universities to adjust to and influence the changing world.

**To enhance the power of the core database, we will enrich it by integrating several elements.** Most importantly, we will add a measure the quantity and quality of the output of scholars and establish their migration patterns. We propose to measure the quality and influence of scholars by their book production. Data on books have been collected and harmonized by Buringh and van Zanden (2009) from various sources. As far as migration is concerned, the mobility of students and professors has been a key aspect of European universities since their beginning. Until the seventeenth century, all universities taught in Latin, which facilitated *peregrinatio academica*, academic pilgrimage (Rydder-Symoens, 1992). As our proposed database will integrate the records from a cross section of universities and academies and enable us to identify the patterns of migration for scholars in a systematic way, well beyond what is presently known for only the most outstanding individuals (for example, Desiderius Erasmus tutored in Paris, then Louvain, then Cambridge, before moving to Italy). The identification of these patterns matters for the mapping and understanding the dynamics of the diffusion of scientific and technical knowledge.

Compared to the existing literature on famous people, the proposed database will have unique advantages. Unlike most of historical demography (See Cummins 2014 for the *apogée* of this discipline), it will not focus on noble families, which might not be prime depositors of upper tail human capital. Compared to generalist studies of famous people (see de la Croix and Licandro 2015), we will target one precisely defined group, for whom we know the nomination date (hence we can compute the population) and the migration patterns. Finally, compared to studies based on electronic resources (a fascinating new study is by Gergaud, Laouenan and Wasmer 2016), we will focus on a specific group, using sources much more complete and reliable, while the migration pattern will be assessed by comparing samples from different universities.

I will now detail the way that we intend to use the new database to answer the core research question. But before, notice that once completed, the new database will then be made openly available for use in a variety of ways by the scientific communities in economics, demography and prosopography. It can be compared with other databases to deliver new insights. The database will also be available online for the civil society. Indeed, there is a large interest in many European universities in recording more systematically the history of the university, as many websites of universities witness. More generally, the database can be used to assess further how intellectual elites interacted with the society (still a very timely issue, with the rise and success of some anti-elite movements in this year 2016).

**The proposed database will first be used to establish to what extent UTHC is related to growth.** The aspects of UTHC we will focus on are: composition (by field and place of birth), density, quality and quantity of output, mobility, and longevity. The unit of analysis will be the city. An important strength of our methodology will be the capability to observe where the scholars have actually worked, which is not the case when one only knows the place of birth and the place of death. To measure outcomes, we will rely on existing sources, for example: Bairoch, Batou and Chèvre (1988) built a database of city population for almost all cities in Europe that reached 5k inhabitants before 1850. City growth is often used as an indicator of economic vitality. Dittmar (2011) compiles information from three different sources on the adoption of the printing press during its infancy period (1450-1500). DeLong and Shleifer (1993) built an indicator on whether cities were free or subject to the will of a prince. The integration of these sources will open up possibilities for radically new analyses of such issues, which have been considered separately in the past.

The proposed database will be rich enough **to address the question of the existence of agglomeration externalities and peer effects, or, in other words, whether the presence of particularly productive scholars increases the productivity of the other scholars around them.** We will thus challenge the external validity of Waldinger (2012) result, who found no evidence of such effects on 20<sup>th</sup> century data, using the dismissal of scientists by the Nazi government in 1933 as a source of exogenous variation in the peer group of scientists staying in Germany.

On the demographic side, we will apply nonconventional methods (in economics), to identify characteristic statistical patterns of the migration of scholars. Taking inspiration from Schich et al. (2014), we will provide **(1) a macroscopic view of the history of scholars and universities in those parts of Europe that were the crucibles of the industrial revolution and (2) document the historical trends of knowledge centres primacy beyond the scope of specific events or narrow time intervals that historians usually restrict themselves to.** Moreover, the large number of observations, as well as the knowledge of the age at which each scholar enters the population at risk (their age at nomination), will allow us to compute properly the life expectancy of scholars, and to measure correctly its standard error. Life expectancy can be computed for different regions and time periods, and correlated also to outcome variables.

The composition and density of UTHC are not, however, the whole story. Another, more subtle, channel linking elites to outcomes is through the contact time effect. In a world where face-to-face communication was essential for knowledge transmission and enhancement, the productive life of the elite should be long enough to give them enough time to significantly affect their environment. A formal link between productivity growth and longevity is implicitly provided by Lucas (2009). In his model, people learn ideas from the other people they meet. The more people they meet, the better they become. If they live long, they have many chances to become excellent, and they also give many opportunities for other people to learn from them. This effect of longevity on growth might quantitatively be sizeable, and this justifies why several authors have tried to assess changes in longevity of the elite before the industrial revolution (Cummins, 2014, de la Croix and Licandro, 2015). We will, however, be able **to go well beyond these studies, as we will know precisely where the scholars interacted and for how long.**

In exploiting empirically the database, we will have to address the issue of endogeneity of the localization of human capital that many other researchers have faced before us. The literature has adopted several strategies to deal with this issue. One is to use instrumental variable techniques to isolate the causal links. An alternative is to find a source of random variation, which modified the allocation of UTHC without altering other relevant unobserved variable. The creation of universities itself can be seen in some cases as a natural experiment. Why was there no university in London until 1836, and why were universities sometimes founded later in more important cities remain a mystery for the historians (Rüegg, 1992). Looking in details into the history of each university will provide valuable information to identify the possible sources of exogenous variations. Persecution by the authorities is a surprising ingredient in the foundation of new universities. This is what happened in Cambridge, with masters and students fleeing Oxford following the execution of a few students upon the order of the mayor and the king (Verger, 1992). The same pattern repeated in Paris in 1229-31, leading to the creation of universities in Orléans and Angers. The great Schism between the Pope and the Emperor is considered as having played a major role in the creation of universities and is treated as a natural experiment by Cantoni and Yuchtman (2014). Later, at the beginning of the modern period, the religious conflicts between Catholics and Protestants lead to major migration of skilled people (Scoville 1953), implying changes in the university landscape. The Huguenot diaspora and their migration to Prussia after the revocation of the Nantes edict is an example used in the literature (Hornung, 2014). One can also notice that several members of the French academies left after this revocation (but were still allowed to maintain written exchanges with their former colleagues, see Pederson (1996)). The decline of Louvain and the rise of Leiden in the Netherlands might also be evidence of a brain drain fleeing the Spanish Brabant.

**To further understand the mechanisms linking UTHC to technical progress, we will develop a new theory of the complementarity between elite knowledge and artisanal techniques.** We will then do the same for the complementarity between elites and the adoption of enlightened institutions.

Notice that, to model productivity growth, we cannot rely on existing explicit models of endogenous technological progress built on R&D efforts by firms, following the seminal papers of Romer (1990) and Aghion and Howitt (1992). While such models are useful for analyzing innovation in modern times, their applicability to long-run historical change is doubtful, partly because legal protections for intellectual property became widespread only recently. Instead, we need to build a new model on the assumption that productivity growth is based on the exchange of ideas from person to person, and that new ideas cannot be protected and therefore spread rapidly.

Concerning the first complementarity, the existing literature assumes a sort of substitutability between artisans and elites. For example, in my recent paper with Doepke and Mokyr (de la Croix, Doepke and Mokyr, 2016), we assume that apprentices acquire ideas from master craftsmen, but also get new ideas exogenously (maybe from contacts with the elite), and they implement the best of the two. **To go beyond this simple view and gain a greater understanding of the various complementarities between the dissemination of the creation of knowledge, we need to start from a model of person-to-person exchanges of ideas.** Extending the Lucas and Moll (2014) model to allow for two types of knowledge, with their own specificities, will be a good starting point. The key new contribution will be to model the “encounter” of artisanal and scientific knowledge (like spiral-spring balance inventors meet watchmakers, see Kelly and Ó Gráda, 2016), and its implications for the consecutive dynamics of technical progress. From the point of view of an authority, who has to choose between inviting craftsmen or scientists to his city, a key tradeoff will be between increasing artisanal knowledge and technical progress in the short-run, or instead paving the way for further major inventions in the long-run. The last step will be **to test the new model against data, combining information on the prevalence of scientific fields at the local level from our newly build database with available micro data on the adoption and price of specific products.** One value of using such a new structural model is to be able to generate predictions from “what if” scenarios.

With regard to the complementarity between elites and the adoption of enlightened culture and institutions, it should be recognized that the presence of learned institutions is a two edged sword. History shows cases where universities fought against novelty. This might arise because universities had a vested interest in the status quo, for example when the Scientific Revolution involved a series of repudiation of key Aristotelian dogmas (Porter 1996), which had been taught for centuries. A theoretical way to model this insight can be based on Acemoglu (2008). In his model, an oligarchic institution may initially enjoy a high rate of growth, but oligarchies also tend to extract rents and establish barriers to entry. Over time innovation inevitably moves from one location to the next, so that members of a sitting oligarchy do not remain at the frontier. Such a situation, where entrepreneurs (in our case, scholars) remain in place irrespectively of their productivity, is labelled a sclerotic equilibrium by Acemoglu. As many new universities emerged in Europe as corporations of masters and students (see Greif and Tabellini (2012) on why the adoption of corporations in Europe was much more attractive), they fit well Acemoglu’s oligarchic institutions. However, there are many cases where universities and academies favored modernity. **To model this race within universities between conservative forces and modernity forces we will see universities as firms offering several products (fields). Investing into the development of a new product line (faculty) makes university closer to the frontier but hurts the vested interests of the scholars working in existing fields.** We will also model the influence of adopting new fields on the culture of the rest of the society. The third ingredient of this model will consist in a feed-back effect from a more modern society on the tradeoff faced by universities between developing new fields and the interests of its scholars. **Such a new model of the dynamic interactions between conservative and modern forces within universities and learned societies will allow us to derive the conditions under which modernity prevailed and use the richness of our database to examine where and when it did so.** Moreover, by using the city level information described above, we will be able to gain new insights about the nature and extent of the indirect effect scholarly elites had on the development of the industrial revolution through affecting the openness to new ideas and the adoption of more flexible and productive institutions.

To conclude, the constitution of the database, and the development of empirical and theoretical researches relying on its wealth will allow for the first time to have a view on the role of UTHC in the rise of the West rigorously grounded on evidence, which can be reproduced, falsified, and developed further. Once having reached a critical amount of information, and having developed a structure and a methodology to address the measurement of UTHC, it will be easier to continue extending the database beyond the 60 months of the project, particularly by enlarging further its geographical coverage. Maintaining and extending this database will be a valuable research asset to me in my future research.

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**Section b: Curriculum vitae****PERSONAL INFORMATION**

David de la Croix

Belgian nationality. Born April 22, 1964.

website: <http://www.de-la-croix.be>

orcid.org/0000-0002-7589-8535

**EDUCATION**

1992: Ph.D. in Economics (Université catholique de Louvain) on “Union-Firm Bargaining and Equilibrium Unemployment in Quantity Rationing Models.” Director: H. Sneessens.

1988: Master of Arts in Economics (Université catholique de Louvain) with Magna cum laude.

**CURRENT POSITION(S)**

2005- : Full professor at Université catholique de Louvain

**PREVIOUS POSITIONS**

Invited professor at the University of California, Los Angeles (2000-2001), University of Copenhagen (2008), National Taiwan University (2009), University of Capetown (2012), University of Poznan (2015).

1995-2005: Research Associate at the National Fund for Scientific Research (Belgium).

1992-1993: Research Fellow at the Rijksuniversiteit Limburg (Maastricht).

1989-1993: Research assistant (1989-1993) and Post doc. Researcher (1993-1995) at the National Fund for Scientific Research.

**FELLOWSHIPS AND AWARDS**

2015-2017: International Panel on Social Progress

2014-2017: Francqui Research Professorship

2010-2013: United Nations: Panel on New Challenges in Population and Development (IUSSP)

2003-2004: Francqui Chair, Ghent University.

2000-2001: Fulbright research grant.

2000-2001: NATO research grant.

**SUPERVISION OF GRADUATE STUDENTS**

I firmly believe that the PhD students are the blood and flesh of any good department. Among the sixteen PhD students, who completed their dissertation under my supervision, eight work in research and teaching positions (among whom seven already permanent positions at university or in Central Banks research center), four are in executive positions (EU and World Bank). I am currently supervising seven PhDs (3 almost ready to complete).

16 Completed theses as promotor: Alexandra Rillaers (2000), Rafael Munoz (2000), Géraldine Mahieu (2002), Joao Medeiros (2003), Lionel Artige (2004), Fabio Mariani (2005), Tapas Mishra (2006), Carmen Camacho (2007), Alessandro Sommacal (2008), Davide Dottori (2009), Luca Marchiori (2009), Gül Ertan Özgüler (2010), Paolo Melindi Ghidi (2012), Paula Eugenia Gobbi (2013), Emeline Bezin (2015), Pierre Pecher (2016).

**INSTITUTIONAL RESPONSIBILITIES**

2015-2016: Member of scientific commissions of the National Fund for Scientific Research

2010-2015 : Member of the promotion committee (UCL).

2010-2014 : Member of the Research Council of the University (UCL)

2005-2010 : Director of the doctoral program in Economics, UCL.

### ACADEMIC ENTREPRENEURSHIP

When I started to work on long-run growth at IRES in the nineties, I was alone on that subject. Over the years, I participated with other colleagues to the transformation of IRES, a business cycle advising unit founded in 1928, into a modern research center publishing in the best journals. I lead the team on long-run growth and demographic economics, which now includes three permanent professors other than me, 3 post-docs and 15 Ph.d students.

Trying to get people of different horizon to work together is one of my aims. In 2008 I obtained a large grant for a joint project on “sustainability” between economists and applied philosophers of the Hoover Chair of economic and social ethics, promoting thereby a new interdisciplinary approach to long-term growth. In 2015, I obtained another large grant on “Family transformations”, now involving economists and demographers.

More information: <http://perso.uclouvain.be/david.delacroix/arc-family.html>

Two years ago, I instigated a new journal. The Journal of Demographic Economics (JODE, published by Cambridge University Press) is intended to be the premier professional outlet for what has become a vibrant and flourishing subfield within economics. The objective is to encourage research in this field, exploiting the complementarities between theory and empirics and encouraging interdisciplinary collaborations between demographers and economists.

More information: <http://perso.uclouvain.be/david.delacroix/jode.html>

### OVERVIEW OF PUBLICATION RECORD

48 coauthors, 81 published articles, 2 monographs, 2 encyclopedia entries, 32 popular articles.

#### Significant Publications in top 5 journals:

Baudin T., De la Croix D., and P. Gobbi, Fertility and childlessness in the United States, *American Economic Review*, **105**, 1852-1882, 2015.

De la Croix D. and F. Mariani, From Polygyny to Serial Monogamy: a Unified Theory of Marriage Institutions, *Review of Economic Studies*, **82**, 565-607, 2015.

De la Croix D. and M. Doepke, To Segregate or to Integrate: Education Politics and Democracy, *Review of Economic Studies*, **76**, 597-628, 2009.

De la Croix D. and M. Doepke, Inequality and growth: why differential fertility matters, *American Economic Review*, **93**, 1091-1113, 2003.

De la Croix D., M. Doepke, and J. Mokyr, Clans, Guilds, and Markets: Apprenticeship Institutions and Growth in the Pre-Industrial Economy, *R&R* at *Quarterly Journal of Economics*, 2016.

#### Most cited publications:

De la Croix D. and M. Doepke, Inequality and growth: why differential fertility matters, *American Economic Review*, **93**, 1091-1113, 2003. GS # citations: 547

De la Croix D. and P. Michel, *A Theory of Economic Growth: Dynamics and Policy in Overlapping Generations*, Cambridge University Press, 2002. ISBN 978-0521001151. GS # citations: 490

Boucekkine R., D. De la Croix and O. Licandro, Vintage human capital, demographic trends and growth, *Journal of Economic Theory*, **104**, 340-375, 2002. GS # citations: 402

**Appendix: All ongoing and submitted grants and funding of the PI (Funding ID)**  
Mandatory information (does not count towards page limits)

**On-going Grants**

<i>Project Title</i>	<i>Funding source</i>	<i>Amount (Euros)</i>	<i>Period</i>	<i>Role of the PI</i>	<i>Relation to current ERC proposal</i>
ARC project 15/19-063 on "family transformations: incentives and norms"	French speaking community of Belgium	700,000 euros (2 post-docs, 3 docs, research money)	Sep 2015 – Sep 2019	Main Promotor (other promoters: Luca Pensieroso, Ester Rizzi, Fabio Mariani)	unrelated
Franqui Research Professorship on "Fertility choices: driving forces"	Franqui foundation	135,000 euros (full teaching buy out + small amount of research money)	Sep 2014– Sep 2017	Beneficiary	unrelated

**Applications**

<i>Project Title</i>	<i>Funding source</i>	<i>Amount (Euros)</i>	<i>Period</i>	<i>Role of the PI</i>	<i>Relation to current ERC proposal<sup>2</sup></i>
none					

## Section c: Ten year track-record

### BIBLIOMETRY

3765 citations (G. Scholar), 1010 citations in Scopus.

**h-index:** 27 according to G. Scholar, 16 according to Scopus

In **Repec**, among the top 1% authors at the world level according to 38 criteria, among which: Number of Distinct Works, Number of Citations, h-index, Number of Journal Pages, Strength of students.

### TOP 10 SCIENTIFIC PUBLICATIONS of the last 10 years

De la Croix D., M. Doepke, and J. Mokyr, Clans, Guilds, and Markets: Apprenticeship Institutions and Growth in the Pre-Industrial Economy., Strong Revise & Resubmit at *Quarterly Journal of Economics*, 2016.

*Compares growth under alternative institutions to deal with moral hazard problem in master-apprentice relationship. Guilds and market based systems allow knowledge to cross the family/clan boundaries. Guilds adoption is more likely when initially in a nuclear family system.*

Baudin T., De la Croix D., and P. Gobbi, Fertility and childlessness in the United States, *American Economic Review*, **105**, 1852-1882, 2015.

*Theory of parenthood decisions which allows researchers to understand and measure the reasons behind childlessness, and analyze its change over time and across education groups in the US.*

De la Croix D. and F. Mariani, From Polygyny to Serial Monogamy: a Unified Theory of Marriage Institutions, *Review of Economic Studies*, **82**, 565-607, 2015.

*Explains the transition from polygyny to monogamy, and the rise of serial monogamy as following the urban revolution and industrial revolution.*

De la Croix D. and O. Licandro, The longevity of famous people from Hammurabi to Einstein, *Journal of Economic Growth*, **20**, 263–303, 2015.

*Describes a new database built from the Index Biobibliographicus Notorum Hominum (IBN), containing vital dates and characteristics of 300,000 famous people. Identifies the moment at which adult longevity started to increase prior to the industrial revolution.*

De la Croix D. and F. Docquier, An incentive mechanism to break the low-skill immigration deadlock, *Review of Economic Dynamics*, **18**, 593-618, 2015.

*Design of a migration policy maximizing global welfare subject to the constraints that the rich countries are at least as well off as in the current situation.*

De la Croix D. and O. Licandro, The Child is Father of the Man - Implications for the Demographic Transition, *The Economic Journal*, **123**, 236-261, 2013.

*Theory of the demographic transition and the industrial revolution based on the evidence that physical development during childhood is an important predictor of adult life expectancy.*

De la Croix D. and F. Docquier, Do Brain Drain and Poverty Result from Coordination Failures?, *Journal of Economic Growth*, **17**, 1-26, 2012.

*Analyzes whether high brain drain can be the outcome of an expectations driven poverty trap.*

De la Croix D. and M. Doepke, To Segregate or to Integrate: Education Politics and Democracy, *Review of Economic Studies*, **76**, 597-628, 2009.

*Studies why societies vary in their choices regarding the mix of private and public schooling, and how education and fertility decisions interact with voting on public schooling expenditures.*

De la Croix D. and D. Dottori, Easter Island Collapse: a Tale of Population Race, *Journal of Economic Growth*, **13**, 27-55, 2008.

*Proposes a new motive to have children: to develop military potential.*

Boucekkine R., D. De la Croix and D. Peeters, Early Literacy Achievements, Population Density and the Transition to Modern Growth, *Journal of the European Economic Association*, **5**, 183-226, 2007.

*Shows how increasing population density helped covering the fixed cost of schools and promoted education in England 16<sup>th</sup>-18<sup>th</sup> centuries, hence paving the way to the industrial revolution.*

### **RESEARCH MONOGRAPHS & chapters in collective volumes**

De la Croix D., *Fertility, Education, Growth and Sustainability*, Cambridge University Press, 2012. ISBN 978-1107029590.

De la Croix D., Did Longer Lives Buy Economic Growth? From Malthus to Lucas and Ben-Porath, in *Demographic Change and Long-Run Development*, M. Cervellati and U. Sunde eds, MIT Press, chapter 5, 2016.

*Summary of the possible impact of increases in adult longevity on economic growth with a focus on two particular channels: the contact time effect and the incentive effect.*

### **Ph.D STUDENTS MENTORING – COMPLETED 2006-2016 with their current employer**

Tapas Mishra (U. Southampton), Carmen Camacho (CNRS), Alessandro Sommacal (U. Verona), Davide Dottori (Bank of Italy), Luca Marchiori (U. Luxemburg), Gül Ertan Özgüler (U. Izmir), Paolo Melindi Ghidi (U. Aix-Marseille), Paula Eugenia Gobbi (FNRS), Emeline Bezin (FNRS), Pierre Pecher (U. Aix-Marseille).

### **PARTICIPATION TO INTERNATIONAL CONFERENCES (selected examples)**

American Economic Association - ASSA Meeting (San Diego, Jan 2013, Philadelphia, Jan 2014)  
NBER Summer Institute (Jul. 2007)

Meeting of the Society for Economic Dynamics, (Toulouse, June 2016), (Toronto, June 2014), (Seoul, June 2013), (Limassol, June 2012), (Montreal, July 2010), (Cambridge MA, July 2008).

Conference on Growth and Development New Delhi, Indian Statistical Institute, (Dec 2015, Dec 2009)

Barcelona GSE Summer forum (June 2016, June 2015, June 2014, June 2013)

### **INVITATIONS TO WORKSHOPS (selected recent examples)**

“Family Macroeconomics” Edesheim, Germany, June 22-23, 2015.

“Institutions, Culture, and Long-run Development”, Munich, Germany, November 13-14, 2015

“Deep-rooted Factors in Comparative Development”, Brown RI, USA, April 30-May 1, 2016

### **EDITORIAL AND EXPERT ACTIVITIES**

**Editor in Chief** of Journal of Demographic Economics (2015-)

Member of the **Editorial Board** of Fiscal Studies (2006-), Recherches Economiques de Louvain (1997-2014), Cliometrica (2006-).

**Associate Editor** of Journal of Economic Dynamics and Control (2004-2013), Journal of Development Economics (2011-), Journal of Public Economic Theory (2011-2015).

External **Expert** for the FNRS (Belgium), CNRS (France), the FCT (Portugal), the ISF (Israel Science Foundation), the SNF (Switzerland), and the European Commission (Marie-Curie, ERC).

Participation in **thesis committees** as foreign member: Uppsala University (Sweden), Vienna University (Austria), Ecole Polytechnique (Paris), EHESS (Paris), University of Aix-Marseille II, University of Paris 1 (France), University of Namur, University of Ghent (Belgium).

Participation to French and German “**habilitation**” **committees** at: University of Aix-Marseille II, Leipzig, Paris 1, and Toulouse.

### **AWARDS (See CV)**