ERC Advanced Grant 2018
Research proposal [Part B1]

Did elite human capital trigger the rise of the West? Insights from a new database of scholars from European universities and academies

UTHC

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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 Europe over the period 1088CE-1800CE. Sources will be primary (published cartularia and matricula), secondary (books on history of universities) and tertiary (biographical dictionaries and encyclopedia). To measure the quality of scholars, we will match these data with the existing catalogues of publications.

Second, we will exploit the variation in the density, composition and quality of the UTHC across time and space to correlate the growth of UTHC with the adoption of new techniques and better institutions and the development of literacy, numeracy, and urbanization. Causal identification will rely on both instrumental methods and exogenous variations in the creation of universities and in the density of the UTHC. The migration pattern of scholars will be used to identify positive selection, sorting and agglomeration in the Medieval and Early Modern academic market, and when and whether European universities were open corporations attracting scholars from all parts.

Third, we will develop a new theory of the complementarity between elites and artisans, to determine the incentives under which an economy will rely on applied codified knowledge in addition to tacit knowledge, thus speeding up the diffusion of ideas. 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 satisfying vested interests and developing new approaches and fields, letting scholarly elites change culture and promote development. With the data that we gather, we will be able to measure the importance of these theoretical mechanisms and how the UTHC and society interact.

B1.a: Extended Synopsis

Research question: was upper tail human capital (UTHC) critical to the triggering of the rise of the West

The "Rise of the West" (Mc Neil, 1963) described the unleashing of an economic and social transformation which had never been 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), Galor (2011), Mokyr (2009, 2016), Voigländer and Voth (2013a, 2013b), and Chaney (2019) among others. For most of them, self-reinforcing dynamics of technological and institutional 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 as their contribution to technological progress is concerned. Were individuals such as Newton, Galileo, Kepler, and Vesalius really needed for the Industrial Revolution to take place? Is it true that, as Mokyr (2016) writes, in a market economy, it is the few who drag along the many? Is it true that, even if the role of overall human capital as an engine of growth (Cervelatti and Sunde (2005), Galor (2011)) remains disputed, it was the upper tail human capital that was key?

In this project, the objective is to analyze quantitatively whether elite knowledge and upper tail human capital (UTHC) were critical to the triggering of the rise of the West. The current literature, which is mostly based on qualitative approaches, can be grouped into three competing views. The first group claims that the UTHC was essential. This view leans towards considering innovation as being driven essentially by the UTHC – those scientists and mathematicians who pushed the envelope of propositional knowledge, which was then applied. For Mokyr (2002), a small group of at most a few thousand people showed the way to the Industrial Revolution. This view is shared by Jacob (2014) and Wootton (2015). In addition to developing technology the UTHC also contributed to the building of better institutions as early as in the Middle-Ages (Chaney, 2011), which would turn out to be complementary with the growth process: theologians promoted nuclear family structures (Mitterauer 2010), lawyers developed Roman and civil law, physicians laid the ground for advances in botany, etc. The opposite view sees innovations as being driven by practical knowledge, from craftsmen to barber surgeons, which improves over time through learning-by-doing and the occurrence of improvements through trial-and-error and serendipity. Formal, codified knowledge plays no role in this approach. 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 scholars, in university-less London rather than Oxford, or in Lyons rather than Paris (Porter 1996). A third approach promotes the importance of the indirect effect of elite knowledge. Elites triggered a cultural change in the period 1500-1700, which made part of the population ready for modern technologies and institutions. This thesis is defended by Mokyr (2016): the Enlightenment in the eighteenth century was pivotal in driving economic growth in the nineteenth century (see also Cinnirella, 2018). From a theoretical point of view, this view resembles the threshold externality story of Azariadis and Drazen (1990), in which a take-off occurs once a certain threshold in human capital is reached.

There are currently no global quantitative analyses of the historical effect of the UTHC on the dynamics leading to the Industrial Revolution**.** Recent country-level studies include Dowey (1916) for England, Squicciarini and Voigtländer (2015) for France, and Dittmar and Meisenzahl (2016) and Cinnirella and Streb (2017) for Germany. Squicciarini and Voigtländer (2015) show that the number of people who subscribed to 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, which 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 a limited time frame. Some approaches have a broader geographical coverage, but are based either on a selection of people from the elite (often mixing scholars in with a large group of famous or noble people – see references below), 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 proposed database: content, purpose, feasibility

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 Europe from the creation of the first universities (c. 1088) through to the Industrial Revolution (c. 1800). This database will provide the platform for developing new theory and new empirical studies that will be used in combination with each other. This database will be unique, as it will

link scholars to the places where they actually worked and interacted (universities and academies). By aiming at a European view over a 700 years period, our project answers the call to arms of the History Manifesto (Guldi and Armitage 2014), by arguing in favor of the revival of a more global and *longue durée* analysis after a period of comparative retreat among professional historians (a retreat which is found in economics too).

Creating such a database will make it possible to exploit the variation in the composition, density, and quality of the UTHC across time, space, and key fields and enable us to establish the nature and extent of the correlation between the UTHC and the adoption of new techniques and better institutions, the development of cities, and the rise in literacy and numeracy (see Baten and Hippe, 2018) at the regional level. It will also make it possible to perform causal identification by exploiting exogenous variations in the creation of universities and in the density of the UTHC. Another strong point of gathering this data together in this way will be to enable us to reveal the migration pattern of scholars and to measure positive selection (better people are less sensitive to distance) and sorting (better people concentrate in the region where returns are higher) in the Medieval and Early Modern academic market. Yet, before going into the exploitation of the database, let us discuss the feasibility of the project.

Over the period 1088-1800, the number of universities in Europe rose to nearly two hundred (Frijhoff, 1996). Based on the very complete coverage of the professors at Heidelberg by Drüll-Zimmermann (1991, 2002) and the members of the Leopoldina, the total population of scholars should be less than 170k. This alone stresses the relative risk of the project, as we cannot fully predict how much time will be needed to gather a significant amount of data. However, achieving a coverage rich enough to evaluate and test significant variability across places, times, and fields, and to identify mobility patterns, would already represent a substantial advance. We will limit the database to universities active during the period 1088-1800. It will include all professors in these universities active before 1800. We will start with Central Europe, where a wealth of information is already available, and enlarge the extent progressively. We can quickly (within a few months) establish data for 10,000 professors by integrating and harmonizing existing sources 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 recently been established and has been made available on the web. This shows the interest of these universities themselves in particular regions that I believe it is important to look at their past cultural and their economic impact in a more systematic way. Some universities have not yet established an authoritative list of their professors, but some authors, sometimes a century ago, independently published a biography of them. This is true for 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 combine knowledge from books written on their history with *matricula* (persons registered at a given university) and *cartularia* (containing transcriptions of original documents related to the historical events at a university). I have pilot-tested this methodology on the University of Aix (de la Croix and Fabre, 2018). Once the intermediary goal of reaching 10k scholars is achieved, we will then proceed in two directions (1) expanding the database further by increasing the number of scholars and (2) by enriching the database by incorporating data on books published. Reaching this intermediate stage may require adjustments in the range of universities covered. Priority will be given to expanding the coverage of the hexagon bounded by Glasgow, Copenhagen, Krakow, Naples, Marseilles, and Plymouth (suggested in Ferguson (2011) to cover the key figures of the Scientific Revolution), **A strength of our approach is the scalability of the project and the progressive on-going expansion of its coverage.**

Over the course of seven centuries, medieval universities preserved a recognizable identity, including their independence from Church and State (Ashby, 1963). Each one went through phases of glory and decadence. They were sometimes accused of being an obstacle to modernity or of being completely irrelevant for the Scientific Revolution, as exemplified by Manuel (1968) comment 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 finds that a high proportion of the great names of early modern science made their career as professors in university employment. However, an exodus of scientists from the universities is well documented (Pedersen, 1996). Hopefully, we will find many important scholars in the list of members of the Scientific Academies. Taking into account the members of the learned societies will moreover enable us to better capture the shifts in focus that took place following the humanistic revolution. Initiated in Italy (7,000 of their members are readily available from https://data.bl.uk/iad/), the rise of Academies gained momentum in Northern Europe with the creation of 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 being a

key engine of cultural change. Gathering information on all members of these academies since their inception is a feasible task as the information in often readily available from the academies themselves. Considered at the European level, it is an as yet untapped resource.

An important aspect of the core database will be the systematic and progressive inclusion of **an army of less known scholars**, who are typically not recorded in encyclopedia, but still can inform us on the features and impact of the UTHC population. Another key aspect lies in gathering the data on fields of study. When universities emerged, there were four faculties (arts, law, medicine, and theology), each serving a particular sector of society. Later on, as society's needs increased, some universities expanded the realm of their expertise, while others did not, thus becoming increasingly obsolete. Humanism, directly followed by Protestantism, induced an expansion of the faculty of arts. Encoding properly the field(s) of scholars (many were acting in more than one, typically the polymaths) will make it possible to quantify and map these changes in a precise way, and also to identify the ability of various universities to adjust to and influence the changing world.

To enhance the power of the core database, we will enrich it by integrating a measure of the quantity and quality of the output of scholars from their book production and their impact (as demonstrated, for example, by the number of their works in library holdings in world libraries). Data on books have been collected and harmonized by Buringh and van Zanden (2009) and by Chaney (2017) from various sources. We propose also to measure the quality and influence of institutions (universities and academies) in different complementary ways, namely: [1] the book production and the consequential influence of their members, [2] the diversity of their members in terms of their geographic origin and [3] the mean distance with respect to the birth place of their members. Their diversity can be built up using the index of birthplace diversity as suggested by Alesina, Harnoss, and Rapoport (2016).

Compared to the existing literature on famous people using big data, the proposed database will have unique advantages. Unlike most historical demography (see Cummins 2017 for the *apogée* of this discipline), it will not focus on noble families, which might not be the prime depositors of upper-tail human capital. Compared to generalist studies of famous people (see de la Croix and Licandro 2015) or of authors (Chaney 2017), we propose to target one precisely defined group, for whom we know both their nomination date, which allows the population to be computed) and their migration patterns. Finally, compared to studies based on electronic resources (two fascinating new studies are by Gergaud, Laouenan, and Wasmer 2016 and Tabellini and Serafinelli 2017), we will focus on this specific group, using much more thorough and university specific sources.

Empirical step: establishing to what extent the UTHC is related to growth and modernization

I will now detail the way in which we plan to use the new database to address our core research question. The aspects of the UTHC that we will focus on are: composition (by field and place of birth), density, quality and quantity of output, mobility, birthplace diversity, and longevity. The units of analysis will be the city, the geographic cell, and the region. An additional strength of our methodology will be the ability to observe where the scholars 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. DeLong and Shleifer (1993) built an indicator of whether cities were free or subject to the will of a prince. Beyond cities, Dittmar (2011) compiles information from three different sources on the adoption of the printing press during its infancy period (1450-1500). To measure regional development in terms of broad human capital, we can rely on numeracy indexes based on age heaping measures, as suggested by A'Hearn, Baten, and Crayen (2009), and on anthropometric measures (Cinnirella and Komlos 2007,Baten et al. 2010). Literacy in the pre-industrial period can be measured by signatures on marriage registers. In addition to analyzing modernization outcomes, 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 increased the productivity of other scholars around them.

On the **demographic side**, we will apply nonconventional methods (in economics), to identify characteristic statistical patterns in 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 all parts of Europe, that were, or not, the crucibles of the Scientific and Industrial Revolutions, and (2) document the historical trends in the primacy of knowledge centers 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 entered the population at risk (their age at nomination), will allow us to properly estimate the life expectancy of scholars. Life expectancy can be computed for different regions and time periods, and also correlated to outcome variables.

When exploiting the database empirically, we will have to address the issue of the **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 causal links (see historical examples in Becker ans Woesmann 2009, and Becker et al. 2010). An alternative is to find a source of random variation, which modified the allocation of the UTHC without altering other relevant unobserved variables. The creation of universities itself can be seen in some cases as a natural experiment. Why there was no university in London until 1836, and why universities were sometimes founded later in more important cities are questions which remain a mystery for historians (Rüegg, 1992). Looking in detail 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 was 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 played a major role in the creation of German universities and is treated as a natural experiment by Cantoni and Yuchtman (2014). Later, the religious conflicts between Catholics and Protestants led to a major migration of skilled people (Scoville 1953), implying changes in the university landscape (Becker et al. 2016). The Huguenot diaspora and the migration to Prussia which followed 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 composition and density of the UTHC are not, however, the whole story. Another channel linking elites to outcomes is 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 had to be long enough to significantly affect their environment. A formal link between productivity growth and longevity is provided by Lucas (2009). In his model, people learn ideas from the people they meet. The more people they meet, the more creative and productive they become. If they live long, they have more chances of becoming excellent in their fields, and they also provide more opportunities for other people to learn from them. This effect of longevity on growth might be sizeable in quantitative terms, and this justifies why several authors have tried to assess changes in the longevity of the elite before the Industrial Revolution (Cummins, 2017, 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.

Beyond the effect of UTHC density, quality and longevity on outcomes, we will also gain new insights from modelling **the migration behavior of individuals**. The spread of knowledge through the mobility of students and professors has been a key aspect of European universities since their inception. Until the seventeenth century, all universities taught in Latin, which facilitated *peregrinatio academica*, or academic pilgrimage (Rydder-Symoens, 1992). As our proposed database will integrate records from a cross section of universities and academies, it will enable us to identify the patterns of migration for scholars in a systematic way, thus going 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). In particular, we will be able to identify and explain the selection and sorting patterns underlying the location decisions of university professors. In general, positive selection refers to the force that drives the increase in prevalence of advantageous traits. In the context of migration, positive selection refers to the fact that high skilled workers are more likely to migrate (Abramitzky, Boustan, Eriksson 2012). In the context of our university professors, this would imply that the best people are less sensitive to distance when choosing where to settle. Sorting therefore appears when individuals with better attributes are concentrated in the region where the returns are higher. In our context, there would be sorting if better people are more likely to settle in more prestigious universities and/or in more attractive cities. Finding both positive selection and sorting would back the claim that medieval universities were one of the most original creation of the Western Civilization, in which students were educated by a plurality of masters coming from all parts of Europe (Rashdall, 1895). Our database will also be rich enough to see how this pattern changed over time, and across regions and fields.

New theories of the complementarity between (A) elite knowledge and practical techniques, and between (B) elites and the adoption of enlightened institutions.

The possible link between UTHC and modernization arises through the adoption of new techniques and the establishment of new institutions. To further understand the mechanisms linking the UTHC to technical progress, we will develop a new theory of the complementarity between (A) elite knowledge and artisanal techniques, and between (B) elites and the adoption of enlightened institutions. We cannot rely on existing explicit models of

endogenous technological progress built on R&D efforts by firms to model productivity growth, following the seminal papers of Romer (1990) and Aghion and Howitt (1992). While such models are useful to analyze innovation in modern times, their applicability to long-run historical change is doubtful, because legal protections for intellectual property only became widespread recently. Instead, we will 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 (A), the existing literature (see de la Croix, Doepke, and Mokyr (2018)), assumes that apprentices acquired ideas from master craftsmen, but also got new ideas exogenously (maybe from contacts with the elite), and that they implement the best of the two. The literature on the history of science (Valleriani 2017), however, shows that the interface between UTHC and practical knowledge is more complex than just adopting a new idea for free, and that more elaborate modelling is required to understand the incentives underlying fast adoption and diffusion. We will model this interface by considering three layers. The first layer is theoretical knowledge, *sciencia*, mostly developed by intellectuals and generally codified in books. The second layer is that of codified practical knowledge, often in collections of recipes or in almanacs. The third layer is *ars*, the knowledge of master craftsmen, which is mostly uncodified, acquired through experience during an apprenticeship. Such a theoretical framework allows the three layers of knowledge to interact by modelling explicitly the process of publishing recipe collections which is at the core of the second layer. One key question the model will address is to determine the conditions under which an economy will either come to rely on applied codified knowledge in addition to tacit knowledge, speeding up the diffusion of ideas or stick to the traditional way of learning through interpersonal contacts**.** Incentives depend on the printing technology, the density of the population, the literacy of the population, and the effective protection of intellectual property. As patents and copyrights did not apply during the period we consider, intellectual property was not formally protected, I plan to consider mechanisms of innovation without monopoly rents inspired from Boldrin and Levine (2008).

With regard to the complementarity between elites and the adoption of enlightened culture and institutions, I start from the idea that the presence of learned institutions is a two-edged sword. There are cases in history when universities fought against novelty. This might have arisen because universities had a vested interest in the status quo, for example when the Scientific Revolution involved the 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). 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. Along this line, a university 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. However, there are many cases in which universities and academies favored modernity. To model this race within universities between conservative and modern forces, we will see universities as firms offering several products (fields). Investing in the development of a new product line puts universities closer to the frontier, but is in conflict with the vested interests of the scholars working in the existing fields. We will also model the influence of the adopting of new fields on the culture of the rest of society. The development of this new model of the dynamic interactions between conservative and modern forces within universities and learned societies will us to enable to derive the conditions under which modernity prevailed, and to use the richness of our database to examine where and when it did so**.**

Conclusion

To conclude, constituting the proposed database and developing empirical and theoretical research, which relies on its depth and wealth, will allow us for the first time to have a view at the European level of the role of the UTHC in the rise of the West, which is rigorously grounded in evidence, and which can be reproduced, falsified, and developed further. It will be easier to continue extending the database beyond the 60 months of the project, particularly by further broadening its geographical scope. Maintaining and extending this database will be a valuable research asset to both me and other researchers in future research. On completion the new database will be made openly available for use in a variety of ways by the scientific communities in social sciences. The database will also be available online for the civil society. Indeed, there is a great interest in many European universities in recording their history more systematically, as attested to by many university websites. More generally, the database can be used to further assess how intellectual elites interacted with and provide an important contribution to measuring European immaterial capital.

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Squicciarini, Mara and Nico Voigtländer. 2015. Human Capital and Industrialization: Evidence from the Age of Enlightenment, *The Quarterly Journal of Economics* **130** (4): 1825-1883.

Tabellini, Guido and Michel Serafinelli 2017, Creativity over Time and Space, mimeo.

Valleriani Matteo 2017, *The Structures of Practical Knowledge*, Springer.

Verger Jacques. 1988. Peut-on faire une prosopographie des professeurs des universités françaises à la fin du Moyen Âge?, *Mélanges de l'Ecole française de Rome. Moyen-Age, Temps modernes* **100**, 55-62.

Voigtländer, Nico, and Joachim Voth. 2013a. How the West 'Invented' Fertility Restriction. *American Economic Review,* **103**(6), 2227-64.

Voigtländer, Nico, and Joachim Voth. 2013b. The Three Horsemen of Riches: Plague, War and Urbanization in Early Modern Europe. *Review of Economic Studies*, **80**(2), 774-811.

Wootton, David. 2015. *The Invention of Science: A New History of the Scientific Revolution*, London: Allen Lane.

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), 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 Cape Town (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-doctoral Researcher (1993-1995) at the National Fund for Scientific Research.

FELLOWSHIPS AND AWARDS

2017-2018: Fellow at Iméra, Center for Advanced Studies, Marseille
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 Ph.D. students are the blood and flesh of any good department. Among the nineteen Ph.D. students, who completed their dissertation under my supervision, fifteen are working in research and teaching positions (among whom nine already hold permanent positions at universities or in Central Bank research centers), five are in executive positions in major institutions(EU and World Bank). I am currently supervising four Ph.D. students (1 almost ready to complete).

20 completed dissertations as supervisor: 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), Hamzeh Arabzadeh (2016), Robert Stelter (2016), Lucia Granelli (2018), Zainab Iftikhar (2018).

INSTITUTIONAL RESPONSIBILITIES

2015-2016: Member of scientific commissions at 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 working on long-run growth at IRES in the nineties, I was alone on the 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 other permanent professors, 3 post-docs and 15 Ph.D. students.

Trying to get people of different horizons 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, thereby promoting 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

Four years ago, I created 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 promoting interdisciplinary collaborations between demographers and economists.
More information: http://perso.uclouvain.be/david.delacroix/jode.html

OVERVIEW OF PUBLICATION RECORD

54 coauthors, 89 published articles, 2 monographs, 2 encyclopedia entries, 32 popular articles.

Significant publications in top-5 journals:

De la Croix D., M. Doepke, and J. Mokyr, Clans, Guilds, and Markets: Apprenticeship Institutions and Growth in the Pre-Industrial Economy, *Quarterly Journal of Economics*, **133**, 1-70, 2018.

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.

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: 730

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: 563

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: 471

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

On-going Grants

Project Title	*Funding source*	*Amount (Euros)*	*Period*	*Role of the PI*	*Relation to current ERC proposal*
ARC project 15/19-063 on "family trans-formations: incentives and norms"	French-speaking commu-nity of Belgium	700,000€ (2 post-docs, 3 docs, re-search money)	Sep 2015 – Sep 2020	Main Promotor (other promotors: Luca Pensieroso, Ester Rizzi, Fabio Mariani)	unrelated

Applications Pending

Project Title	*Funding source*	*Amount (Euros)*	*Period*	*Role of the PI*	*Relation to cur-rent ERC proposal*[2]
none					

Section c: Ten-year track record

BIBLIOMETRY (Aug 15, 2018)

4,661 citations (G. Scholar), 1,327 citations in Scopus.
h-index: 32 according to G. Scholar, 18 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 in the last 10 years

Baudin T., De la Croix D., and P. Gobbi, Endogenous Childlessness and Stages of Development, **Journal of the European Economic Association**, forthcoming.

Measures the importance of opportunity driven and poverty driven childlessness in 36 developing countries with a structural model of fertility and marriage. Shows that the endogenous response of marriage and childlessness matter for determining the impact of social progress.

De la Croix D., M. Doepke, and J. Mokyr, Clans, Guilds, and Markets: Apprenticeship Institutions and Growth in the Pre-Industrial Economy., ***Quarterly Journal of Economics***, **133**, 1-70.

Compares growth under alternative institutions to deal with the moral hazard problem in master-apprentice relationship. Guilds and market-based systems allow knowledge to cross the family/clan boundaries. Guild 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 when 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 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 a 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 motivation to have children: developing military potential.

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**, 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. STUDENT MENTORING – COMPLETED 2008-2018 with their current employer

Alessandro Sommacal (U. Verona), Davide Dottori (B. of Italy), Luca Marchiori (U. Luxemburg), Gül Ertan Özgüler (U. Izmir), Paolo Melindi Ghidi (U. Paris X), Paula Eugenia Gobbi (U. Brussels), Emeline Bezin (CNRS), Pierre Pecher (U. Aix-Marseille), Hamzeh Arabzadeh (U. Aachen), Robert Stelter (Max Planck Rostock), Lucia Granelli (Eur. Commission), Zainab Ifikhar (Goethe U., Munich).

PARTICIPATION TO INTERNATIONAL CONFERENCES (selected examples)

NBER Summer Institute (Jul. 2007)

American Economic Association - ASSA Meeting (San Diego, Jan 2013, Philadelphia, Jan 2014)

Meeting of the Society for Economic Dynamics, Edinburgh June 2017, 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 WORSKHOPS (selected recent examples)

"Family Macroeconomics" Edesheim, Germany, June, 2015, Mannheim, Germany, October 2018.

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

"Deep-rooted Factors in Comparative Development", Brown RI, USA, May 2016, May 2017

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 **Ph.D. committees** as a 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 "**habilitation" committees** at: Aix-Marseille II, Leipzig, Paris 1, and Toulouse.

AWARDS (See CV)