AFC ASSOCIATION FRANÇAISE DE CLIOMÉTRIE

WORKING PAPERS

Nr. 5, 2014

On the Construction of a Historical Gender Gap Index. An Implementation on French Data

Faustine PERRIN

On the Construction of a Historical Gender Gap Index

An Implementation on French Data

Faustine Perrin*

Abstract

The enlightenment of the long-run relationship between gender equality and economic growth is hampered by the lack of information and resources on the various dimensions of gender equality. This paper is a first attempt to assess the size of the gender gap in a historical perspective. Exploiting a unique census-based dataset of 86 French counties in the mid-19th century, I construct a Historical Gender Gap Index measuring the size of the gap between men and women in three critical areas: economic opportunities, educational attainment, and health. The county comparisons afford the identification of the strengths and weaknesses of French regions in closing the gender gap. I find that France can be divided into two main areas. In particular, I show that Northern counties that have succeeded the best in narrowing the gap tend to display better economic performance.

Keywords: Gender Equality • Index • Development Process • 19th Century • France

JEL Classification: J16, N33, O11

* Bureau d'Economie Théorique et Appliquée (BETA) – University of Strasbourg Institute for Advanced Studies, France; Email: faustine.perrin@unistra.fr.

1. Introduction

The promotion of gender equality together with economic and social empowerment of women has been recently recognized essential to achieve sustainable development, as evidenced by its adoption as the third *Millennium Development Goal* by the United Nations member states in 2000. By removing barriers that prevent women from accessing – the same way as men – to human capital endowments, economic opportunities and human rights, gender equality may afford economies to result in better economic performance and to improve economic development. Despite the recent recognition of gender equality and female empowerment as a key goal for economic development, gender differences persist and continue to be a major challenge for both developed and developing countries. Inequalities between men and women seem to be rooted in the cultural, social and political systems of many countries. In order to better understand the relationship between gender equality and economic development, I believe that it is essential to come back to the genesis of this relationship.

Diebolt and Perrin (2013b), in recent literature on Unified Growth Theory, have investigated the interplay between gender equality and long-run growth. They argue that female empowerment toward greater gender equality has been at the origin of the demographic transition and engaged the take-off to modern economic growth. More specifically, they point out the existence of three stages of development. In the early stage of development, the economy is characterized by low technological progress, low gender equality, low education, low standard of living, and high fertility. The rise in gender equality and technological progress, in transitory stages of development, induces a substantially larger fraction of individuals to acquire human capital, what triggers rapid developments and reinforces gender equality. Due to larger educational investments, the opportunity cost of having children increases and average fertility declines. Individuals have fewer children but better educated ones. The demographic transition occurs along with the process of human capital accumulation. Ultimately, in later stages of development, the level of gender equality and the fraction of skilled individuals converge toward their maximum; living standards are high and fertility is low. According to Diebolt and Perrin (2013a, 2013b), the rise in gender equality – at the origin of the trade-off between the number of children and the endowment in human capital – is the crucial ingredient of the transition from stagnation to sustained economic growth.

If the empirical literature on the link between gender equality and economic development using contemporaneous data is rather abundant (e.g. Schultz, 1995; Dollar and Gatti, 1999; Klasen, 2002; Knowles, Lorgelly and Owen, 2002, Doepke and Tertilt, 2009, Klasen and Lammana 2009, for a non-exhaustive list), one may note the absence of empirical studies of this relationship on earlier periods (i.e. using historical data). The enlightenment of the long-run relationship between gender equality and economic growth is hampered by the lack of information and resources on the various dimensions of

gender equality. This work is stimulated by the absence of an indicator enabling to measure the level of gender equality, and its evolution, in a historical perspective.

Since the seminal work of Yllö (1984), in which the author constructed an indicator measuring existing gender inequality in the US states (the Status of Women Index), a number of international comparative gender equality indices have been built up to offer a way to compare the achievements of countries with each other. Each index integrates a distinct list of parameters that affects the outcome for each country. In 1995, the United Nations Development Program presented two indicators designed to reflect gender disparities in basic capabilities: the Gender-related Development Index (GDI) and the Gender Empowerment Measure (GEM). The GDI aims to show the inequalities between men and women in three critical areas, namely healthy life, knowledge and standard of living. The GDI is the un-weighted average of the equally distributed life expectancy index, education index and income index. Similarly to the GDI, the GEM attempts to measure the extent of gender inequality across the globe, based on estimates of women's relative economic income, participations in high-paying positions with economic power, and access to professional and parliamentary positions. Alternative measures have then been developed with the ambition to provide solutions to methodological and conceptual limitations raised by Bardhan and Klasen (1999), Dijkstra and Hanmer (2000) and Schüler (2006), among others. Within these alternatives, the Gender Gap Index (GGI), developed by the World Economic Forum (Hausmann, Tyson and Zahidi, 2006), ranks countries according to their gender gaps, in four critical areas: economic participation and opportunity, educational attainment, health and survival, and political empowerment. The scores can be interpreted as the percentage of the inequality between women and men that has been closed. More recently, the Social Institutions and Gender Index (SIGI), based on the OECD's Gender, Institutions and Development Database, has been developed as an alternative index measuring the discrimination against women (Branisa *et al.*, 2014). Instead of measuring gender inequalities in outcomes such as the GDI, the GEM and the GGI, the SIGI captures and quantifies discriminatory social institutions. It notably includes early marriage, discriminatory inheritance practices, violence against women, son bias, restrictions on access to public space and restricted access to productive resources.

If recent improvements have been made to measure gender equality through the development of new indicators, there exists no such tool at the historical level. One of the main constraints in economic history concerns the data availability. The dearth of historical data does not allow us to construct an index in the line of the one developed by Branisa *et al.* (2014). In this paper, I propose to develop an instrument measuring the size of the gender gap in line with the methodology developed by Hausmann, Tyson and Zahidi (2006) – in the framework of the project launched by the World Economic Forum in 2005.

As a first attempt to evaluate the level of gender equality at the historical level, I focus on France. Based on a unique dataset built up from the *Statistique Générale de la France*, I create a county-level historical gender gap index measuring the extent to which women in 86 French counties have achieved equality with men in the 1850s. The index captures the size of the gap between men and women in three critical areas: economic participation and opportunities, educational attainment, and health and survival. Gender equality is considered achieved when women and men have the same rights and opportunities across all sectors of society, and when their behaviors, aspirations and needs are equally valued and favored. The construction of the index aims at providing an overview of the extent to which opportunities and resources are distributed among genders in French counties. A further ambition of the construction of a historical index is to provide a tool that will allow us to estimate, in a future work, the existence and the magnitude of the relationship between gender equality and economic growth in the middle of the 19th centuries, much earlier than existing studies.

The geographical distribution and county comparisons allow identifying the strengths and the weaknesses of French counties in terms of gender equality. Strong heterogeneity is found across counties. The geographical distribution of the gender gap index highlights the existence of two main areas. In particular, it appears that Northern counties have succeeded the best in narrowing this gap. The county comparison with economic and demographic profiles provides an overview of gender-related environment in each county. In particular, it suggests that counties that have succeeded the best in closing the gender gap display better economic performance and exhibit lower fertility rates.

The remainder of the paper is structured as follows. Section 2 describes the dataset and provides descriptive statistics. Section 3 develops the methodology chosen to build an historical measure of the size of the gender gap. Section 4 presents the 1850s gender gap index covering 86 French counties. Section 5 provides an overview of the county-level relationship between gender-related environments and economic and demographic profiles. Section 6 summarizes and concludes.

2. Data – A French County-Level Database

This paper is a first attempt to capture the degree and the amplitude of gender-based disparities in historical perspective. The difficulty in constructing an index on a historical perspective relies on the availability of the data. In order to explore the size of the gender gap, gender-related variables are built in three critical categories: *(i)* economic participation and opportunity; *(ii)* educational attainment; and *(iii)* health and survival. Conversely to the Gender Gap Index using contemporaneous data, political criteria are not included. Country-level data prevent from integrating the same measurement of political representation as the one used to study gender equality at the national level (i.e. female-to-male seats in Parliament). An alternative measure of political empowerment suitable with county-level

analyses must be used. Unfortunately, the lack of available historical data does not allow to integrate such a measurement in the indictor. Beyond the matter of data availability, women political representation was quasi-null until a relatively recent period. Introducing political criteria in the 1850s index would not contribute to display any heterogeneity across counties.

The paper focuses on France. France is an iconic case, particularly interesting to investigate not only for the richness of its data (which remain largely unexploited) but for several additional reasons. First, France was the most populated European country at the dawn of the nineteenth century. Second, France is also the first clear case of fertility decline in Europe – rapid in its infancy triggered by rural and prosperous departments. Third, France was a precursor in the light of primary education. In 1792, Condorcet already proposed a reform for secular, compulsory and free schooling. Since 1833, the Guizot law has required municipalities with more than 500 residents to fund a primary school and a teacher. In 1836, the Guizot law was extended to girls, although the French communes had no strict obligation to fund a primary school for girls. During the 19th century, several other important laws have been implemented in favor of the education of children of both sexes.[1]

I use county-level data collected from diverse publications of the *Service de la Statistique Générale de la France*. The French Statistical Office publishes data since 1800. It is from 1851 that the Statistical Office provided data ranking population by age, gender, marital status and other essential information to build a measure of the size of the gender gap. The dataset covers information about aggregated individual-level behavior for 86 French counties (*départements*). [2] The major part of the dataset is constructed from General Censuses, Statistics of Primary Education, Population Movement and Agriculture Survey conducted in the 1850s; and from Industrial Statistics conducted in 1861. A combined use of the various Censuses allows us to construct a dataset with gender-related detailed information on employment and wages in industry and agriculture, literacy rates, enrollment rates in primary schools, population, longevity and mortality. The index measures gender-based gaps in outcomes variables. This provides an index independent of the level of development of the counties and will allow us to study in a future work the factors (county-specific input variables) at the origin of these gaps.

Economic Criteria. – Four variables are used to capture the gap in terms of economic opportunity and participation. The share of people employed in manufacturing and the share of people making their living from agriculture in 1851 are used to capture the participation gap for men and women. The

[1] See Chapter 3 in Perrin (2013) for a more detailed description of the reforms of primary education in France in the 19th century.
[2] County-level data aggregate individual-level behavior to a regional level and reflect as a consequence average behaviors. As already raised by Becker *et al.* (2010), regional aggregates may be problematic if individual-level behaviors deviate strongly from a linear model.

average hourly wages (in *francs*) in industry (in 1861) and in agriculture (in 1852) are mobilized to measure the remuneration gap. The female-to-male measures are then constructed to capture the size of the gender gap in economic participation and opportunities.

Education Criteria. – Three variables are used to capture the gap in education. I use one measure of educational attainment in 1850: the enrollment rates in public primary school – defined as the ratio of children attending school divided by the number of children aged 6-14. The 1854 literacy rate is used as a longer-term view additional variable measuring the ability of individuals to read and to write. The third variable included in the sub-index is the number of female and male public schools. This variable aims specifically at capturing the sex-differential in infrastructures measuring the size of the gap regarding institutional investments in favor of men or women. Similarly to economic criteria, female-to-male measures of educational endowments are then built.

Health Criteria. – Health and survival are measured through the construction of three gender-related variables: the sex ratio at birth (in 1851), the inverted mortality ratio (in 1851) and the life expectancy ratio (in 1856). The sex ratio at birth is defined as the number of female alive births divided by the number of male alive births. This measure aims at capturing the potential households' preference toward sons (society's valuation of women) or inversely women's ability to protect female children in vulnerable years. The sex ratio at birth may indeed be skewed by factors such as infanticide. The mortality ratio consists in the share of female deaths divided by the share of male deaths. The construction of a measure of life expectancy at birth involves following several steps. The measure is calculated by constructing a life table (see Appendix B for a detailed description of the calculations). The data needed to calculate the life expectancy for a particular geographic area are the population in 5-year age bands and the deaths in 5-year age bands. These data are available for the year 1856 combining data from the Census and from the Population Movement. Both the mortality and the life expectancy ratios aim at capturing the mortality differential potentially triggered by violence, malnutrition or diseases. The Appendix A describes all data and sources in greater details.

Table 1: Summary Statistics

Variables	Obs.	Mean	Standard Deviation	Min.	Max.
Economic Variables					
Male labor force in agriculture	86	0,7368	0,1713	0,0462	1,1349
Female labor force in agriculture	86	0,6145	0,1787	0,0364	1,0541
Labor force ratio in agriculture	**86**	**0,8289**	**0,1163**	**0,5434**	**1,1917**
Male labor force in industry	85	0,0577	0,0814	0,0015	0,6364
Female Male labor force in industry	85	0,0362	0,0704	0,0001	0,5515
Labor force ratio in industry	**85**	**0,4802**	**0,3386**	**0,0421**	**1,5543**
Male wage in agriculture	86	1,4140	0,2872	0,7700	2,5200
Female wage in agriculture	86	0,8917	0,1861	0,5500	1,6200
Wage ratio in agriculture	**86**	**0,6344**	**0,0681**	**0,4472**	**0,7928**
Male wage in industry	86	2,2678	0,3847	1,5284	3,8263
Female wage in industry	86	1,0798	0,1956	0,6480	1,6380
Wage ratio in industry	**86**	**0,4790**	**0,0639**	**0,3222**	**0,6607**
Education Variables					
Male literacy rate	86	66,488	19,292	28,9	98,4
Female literacy rate	86	49,527	23,839	15,9	95,4
Literacy ratio	**86**	**0,7150**	**0,1870**	**0,3228**	**0,9780**
Male enrollment in primary school	86	0,5440	0,2113	0,1877	1,0594
Female enrollment in primary school	86	0,3595	0,2586	0,0035	0,9965
Enrollment in primary school ratio	**86**	**0,6002**	**0,2637**	**0,0090**	**1,1078**
Male public schools	86	400,32	188,04	129	883
Female public schools	86	109,47	91,044	2	508
Public school ratio	**86**	**0,2758**	**0,1899**	**0,0103**	**0,9120**
Health Variables					
Male mortality	86	0,0221	0,0027	0,0182	0,0298
Female mortality	86	0,0221	0,0024	0,0168	0,0294
Mortality ratio	86	1,0010	0,0479	0,9073	1,1356
Inverted truncated mortality ratio	**86**	**0,9396**	**0,0507**	**0,7970**	**1,0389**
Boys living birth	86	5 774	3 003	1 991	21 641
Girls living birth	86	5 519	2 897	1 943	20 880
Sex ratio at birth	86	0,9543	0,0268	0,8736	1,0523
Truncated sex ratio at birth	**86**	**1,0109**	**0,0284**	**0,9254**	**1,1147**
Male life expectancy at birth	85	38,081	4,424	26,454	48,960
Female life expectancy at birth	85	40,556	4,834	27,506	49,846
Ratio life expectancy at birth	85	1,0656	0,0492	0,8993	1,2042
Truncated life expectancy at birth	**85**	**1,0053**	**0,0464**	**0,8484**	**1,1361**

Sources: Using data from Statistiques Générales de la France

Table 1 reports descriptive statistics of the variable used in the construction of the gender gap index. One may first notice the high share of individuals working in the agricultural sector for both genders and the low share of individuals making their living from manufacturing. In 1851, almost 74% of men and 61% of women were working in agriculture, while they were only 6% and less than 4% in industry respectively. The female-to-male labor force ratio was strongly higher in agriculture (0.82) than in industry (0.48). In the same line, but to a lesser extent, the female-to-male average wage was higher in agriculture (0.63) than in industry (0.47). However, both female and male average wages were strongly higher in industry than in agriculture; 1.08F for women in industry against 0.89F in agriculture and 2.27F for men in agriculture against 1.41F in agriculture. Regarding the educational variables, more than 66 % of males and 50% of females were able to read and to write in 1854. In 1851, 54.4% of boys aged 6-14 were enrolled in public primary school, while the enrollment rate in public primary school for girls was 36%. There is a strong heterogeneity in education across counties. Enrollment rates go from about 19% (in Var) to 106% (in Manche) for boys and from 0.3% (in Loir-Et-Cher) to 99% (in Manche) for girls.[3] These variations can be explained by several factors: the diffusion of the official French language, the difference in attitudes toward education between Catholics and Protestants (see Becker and Woessmann, 2009) or the wave of spreading ideas coming from Prussia[4] and the insufficiency of educational resources deployed in rural areas in terms of teachers and financial spending. Focusing on health and survival variables, the data display highly similar mortality rates and number of living births between men and women. However, data on life expectancy at birth show that women live in average two and a half years more than men, i.e. 38 years of life remaining at age 0 for men and 40.5 years for women. The health and survival data display here again a strong heterogeneity across counties. The minimum and maximum life expectancy at birth are 26.4 (in Seine) and 48.9 (in Gers) years old for men, respectively, and 27.5 (in Seine) and 49.8 (in Orne) years old for women, respectively, that is to say a difference of more than 22 years of life expectancy.[5]

3. Methodology – The Construction of the Index

The index is constructed using a five-step process in line with the one used by Hausmann, Tyson and Zahidi in the computation of the Gender Gap Index 2006. The procedure is applied to the 10 gender-related variables dataset consisting of 86 county-level observations.

[3] Enrollment rates above 100% are due to the possibility that children below 6 years old and above 14 years old may have been enrolled in public primary schools.
[4] Luther, seminal figure of the Protestant Reformation, emphasized the importance of education and the need of a strong classical culture (so that everyone must be able to read the Bible) and requires the establishment of schools for the children of ordinary folks.
[5] This large gap can be explained by the different level of urbanization across counties. French county-level data suggest that large urban areas (such as Seine – characterized by a density of 29.9 people per km² in 1851) display shorter life expectancy at birth than rural areas (such as Orne – displaying a density of 0.72 people per km² in 1851).

Step 1: Conversion to ratios. – The index consists in measuring gaps between men and women, with the condition that the indicators are independent from the level of development of the county. Richer counties might have, for instance, more education for all their population. Therefore, reasoning solely in terms of gaps and not in terms of levels enables us to focus strictly on gender differences, all other things being equal. Hence, as a first step, I convert all data into female-to-male ratios. For instance, a county with 30% girls and 62% of boys enrolled in primary schools is assigned a ratio of $30/62 = 0.48$ on this variable.

Step 2: Data truncation at equality benchmark. – The second step of the process involves truncating the ratios at the equality benchmark. Truncating the data at the equality benchmark enables to assign the same score to a country that has reached parity between women and men and to one where women have surpassed men. This equality benchmark is considered to be 1 – meaning equal numbers of women and men – on all variables except on the health variables. In human societies, the sex ratio (also called secondary sex ratio) varies according to the age profile of the population but may also be affected by environmental and social factors. Grech *et al.* (2002) have estimated the natural sex ratio at birth to be close to 1.06 males per 1 female. Accordingly, the equality benchmark is set to be 0.944 to correct for natural factors of the sex differential. Similarly, the reversed mortality ratio and the life expectancy ratio are truncated according to the equality benchmark set to be 1.06.[6] The reversed value of the mortality ratio is used in order to work with a dataset with the same sign on interpretation (i.e. the higher the value the better the score) that integrate in this case the positive effect of having a low mortality ratio in the health outcome. The equality benchmark needs to remain fixed to allow tracking the evolution of counties over time.

Step 3: Calculation of weighted averages. – As a third step, I calculate the weighted average of the variables within each sub-index, necessary to create the sub-index scores. This computation aims at giving the same weight to the variables despite the fact that some variables exhibit larger volatility than others (depicted by larger standard deviation) (see Sugarman and Straus, 1988; Harvey, Blakely and Tepperman 1990). The calculation of sub-index scores involves: *(i)* to calculate the standard deviation of each variable; *(ii)* to normalize the variables by equalizing their standard deviations to determine the percentage change in terms of standard deviation to a 1% change of each variable; and *(iii)* to use these weights to calculate the weighted average of the variables. The calculation of weights within each sub-index is given in Table 2.

Step 4: Calculation of sub-index scores. – The following step consists in calculating the weighted average score of the three sub-indexes. This process ensures to integrate the same relative impact on

[6] This ratio is based on the standards used in the UN's Gender-Related Development Index, which uses 87.5 years as the maximum age for women and 82.5 years as the maximum age for men.

the sub-index for each variable – so that a variable for which most counties have already reached equality would be penalized. For example, the wage ratio in industry – that has a relatively small standard deviation – gets a larger weight within the economic opportunity sub-index than the labor force ratio in industry – that has a larger standard deviation. Similarly, for any variable characterized by higher ratio and lower variability (i.e. larger weight), a county that would deviate would be more heavily penalized.

Step 5: Calculation of final scores. – The last step in the process involves calculating final scores. All sub-indexes are bounded between 0 and 1. The value 0 corresponds to perfect inequality; 1 to perfect equality. To create the overall Gender Gap Index, I bring together the three sub-indexes by simply taking their (un-weighted) average for each county. The final score is therefore also bounded between 0 and 1, which allows for comparisons between counties.

Table 2: Description of Sub-indexes and Calculation of Weights

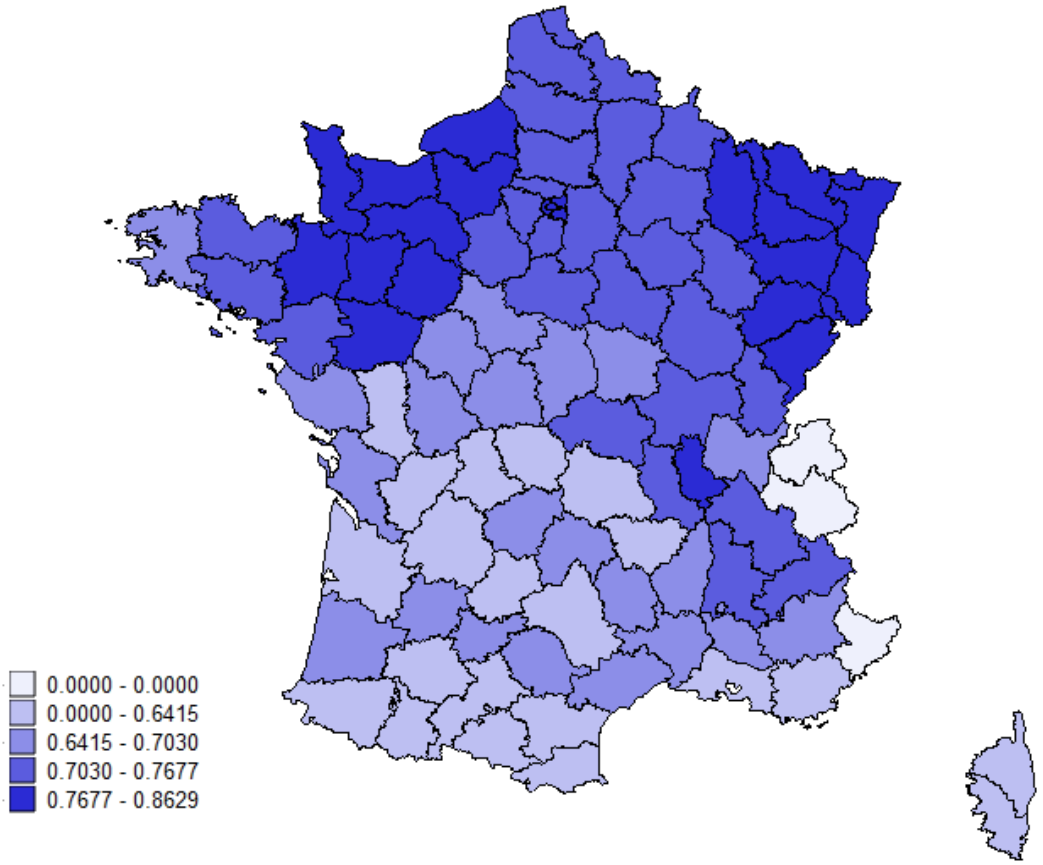
Economic Opportunity	Standard Deviation	Standard Deviation per 1%	Weights
Female-to-male labor force in agriculture	0,1163	0,0860	0,2052
Female-to-male labor force in industry	0,3386	0,0295	0,0705
Female-to-male wage in industry	0,0639	0,1566	0,3737
Female-to-male wage in agriculture	0,0681	0,1469	0,3505
Total		**0,4189**	**1**
Educational Attainment	Standard Deviation	Standard Deviation per 1%	Weights
Female-to-male literacy rate	0,1870	0,0534	0,3111
Female-to-male enrollment in primary school	0,2637	0,0379	0,2633
Female-to-male public schools	0,1899	0,0527	0,3656
Total		**0,1440**	**1**
Health and Survival	Standard Deviation	Standard Deviation per 1%	Weights
Female-to-male life expectancy at birth	0,0464	0,2156	0,2818
Female-to-male mortality (reversed)	0,0507	0,1970	0,2575
Female-to-male living births	0,0284	0,3525	0,4607
Total		**0,7651**	**1**

4. The Historical Gender Gap Index in 1850s France

County-level GGI

Table 3 provides the overall scores of the 1850s Gender Gap Index and the ranking by sub-indexes for each county of the sample. The gender gap appears clearly in all counties. The mean of the index is 0.707. There exists a strong heterogeneity across counties. The index ranges from 0.576 to 0.863, and is more pronounced in some specific parts of France. Northern counties occupy the highest ranks of the index, with Mayenne standing out as the most advanced counties in France, having closed over then 86% of its gender gap. Mayenne is closely followed by Manche, Vosges, Seine-Inférieure, Haut-Rhin, Sarthe and Seine. General trends of the Gender Gap show that the gap between women and men is relatively lower in terms of health and survival outcomes (0.991) than in educational attainment (0.524) and economic opportunities (0.605). Nonetheless, large disparities exist between counties. The difference in educational attainment sub-indexes between extreme counties, Mayenne (0.929) and Corse (0.177), is of order 5.24. In terms of economic opportunities, the difference is lower, i.e. of order 1.62, between Drôme (0.707) and Bouches-du-Rhône (0.435).

Figure 1: Geographical Distribution of the 1850s Gender Gap Index



Sources: Using data from Statistiques Générales de la France

Figure 1 shows the geographical distribution of the 1850s Gender Gap Index (see Appendix C for a map of administrative France with the name of the counties). The map reveals two main areas, separated by an imaginary arc going from Vendée to Drôme. In the Northeastern part of the arc, counties perform relatively well. In the Southwestern part of the line, counties hold the lowest positions in the ranking. Counties such as Lot, Haute-Loire, Basses-Pyrénées, Gers, Ariège, Aude, Corse and Pyrénées-Orientales reflect large gender disparities. To the exception of Lot that exceeds the mean position in terms of the economic opportunity sub-index, these counties are all part of the lowest economic and educational sub-index rankings.

The scores may appear high comparatively to the scores obtained for the Gender Gap Index using contemporaneous data. These apparently high scores result mainly from the fact that certain variables displaying strong gender inequalities are not integrated in the index, such as political empowerment outcomes or female-to-male access to land (which are close to 0). The introduction of such additional variables would considerably lower the score reached by all counties.

Table 3: The 1850s Gender Gap Index Rankings

County	Overall Ranking	Overall Score	Economic Ranking	Educational Ranking	Health Ranking
Mayenne	1	0,862907	9	1	53
Manche	2	0,840255	46	2	12
Vosges	3	0,829824	6	10	1
Seine-Inférieure	4	0,822099	5	11	3
Haut-Rhin	5	0,819258	3	9	22
Sarthe	6	0,815942	11	5	27
Seine	7	0,808191	60	3	57
Ille-Et-Vilaine	8	0,806242	16	6	39
Meuse	9	0,801341	27	7	23
Orne	10	0,794876	8	16	18
Haute-Saône	11	0,792031	24	13	25
Maine-Et-Loire	12	0,788909	49	4	66
Doubs	13	0,787908	19	12	65
Bas-Rhin	14	0,786322	4	17	71
Moselle	15	0,780809	14	18	38
Meurthe*	16	0,778262	76	8	10
Rhône	17	0,778223	2	22	61
Eure	18	0,777234	13	21	34
Calvados	19	0,772464	40	15	28
Marne	20	0,767655	12	26	26
Jura	21	0,763339	22	20	75
Loire	22	0,758196	57	19	24
Isère	23	0,749695	25	35	20
Aube	24	0,744813	20	29	67
Haute-Marne	25	0,744456	81	14	49
Loiret	26	0,743304	48	30	7
Nord	27	0,742503	38	27	51
Seine-Et-Oise	28	0,74137	64	23	36
Côte-D'Or	29	0,739693	53	25	46
Somme	30	0,737857	42	31	37
Aisne	31	0,736216	54	32	19
Yonne	32	0,733917	63	33	11
Morbihan	33	0,732316	39	39	2
Oise	34	0,731914	41	34	43
Pas-De-Calais	35	0,730727	17	40	42
Ardennes	36	0,729735	58	24	70
Drôme	37	0,726751	1	41	83
Eure-Et-Loir	38	0,724195	52	36	30
Seine-Et-Marne	39	0,723528	68	28	56
Côtes-Du-Nord	40	0,718357	34	44	5
Hautes-Alpes	41	0,718014	23	38	81
Saône-Et-Loire	42	0,716412	21	46	40
Allier	43	0,715037	50	37	55

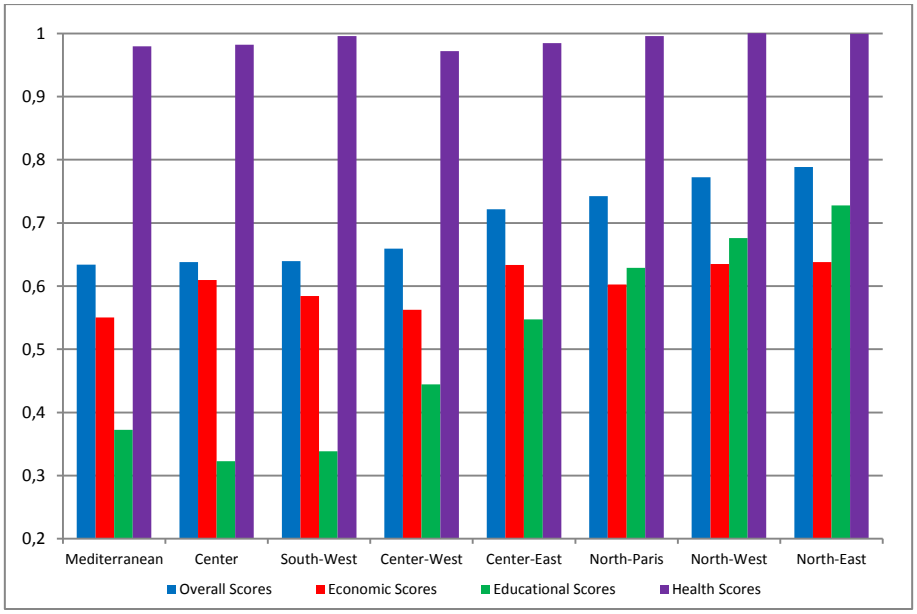
County	Overall Ranking	Overall Score	Economic Ranking	Educational Ranking	Health Ranking
Loire-Inférieure	44	0,713118	37	47	6
Ain	45	0,702963	10	52	76
Loir-Et-Cher	46	0,701483	70	43	15
Cantal	47	0,692261	30	56	41
Vendée	48	0,69154	59	48	44
Gard	49	0,690209	65	49	31
Indre-Et-Loire	50	0,685761	74	42	72
Landes	51	0,678407	7	71	9
Tarn	52	0,678077	71	51	63
Lozère	53	0,677289	36	53	84
Vaucluse	54	0,676986	33	60	58
Nièvre	55	0,6767	73	55	17
Finistère	56	0,675907	15	64	47
Corrèze	57	0,670223	32	65	29
Hérault	58	0,669378	44	58	77
Indre	59	0,668356	55	45	86
Tarn-Et-Garonne	60	0,667667	31	63	62
Charente-Inférieure	61	0,666967	72	62	4
Basses-Alpes	62	0,666936	62	57	69
Cher	63	0,659592	84	54	21
Ardèche	64	0,658796	28	70	45
Vienne	65	0,658017	66	59	68
Lot-Et-Garonne	66	0,650723	69	67	13
Haute-Garonne	67	0,641502	78	69	16
Gironde	68	0,639516	80	61	78
Haute-Vienne	69	0,633777	51	72	59
Aveyron	70	0,631806	47	74	54
Hautes-Pyrénées	71	0,630685	35	79	14
Bouches-Du-Rhône	72	0,629785	86	50	74
Creuse	73	0,624456	18	80	73
Var	74	0,623357	82	66	48
Charente	75	0,621218	43	73	82
Dordogne	76	0,617334	56	76	64
Puy-De-Dôme	77	0,616742	67	75	52
Deux-Sèvres	78	0,614772	79	68	85
Lot	79	0,608992	29	85	50
Haute-Loire	80	0,608816	45	83	32
Basses-Pyrénées	81	0,608154	75	78	35
Gers	82	0,605839	26	82	80
Ariège	83	0,594311	83	81	8
Aude	84	0,593977	85	77	33
Corse*	85	0,579659	61	86	60
Pyrénées-Orientales	86	0,576493	77	84	79

*These counties had missing data for 1 out of 10 variables.

Regional Trends

The whole sample is split into ten sub-samples in order to investigate regional performances. Counties are gathered according to their location (see Appendix F for the description of the regional classification). Figure 2 displays the regional performance of the overall score and the trends on each of the three sub-indexes. The North-East holds the top position followed closely by the North-West. Both regions have closed over 77% of the gender gap. They are followed by the North-Paris Basin and the Center-East that have closed 74% and 72% of their gap, respectively. The South-West, Center and Mediterranean periphery occupy the last places, by having close less than 64% of their gender gap.

Figure 2 : Regional Performance of the Gender Gap Index and its Sub-indexes



The North-East, North-West and North-Paris Basin counties, which perform better than other regions in the overall index, hold the top thanks to their high performance in the educational attainment sub-index. Although no county has yet achieved gender equality, North-East counties have closed more than 70% of the gender gap in educational attainment, triggered by Haut-Rhin, Vosges and Doubs. They also lead in the area of economic participation and opportunities together with North-West and Center-East, by having closed 63% of the gender gap. The relative strengths and weaknesses of the sub-indexes are given in Appendix G (see Figure G).

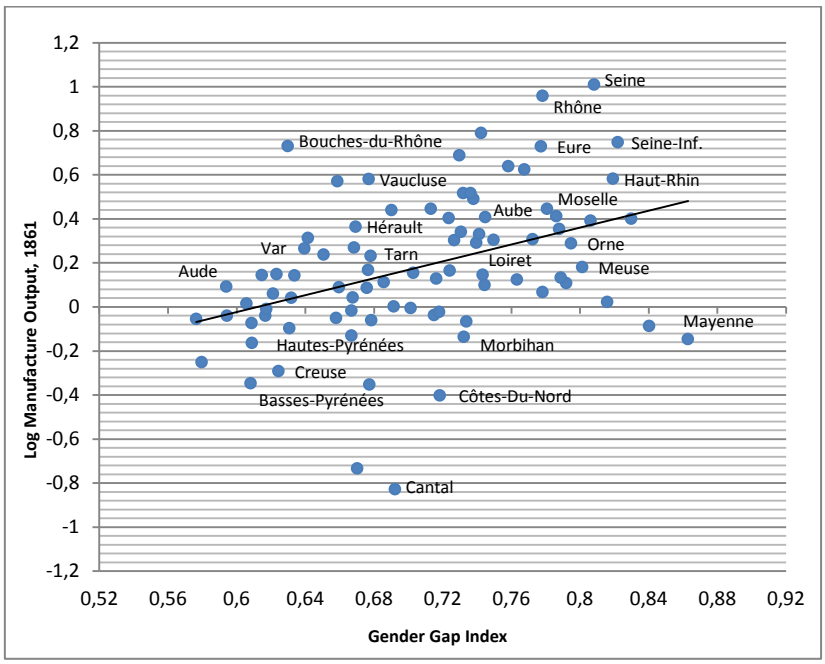
Mediterranean periphery, Center, South-West and Center-West lag behind in the overall ranking due to a dismal performance in educational attainment, triggered down by Ariège, Gers, Haute-Loire, Pyrénées-Orientales, Lot and Corse. In Center and South-West, counties have in average closed only 32% and 34% of the gender gap in educational investment, respectively. However, both regions score relatively better in economic opportunities and participation than Mediterranean periphery and Center-West, with at the end of the line Var, Ariège, Aude and Bouches-du-Rhône. Center-West has the

smallest score within French regions on health and survival, with Charente, Deux-Sèvres and Indre at the bottom spot of the sub-index.

5. The Links with Economic Performance and Demographic Profile

The previous section has examined the amplitude and the geographical distribution of the Gender Gap Index in France in the 1850s. This last section aims at providing a first hint of the links between: *(i)* gender equality and economic performance; and *(ii)* gender equality and demographic profile. As advanced by the unified growth model of Diebolt and Perrin (2013b), improvements in gender equality would be at the origin of the demographic transition and would have engaged the take-off to Modern economic growth. According to the theory, gender equality should be positively correlated with economic performance, and negatively correlated with fertility.

Figure 3 : Scatter Plot of the Links between GGI and Economic Performance

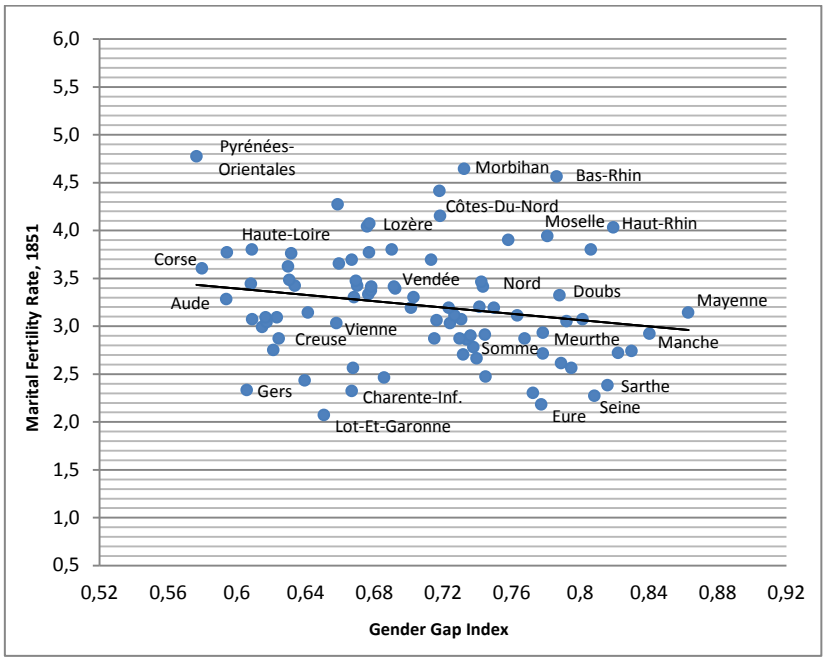


Sources: Using data from Statistiques Générales de la France

Gender equality may affect economic growth through various channels, such as the quality of endowments in human capital, the allocation of talent across occupations or via the consumption. Figure 3 presents a scatter plot that relates the Gender Gap Index with the economic performance, proxied by the output in the manufacture sector in 1861, for a set of 86 counties. The plot shows a positive correlation between the level of gender equality and the economic performance. Counties with a higher gender gap index tend to have a higher manufacture output. The correlation coefficient is 0.4032 and is highly statistically significant (at the 1% probability level).

Figure 4 displays the cross-county plot of the Gender Gap Index and the demographic profile – measured by the marital fertility rate in 1851. The plot shows a negative correlation, such that counties with a higher gender gap index tend to exhibit lower fertility rates. The correlation coefficient is -0.1973 and is statistically significant at the 5% probability level.

Figure 4 : Scatter Plot of the Links between GGI and Demographic Profile



Sources: Using data from Statistiques Générales de la France

A few outliers, not in line with such negative relation between fertility rates and the gender gap index, can be observed. For instance, counties close from the Northeastern border, such as Haut-Rhin, Bas-Rhin and Moselle, exhibit at the same time large fertility rates and high gender equality. These counties are characterized by larger educational structures, enrollment rates and literacy rates, for both genders, than any other counties. Religion is peculiar in this area closely located from Wittenberg and characterized by the largest share of Protestants.[7] Although fertility rates are amongst the largest, the average age at marriage for both genders is higher than in the rest of France.

Although correlation does not imply causality, these relationships are consistent with the theory that empowering women is beneficial to economic growth and reduces fertility (Diebolt and Perrin, 2013b). Further analysis need to be conducted to check the validity of the theory and its underlying mechanisms; and to increase the understanding of the long-run relationship between gender equality and the development process.

[7] Becker and Woessmann (2009) observe that at the times of Martin Luther, Protestantism in Prussia had a tendency to spread in circles around Wittenberg, where Luther preached that every Christian should be able to read the Bible.

6. Conclusion

The main contribution of this paper is the construction of a Gender Gap Index at the historical level. My ambition with the construction of such an index is to provide a comprehensive measure of gender equality easily comparable with other variables, i.e. economic, demographic or cultural, in a historical perspective.

Based on a unique county-level dataset of 86 observations of the middle of the 19th century stemming from the *Statistique Générale de la France*, I built an historical Gender Gap Index quantifying the size of the gap between men and women achievements in three critical areas: economic participation and opportunities, educational attainment and health and survival. The index reveals which counties have first divided more equitably their resources between genders and have given higher opportunities to women. The county comparisons afford the identification of the strengths and weaknesses of French regions in closing the gender gap. The geographical distribution of the index highlights the existence of a strong heterogeneity across regions. In particular, it shows that the counties of the Northeastern diagonal part of France are the best performers, with Mayenne at the top position, followed closely by Manche, Vosges and Seine-Inférieure.

The index scores plotted against the economic performance highlights a correlation. This result suggests that women emancipation is positively associated to the development process of a region. Various channels can link the reduction of the gender gap to economic development, such as improvements in education and training or higher productivity of the female labor force. Oppositely, the plot of the index scores against the fertility rates displays a negative correlation. These relationships are consistent with the literature stating that empowering women reduces fertility and is beneficial to economic growth, and notably with the theory of (Diebolt and Perrin, 2013b) according to which female empowerment toward greater equality is at the origin of the demographic transition and triggered Modern economic growth.

The 1850s Gender Gap index is a first try toward the generalization of the index on a longer time period (that would enable us to evaluate the evolution of gender relations over time) and, I hope toward the extension to other countries. Future work will consist in studying the main determinants of the index by identifying to what extend various factors, such as the GDP per capita, the demographic patterns, the cultural environment, the level of urbanization or even the schooling, affect the level of the Gender Gap Index. Additional future work will consist in evaluating (the other way round) to what extent the level of the Gender Gap Index impacts the GDP per capita, the demographic patterns or endowments in human capital, with as a further ambition to bring to light new answers to some of the persistent puzzles underlying the development process.

References

Bardhan K., S. Klasen (1999), "UNDP's Gender-Related Indices: A Critical Review", World *Development*, Vol. 27, n° 6, pp. 985-1010.

Becker S.O., L. Woessmann (2009), "Was Weber Wrong? A Human Capital Theory of Protestant Economic History", *Quarterly Journal of Economics* 124 (2), pp. 531-596.

Becker S.O., F. Cinnirella, L. Woessmann (2010), "The Trade-off between Fertility and Education: Evidence from before the Demographic Transition", *Journal of Economic Growth*, Vol. 15, pp. 177-204.

Branisa B., S. Klasen, M. Ziegler, D. Dreschler, J. Jütting (2014), "The Institutional Basis of Gender Inequality: The Social Institutions and Gender Index (SIGI)", *Feminist Economics*, Vol. 20, n° 2, pp. 29-64.

Cervellati M., U. Sunde (2005), "Human Capital Formation, Life Expectancy and the Process of Development", *American Economic Review*, Vol. 95, pp. 1653-1672.

Demonet M. (1990), *Tableau de l'agriculture française au milieu du XIXe siècle : l'enquête de 1852*, Paris, École des Hautes Études en Sciences Sociales, 304 p.

Diebolt C., F. Perrin (2013a), "From Stagnation to Sustained Growth: The Role of Female Empowerment", *American Economic Review, Papers & Proceedings*, Vol. 103, n° 3, pp. 545-549.

Diebolt C., F. Perrin (2013b), "From Stagnation to Sustained Growth: The Role of Female Empowerment", *AFC Working Paper*, WP2013-4.

Dijkstra A.G., L.C. Hanmer (2000), "Measuring Socio-economic Gender Inequality: Towards an Alternative to the UNDP Gender-Related Development Index", *Feminist Economics*, Vol. 6, n° 2, pp. 41-75.

Doepke M. (2004), "Accounting for Fertility Decline during the Transition to Growth", *Journal of Economic Growth*, Vol. 9, pp. 347-383.

Doepke M., M. Tertilt (2009), "Women's Liberation: What's in it for Men?", *The Quarterly Journal of Economics*, Vol. 124, n° 4, pp. 1541-1591.

Dollar D., R. Gatti (1999), "Gender Inequality, Income and Growth: Are Good Times Good for Women?", *Policy Research Report on Gender and Development Working Paper Series*, n° 1, The World Bank, Washington, DC.

Galor O., O. Moav (2002), "Natural Selection and the Origin of Economic Growth", *Quarterly Journal of Economics*, Vol. 117, pp. 1133-1191.

Galor O., D.N. Weil (1999), "From Malthusian Stagnation to Modern Growth", *American Economic Review*, Vol. 89, pp. 150-154.

Galor O., D.N. Weil (2000), "Population, Technology, and Growth: From Malthusian Stagnation to the Demographic Transition and Beyond", *American Economic Review*, Vol. 90, pp. 806-828.

Grech V, C. Savona-Ventura, C, P. Vassallo-Agius (2002), "Unexplained differences in sex ratios at birth in Europe and North America", *BMJ*, Vol. 324, n° 7344, pp. 1010-1011.

Hansen G.D., E.C. Prescott (2002), "Malthus to Solow", *American Economic Review*, Vol. 92, pp. 1205-1217.

Harvey E.B., J.H. Blakely, L. Tepperman (1990), "Towards an Index of Gender Equality", *Social Indicators Research*, Vol. 22, pp. 299-317.

Hausmann R., L. Tyson and S. Zahidi (2006), *The global gender gap report 2006*, World Economic Forum.

Insee (1966), *Annuaire Statistique de la France. Résumé Rétrospectif*, Vol. 72, Paris.

Jones C.I. (2001), "Was an Industrial Revolution Inevitable? Economic Growth over the very Long Run", *Advances in Macroeconomics*, Vol. 1, pp. 1-43.

Klasen S. (2002), "Low Schooling for Girls, Slower Growth for All? Cross-country Evidence on the Effect of Gender Equality in Education on Economic Development", *World Bank Economic Review*, Vol. 16, pp. 345-373.

Klasen, Stephan, Francesco Lamanna (2009), "The Impact of Gender Inequality in Education and Employment on Economic Growth: New Evidence for a Panel of Countries", *Feminist Economics*, Vol. 15, n° 3, pp. 97-132.

Knowles S., P. K. Lorgelly, P. D. Owen (2002), "Are educational gender gaps a brake on economic development? Some cross-country empirical evidence", *Oxford economic papers*, Vol. 54, n° 1, pp. 118-149.

Lucas R.E. (2002), *Lectures on Economic Growth*. Cambridge, MA: Harvard University Press.

Perrin F. (2013), *Gender Equality and Economic Growth in the Long-Run. A Cliometric Analysis*, PhD Dissertation, University of Strasbourg - Scuola Superiore Sant'Anna, 352 p.

Schüler D. (2006), "The Uses and Misuses of the Gender-related Development Index and Gender Empowerment Measure: A Review of the Literature", *Journal of Human Development*, Vol. 7, n° 2, pp. 161-81.

Schultz T.P. (1995), "Investments in Schooling and Health of Women and Men: Quantities and Returns", In: Schultz T.P. (ed.), *Investment in Women's Human Capital*. Chicago: University of Chicago Press.

Strulik H., J. Weisdorf (2008), "Population, Food, and Knowledge: A Simple Unified Growth Theory", *Journal of Economic Growth*, Vol. 13, pp. 195-216.

Yllö K. (1984), "The status of women, marital equality, and violence against wives. A contextual analysis", *Journal of Family Issues*, Vol. 5, n° 3, pp. 307-320.

Appendix A – County-level Data for France in the mid-19th Century

The data used in this paper are mainly extracted from books published by the *Statistique Générale de la France* (SGF) on population, demographic and public education censuses, between 1800 and 1925. Almost all data are available for 86 counties.

Variables

- **Female (Male) in industry, in 1851.** Number of women (men) employed in manufacturing over total number of women (men) aged 15-60. Manufacturing refers to all types of industry: textile, metal sector and other factories (food, wood, construction…).
- **Female (Male) in agriculture, in 1851.** Number of women (men) employed in agriculture over total number of women (men) aged 15-60. Agriculture refers to all positions within agricultural sector: owners, farmers, sharecroppers and others.
- **Female (Male) literacy rate, in 1854.** The literacy rate consists in number of individuals able to read and to write over total population. 1856-66
- **Girls (Boys) enrollment rate, in 1850.** Number of girls (boys) enrolled in public primary schools over the total number of girls (boys) aged 6-14.
- **Girls (Boys) public primary schools, in 1850.** Number of public primary schools dedicated to girls (boys).
- **Marital fertility rate, in 1851.** Number of new born per married women in age of childbearing (15-45).
- **Female (Male) wage in agriculture, in 1852.** Average of female (male) farm worker wages in *francs* for one working day in the agricultural sector.
- **Life expectancy at age 0, in 1856.** The life expectancy is the expected (in the statistical sense) number of years of life remaining at a given age (here at age 0) – calculated by constructing a life table.
- **Female (Male) living birth, in 1851.** Number of female (male) living births.
- **Female (Male) mortality rate, in 1851.** Number of women (men) who died per 1000 living women (men).
- **Female (Male) wage in industry, in 1861.** Average of female (male) worker wages in *francs* in different industries proportionally to the weight of female (male) in each industry for each department. Manufacturing refers to all types of industry: textile, metal sector and other factories (food, wood, construction…).
- **Manufacture output, in 1861.** Value added in manufacturing per individuals.

Table A: Structure of the 1850s Gender Gap Index

Sub-index	Variables	Sources
Economic Opportunity	Ratio: female labor force in agriculture over male value	*Statistique Générale de la France*, Recensement 1851
	Ratio: female labor force in industry over male value	*Statistique Générale de la France*, Recensement 1851
	Ratio: female wage over male value in manufacturing	*Statistique Générale de la France*, Statistique industriel, 1861
	Ratio: female wage over male value in agriculture	*Statistique Générale de la France*, Enquête agricole, 1852
Educational Attainment	Ratio: female literacy rate over male value	*Statistique Générale de la France*, Enseignement primaire, 1854
	Ratio: female enrollment rate in primary school over male value	*Statistique Générale de la France*, Enseignement primaire, 1850
	Ratio: female public primary schools over male value	*Statistique Générale de la France*, Enseignement Primaire, 1850
Health and Survival	Ratio: female living births over male value	*Statistique Générale de la France*, Recensement, 1851
	Ratio: female mortality over male value	*Statistique Générale de la France*, Recensement, 1851
	Ratio: female life expectancy over male value	*Statistique Générale de la France*, Recensement – Mouvement de la population, 1856

Appendix B – Calculating life expectancy

Life expectancy is calculated by constructing a life table. The data needed to construct a life table and then to calculate life expectancy for a particular geographic area are the population by age bands and the number of deaths for similar age bands. The construction of a measure of life expectancy requires several steps: *(i)* calculating the age specific death rates, $M_x = \frac{deaths}{population}$; *(ii)* calculating the probability of dying, $q_x = \frac{n.M_x}{1+n(1-a_x).M_x}$, where n is the width of each age band interval and a_x the average proportion of the interval lived by individuals before dying, for all age bands; *(iii)* calculating the probability of surviving, $q_x = 1 - p_x$; *(iv)* calculating the number of person alive for an hypothetical population made of 100 000 individuals at age 0, $l_x = l_{x-n} \,.\, p_{x-n}$; *(v)* calculating the number of death during the considered interval, $d_x = l_x - l_{x-n}$; *(vi)* calculating the number of living people during the considered interval, $L_x = n \,.\, [l_{x-n} + (a_x \,.\, d_x)]$; *(vii)* calculating the total number of living persons after the interval, $T_x = T_{x+n} + L_x$; (viii) calculating the expectation of life, $e_x = \frac{T_x}{l_x}$.

Appendix C – Administrative France

Figure C: Administrative France

Source: http://www.cartesfrance.fr/geographie/cartes-administratives/france.html

Note: The name of several *départements* has changed over time. Prior to 1970, the Alpes-de-Haute-Provence was called Basses-Alpes; prior to 1941, the Charente-Maritime was known as the Charente-Inférieure; prior to 1955; the Seine-Maritime was entitled Seine-Inférieure; and prior to 1968, Paris, Hauts-de-Seine, Seine-Saint-Denis and Val-de-Marne composed the Seine, while Yvelines, Essonne, Val-d'Oise together were known as the Seine-et-Oise.

Appendix D1 – Ranking by Sub-index – Economic Opportunity and Participation

County	Score	Rank
Drôme	0,707332	1
Rhône	0,706519	2
Haut-Rhin	0,695137	3
Bas-Rhin	0,692712	4
Seine-Inférieure	0,687427	5
Vosges	0,68061	6
Landes	0,67692	7
Orne	0,67556	8
Mayenne	0,674166	9
Ain	0,666935	10
Sarthe	0,663939	11
Marne	0,662547	12
Eure	0,658951	13
Moselle	0,655134	14
Finistère	0,653413	15
Ille-Et-Vilaine	0,652955	16
Pas-De-Calais	0,65209	17
Creuse	0,648581	18
Doubs	0,646298	19
Aube	0,644441	20
Saône-Et-Loire	0,644213	21
Jura	0,644201	22
Hautes-Alpes	0,641864	23
Haute-Saône	0,64086	24
Isère	0,640387	25
Gers	0,63935	26
Meuse	0,634927	27
Ardèche	0,631673	28
Lot	0,63066	29
Cantal	0,629398	30
Tarn-Et-Garonne	0,628525	31
Corrèze	0,625114	32
Vaucluse	0,618476	33
Côtes-Du-Nord	0,617853	34
Hautes-Pyrénées	0,616767	35
Lozère	0,615105	36
Loire-Inférieure	0,61477	37
Nord	0,613081	38
Morbihan	0,607237	39
Calvados	0,606866	40
Oise	0,600963	41
Somme	0,600787	42
Charente	0,600484	43

County	Score	Rank
Hérault	0,600429	44
Haute-Loire	0,599942	45
Manche	0,598499	46
Aveyron	0,59806	47
Loiret	0,595506	48
Maine-Et-Loire	0,594257	49
Allier	0,593753	50
Haute-Vienne	0,593211	51
Eure-Et-Loir	0,592046	52
Côte-D'Or	0,591095	53
Aisne	0,588931	54
Indre	0,584964	55
Dordogne	0,584583	56
Loire	0,583148	57
Ardennes	0,581544	58
Vendée	0,581229	59
Seine	0,580494	60
Corse*	0,580052	61
Basses-Alpes	0,579903	62
Yonne	0,579027	63
Seine-Et-Oise	0,576593	64
Gard	0,573283	65
Vienne	0,570609	66
Puy-De-Dôme	0,570134	67
Seine-Et-Marne	0,56991	68
Lot-Et-Garonne	0,568307	69
Loir-Et-Cher	0,568064	70
Tarn	0,565042	71
Charente-Inférieure	0,563841	72
Nièvre	0,562112	73
Indre-Et-Loire	0,561143	74
Basses-Pyrénées	0,557845	75
Meurthe	0,557306	76
Pyrénées-Orientales	0,55499	77
Haute-Garonne	0,549347	78
Deux-Sèvres	0,548048	79
Gironde	0,533105	80
Haute-Marne	0,532305	81
Var	0,509038	82
Ariège	0,508626	83
Cher	0,502363	84
Aude	0,501972	85
Bouches-Du-Rhône	0,435351	86

Appendix D2 – Ranking by Sub-index – Educational Attainment

County	Score	Rank
Mayenne	0,929455	1
Manche	0,905085	2
Seine	0,86124	3
Maine-Et-Loire	0,797394	4
Sarthe	0,777862	5
Ille-Et-Vilaine	0,767634	6
Meuse	0,760524	7
Meurthe	0,759055	8
Haut-Rhin	0,752846	9
Vosges	0,752376	10
Seine-Inférieure	0,750635	11
Doubs	0,741451	12
Haute-Saône	0,728085	13
Haute-Marne	0,712652	14
Calvados	0,704928	15
Orne	0,69855	16
Bas-Rhin	0,697487	17
Moselle	0,687678	18
Loire	0,68371	19
Jura	0,68291	20
Eure	0,669957	21
Rhône	0,64702	22
Seine-Et-Oise	0,646384	23
Ardennes	0,638729	24
Côte-D'Or	0,636927	25
Marne	0,633857	26
Nord	0,628953	27
Seine-Et-Marne	0,617621	28
Aube	0,616751	29
Loiret	0,614777	30
Somme	0,611853	31
Aisne	0,609278	32
Yonne	0,605099	33
Oise	0,600364	34
Isère	0,598704	35
Eure-Et-Loir	0,575401	36
Allier	0,56823	37
Hautes-Alpes	0,561262	38
Morbihan	0,560977	39
Pas-De-Calais	0,545598	40
Drôme	0,529368	41
Indre-Et-Loire	0,528345	42
Loir-Et-Cher	0,522529	43

County	Score	Rank
Côtes-Du-Nord	0,513028	44
Indre	0,511594	45
Saône-Et-Loire	0,508406	46
Loire-Inférieure	0,50307	47
Vendée	0,499617	48
Gard	0,493383	49
Bouches-Du-Rhône	0,490839	50
Tarn	0,489829	51
Ain	0,480757	52
Lozère	0,478841	53
Cher	0,466572	54
Nièvre	0,456359	55
Cantal	0,45254	56
Basses-Alpes	0,448627	57
Hérault	0,447226	58
Vienne	0,430293	59
Vaucluse	0,430104	60
Gironde	0,425433	61
Charente-Inférieure	0,411479	62
Tarn-Et-Garonne	0,393918	63
Finistère	0,384249	64
Corrèze	0,380403	65
Var	0,37121	66
Lot-Et-Garonne	0,367272	67
Deux-Sèvres	0,36686	68
Haute-Garonne	0,362657	69
Ardèche	0,351626	70
Landes	0,339779	71
Haute-Vienne	0,326424	72
Charente	0,316387	73
Aveyron	0,31311	74
Puy-De-Dôme	0,294672	75
Dordogne	0,289164	76
Aude	0,276893	77
Basses-Pyrénées	0,265139	78
Hautes-Pyrénées	0,26053	79
Creuse	0,259471	80
Ariège	0,254695	81
Gers	0,224456	82
Haute-Loire	0,222994	83
Pyrénées-Orientales	0,216179	84
Lot	0,209877	85
Corse	0,177694	86

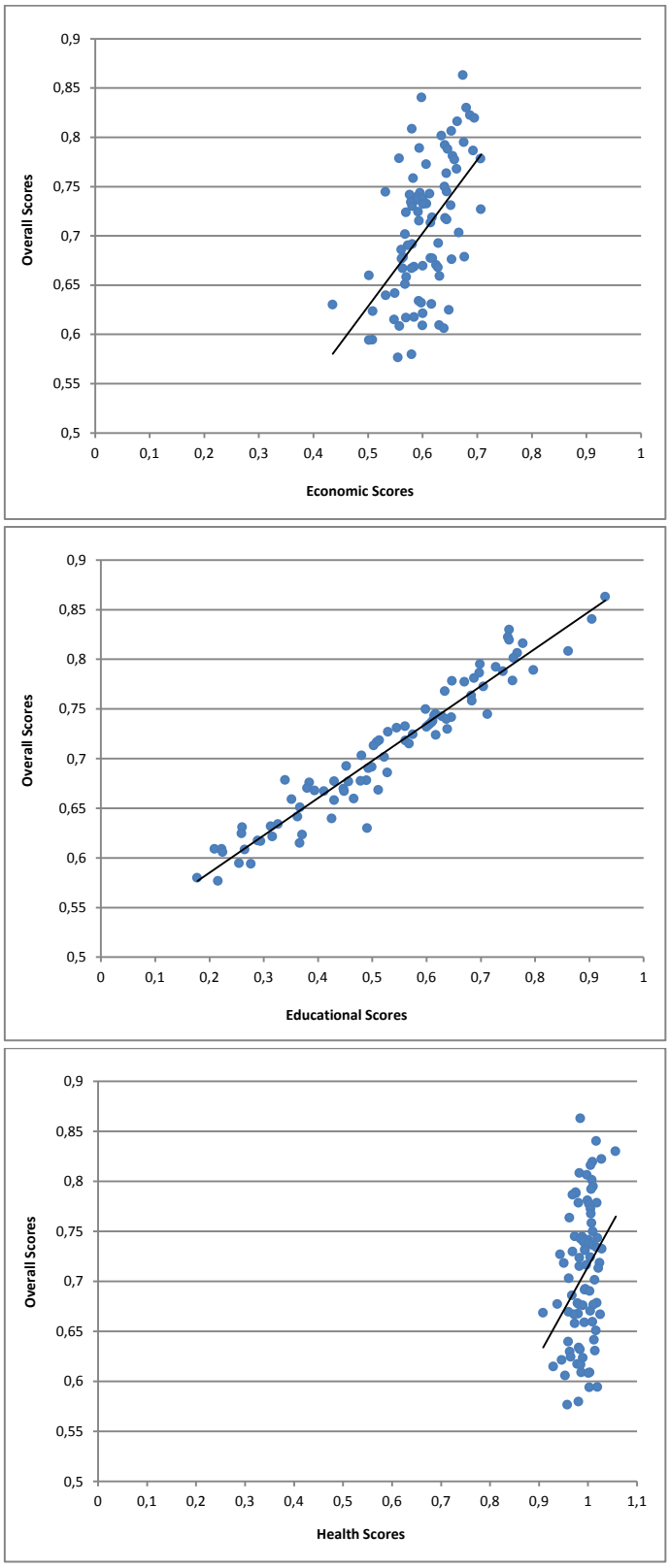
Appendix D3 – Ranking by Sub-index – Health and Survival

County	Score	Rank
Vosges	1,056487	1
Morbihan	1,028734	2
Seine-Inférieure	1,028236	3
Charente-Inférieure	1,025581	4
Côtes-Du-Nord	1,024189	5
Loire-Inférieure	1,021513	6
Loiret	1,019629	7
Ariège	1,019611	8
Landes	1,018521	9
Meurthe*	1,018424	10
Yonne	1,017625	11
Manche	1,017181	12
Lot-Et-Garonne	1,016591	13
Hautes-Pyrénées	1,014757	14
Loir-Et-Cher	1,013857	15
Haute-Garonne	1,0125	16
Nièvre	1,01163	17
Orne	1,010518	18
Aisne	1,010439	19
Isère	1,009995	20
Cher	1,009841	21
Haut-Rhin	1,009791	22
Meuse	1,00857	23
Loire	1,007729	24
Haute-Saône	1,007148	25
Marne	1,006561	26
Sarthe	1,006026	27
Calvados	1,005597	28
Corrèze	1,005151	29
Eure-Et-Loir	1,005136	30
Gard	1,003961	31
Haute-Loire	1,003511	32
Aude	1,003066	33
Eure	1,002795	34
Basses-Pyrénées	1,001477	35
Seine-Et-Oise	1,001134	36
Somme	1,000932	37
Moselle	0,999616	38
Ille-Et-Vilaine	0,998136	39
Saône-Et-Loire	0,996618	40
Cantal	0,994846	41
Pas-De-Calais	0,994493	42
Oise	0,994413	43

County	Score	Rank
Vendée	0,993776	44
Ardèche	0,993089	45
Côte-D'Or	0,991057	46
Finistère	0,99006	47
Var	0,989821	48
Haute-Marne	0,98841	49
Lot	0,986437	50
Nord	0,985474	51
Puy-De-Dôme	0,985421	52
Mayenne	0,985099	53
Aveyron	0,984248	54
Allier	0,983127	55
Seine-Et-Marne	0,983054	56
Seine	0,982838	57
Vaucluse	0,982379	58
Haute-Vienne	0,981694	59
Corse	0,98123	60
Rhône	0,98113	61
Tarn-Et-Garonne	0,980557	62
Tarn	0,979361	63
Dordogne	0,978255	64
Doubs	0,975974	65
Maine-Et-Loire	0,975076	66
Aube	0,973247	67
Vienne	0,97315	68
Basses-Alpes	0,972277	69
Ardennes	0,968931	70
Bas-Rhin	0,968767	71
Indre-Et-Loire	0,967794	72
Creuse	0,965315	73
Bouches-Du-Rhône	0,963163	74
Jura	0,962907	75
Ain	0,961198	76
Hérault	0,960479	77
Gironde	0,960009	78
Pyrénées-Orientales	0,958311	79
Gers	0,953711	80
Hautes-Alpes	0,950916	81
Charente	0,946784	82
Drôme	0,943554	83
Lozère	0,93792	84
Deux-Sèvres	0,929409	85
Indre	0,908511	86

Appendix E – Relationship between Sub-index Scores and GGI Scores

Figure E: Sub-index Scores in Relation to Gender Gap Index Scores

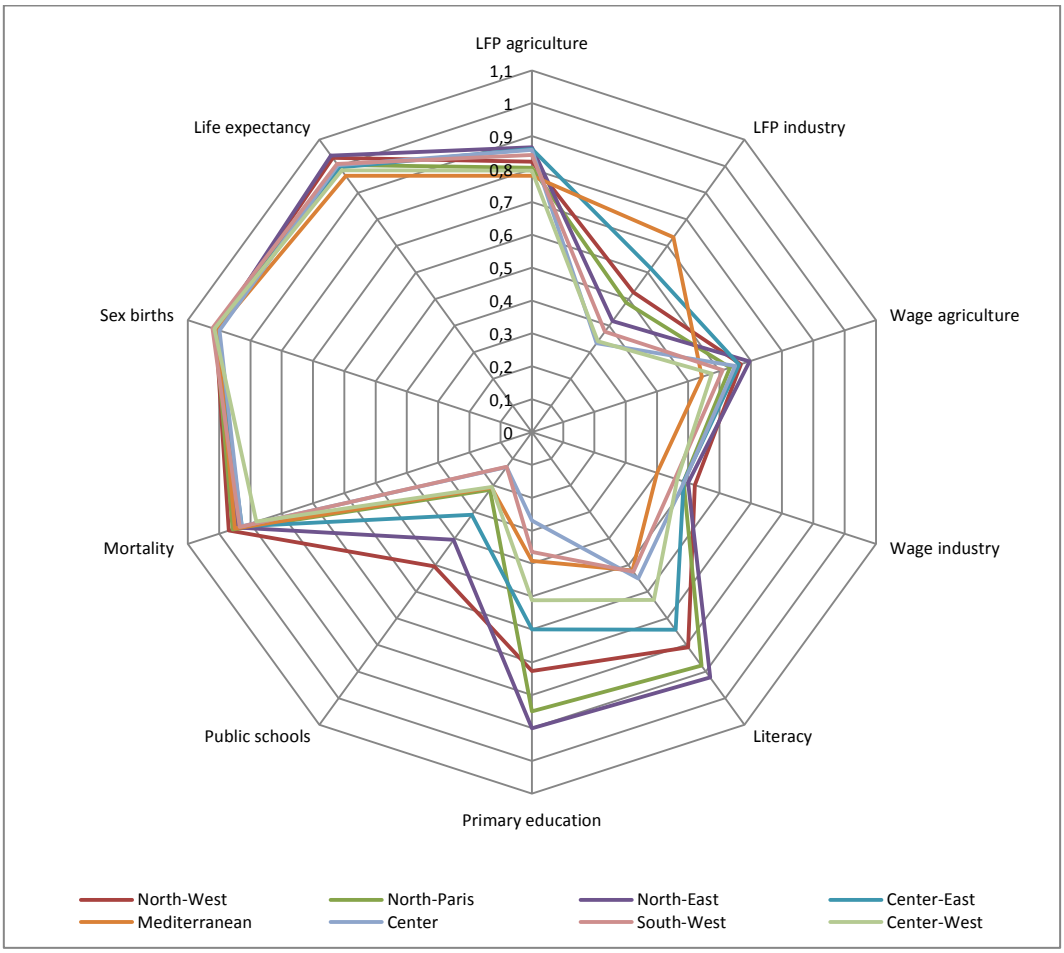


Appendix F – Regional Classification

Nord-Ouest	Nord-Bassin Parisien	Nord-Est	Centre-Est	Méditerranée	Centre	Sud-Ouest	Centre-Ouest
Calvados Côtes-Du-Nord Eure Finistère Ille-Et-Vilaine Loire-Inférieure Maine-Et-Loire Manche Mayenne Morbihan Orne Sarthe Seine-Inférieure Vendée	Aisne Ardennes Aube Eure-Et-Loir Loiret Marne Nord Oise Pas-De-Calais Seine Seine-Et-Marne Seine-Et-Oise Somme Yonne	Doubs Jura Haute-Marne Meurthe Meuse Moselle Bas-Rhin Haut-Rhin Haute-Saône Vosges	Ain Allier Hautes-Alpes Ardèche Côte-D'Or Drôme Isère Loire Nièvre Rhône Saône-Et-Loire	Basses-Alpes Aude Bouches-Du-Rhône Corse Gard Hérault Pyrénées-Orientales Var Vaucluse	Aveyron Cantal Corrèze Creuse Dordogne Haute-Loire Lot Lozère Puy-De-Dôme Haute-Vienne	Ariège Haute-Garonne Gers Gironde Landes Lot-Et-Garonne Basses-Pyrénées Hautes-Pyrénées Tarn Tarn-Et-Garonne	Charente Charente-Inférieure Cher Indre Indre-Et-Loire Loir-Et-Cher Deux-Sèvres Vienne

Appendix G – Regional Profiles

Figure G: Radar Chart of Regional Profiles



WORKING PAPERS DE L'AFC

Année 2014

WP2014-1 Emanuele FELICE
"GDP and convergence in modern times"

WP2014-2 Claude DIEBOLT, Faustine PERRIN
"Growth Theories"

WP2014-3 Magali JAOUL-GRAMMARE
"Prestige social des professions et substituabilité des filières universitaires en France au XXème siècle"

WP2014-4 Ralph HIPPE
"Human Capital in European Regions since the French Revolution"

WP2014-5 Faustine PERRIN
"On the Construction of a Historical Gender Gap Index. An Implementation on French Data"

WP2014-6 Tapas MISHRA, Mamata PARHI, Claude DIEBOLT
"Evolutionary efficiency and distributive effects of inertia in cross-country life-satisfaction"

La liste complète des Working Papers est disponible sur le site www.cliometrie.org