

Desigualdades frente a la salud y la muerte durante la transición de la mortalidad en Europa occidental.

Una perspectiva de largo plazo.

Lionel Kesztenbaum
INED

Catedra de Demografia
El Colegio de Mexico,
7 de octubre, 2013

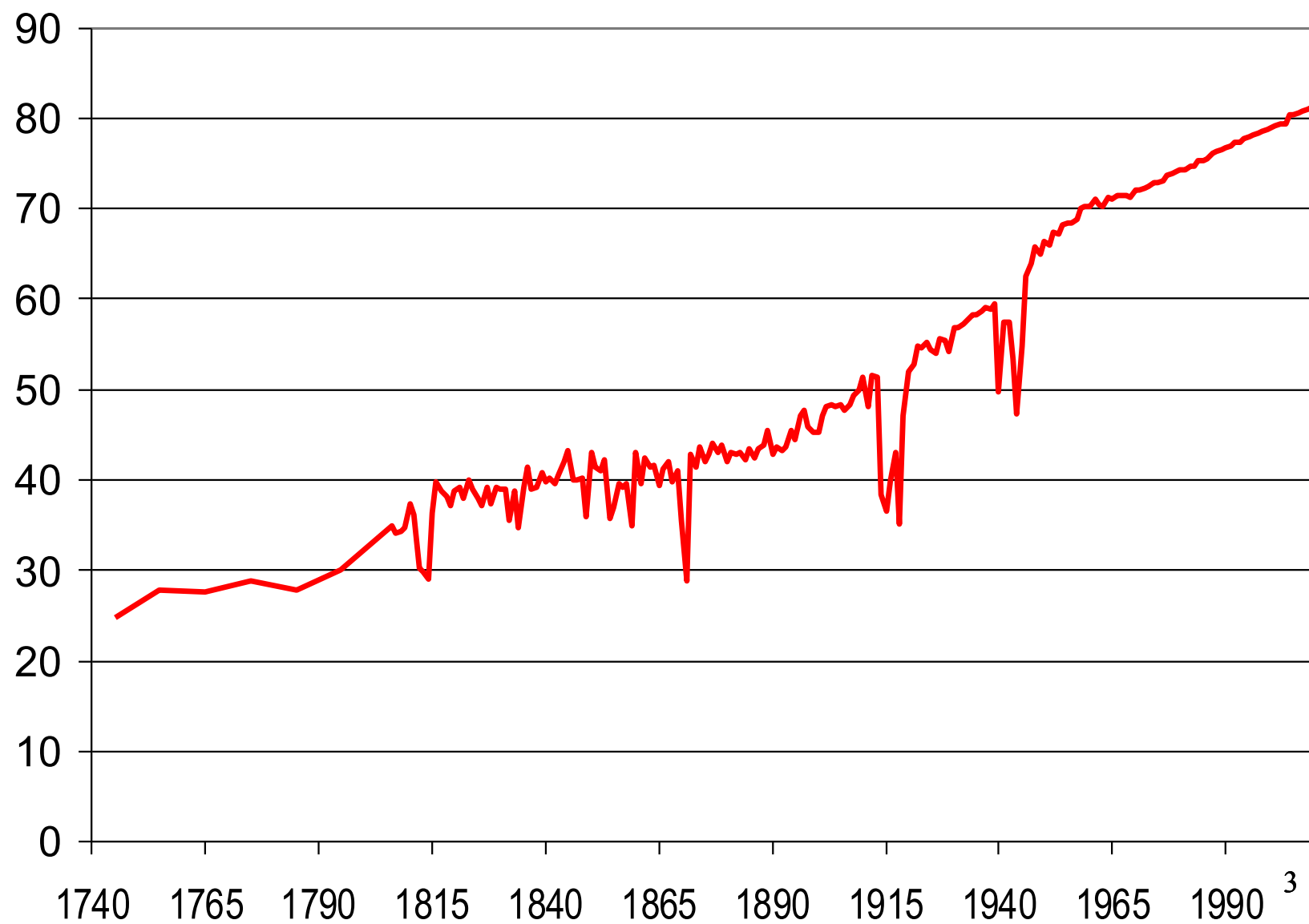
Mortality and health inequalities in the long run.

Lessons from Western Europe

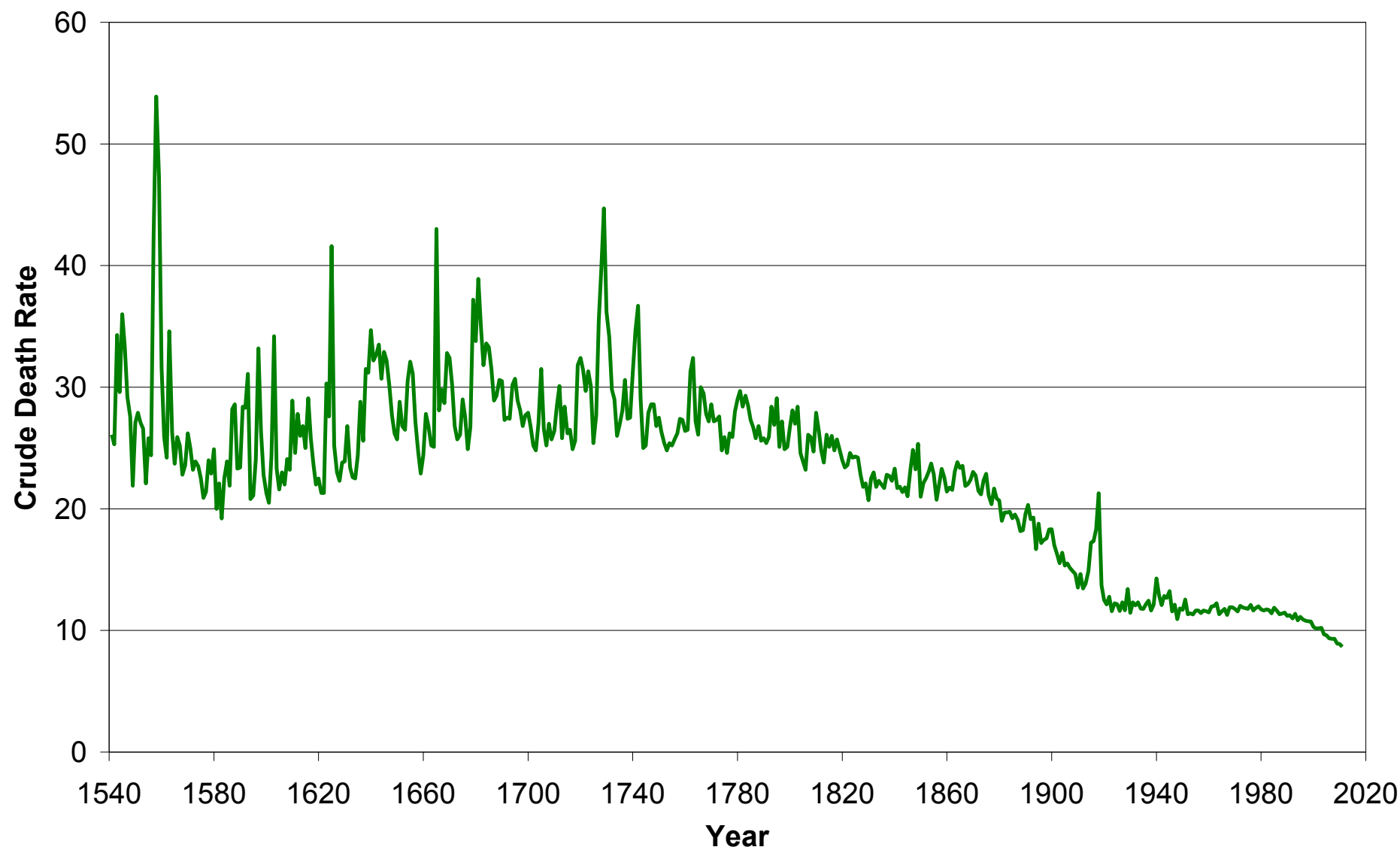
Lionel Kesztenbaum
INED

Catedra de Demografia
El Colegio de Mexico,
7 de octubre, 2013

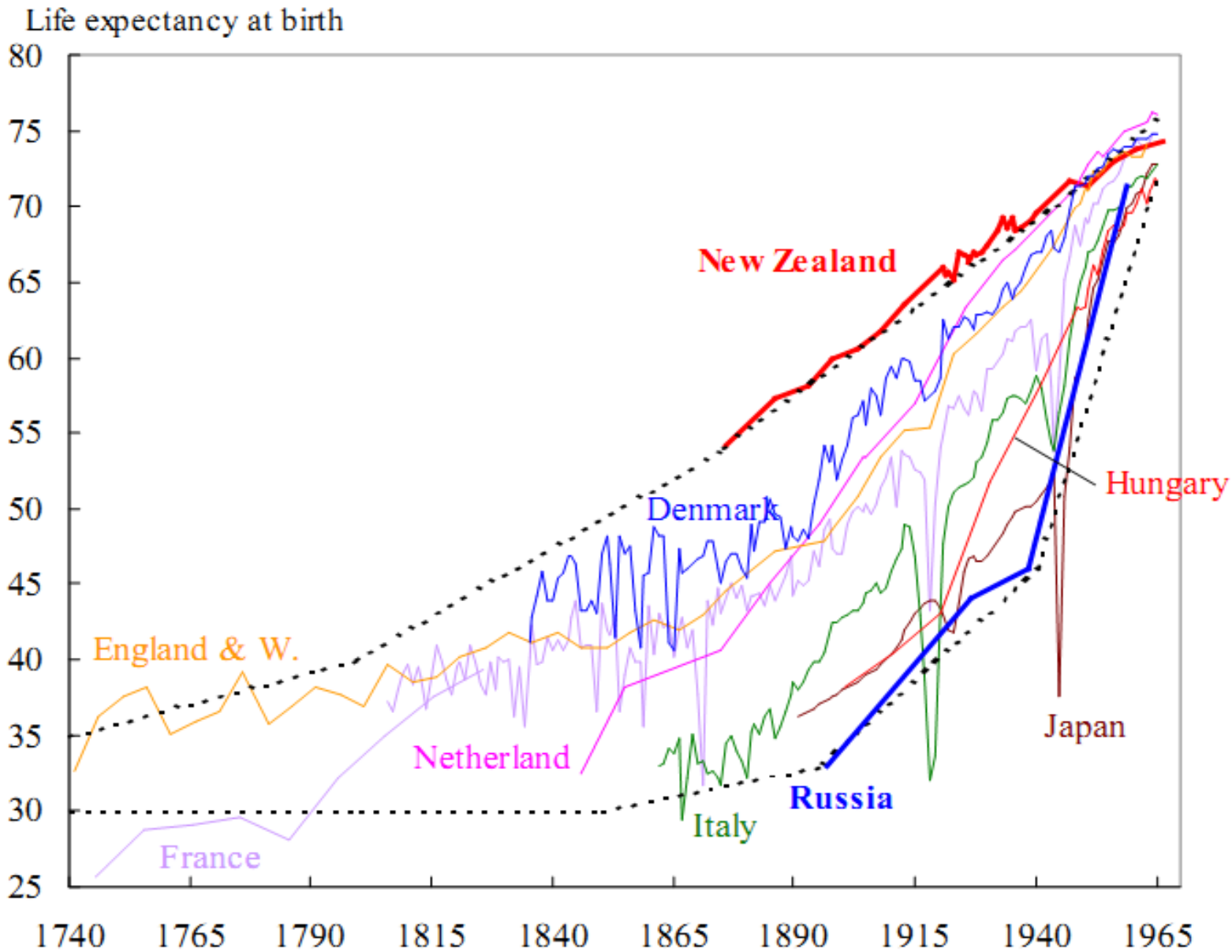
Life expectancy at birth in France



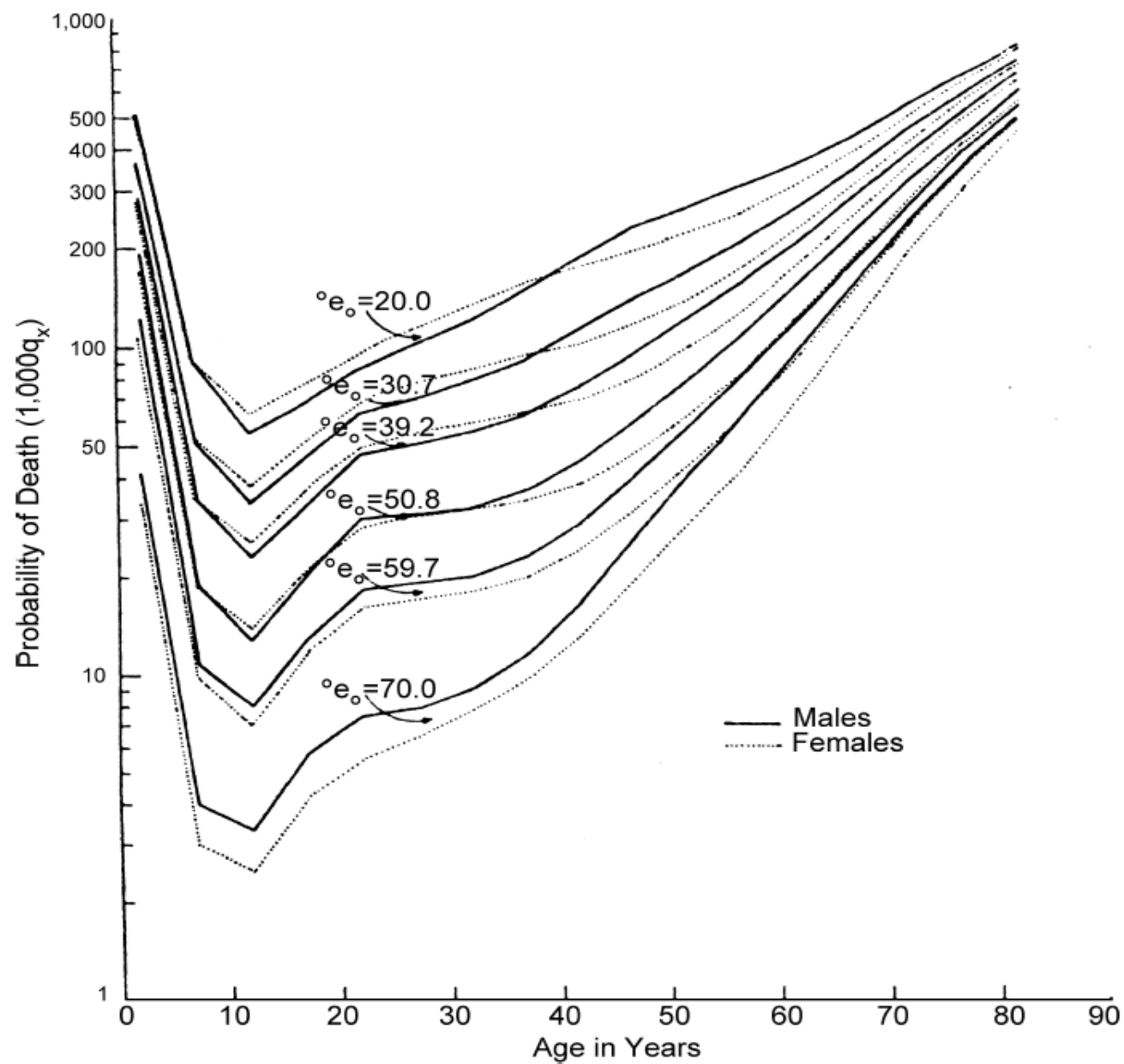
Mortality rates in England



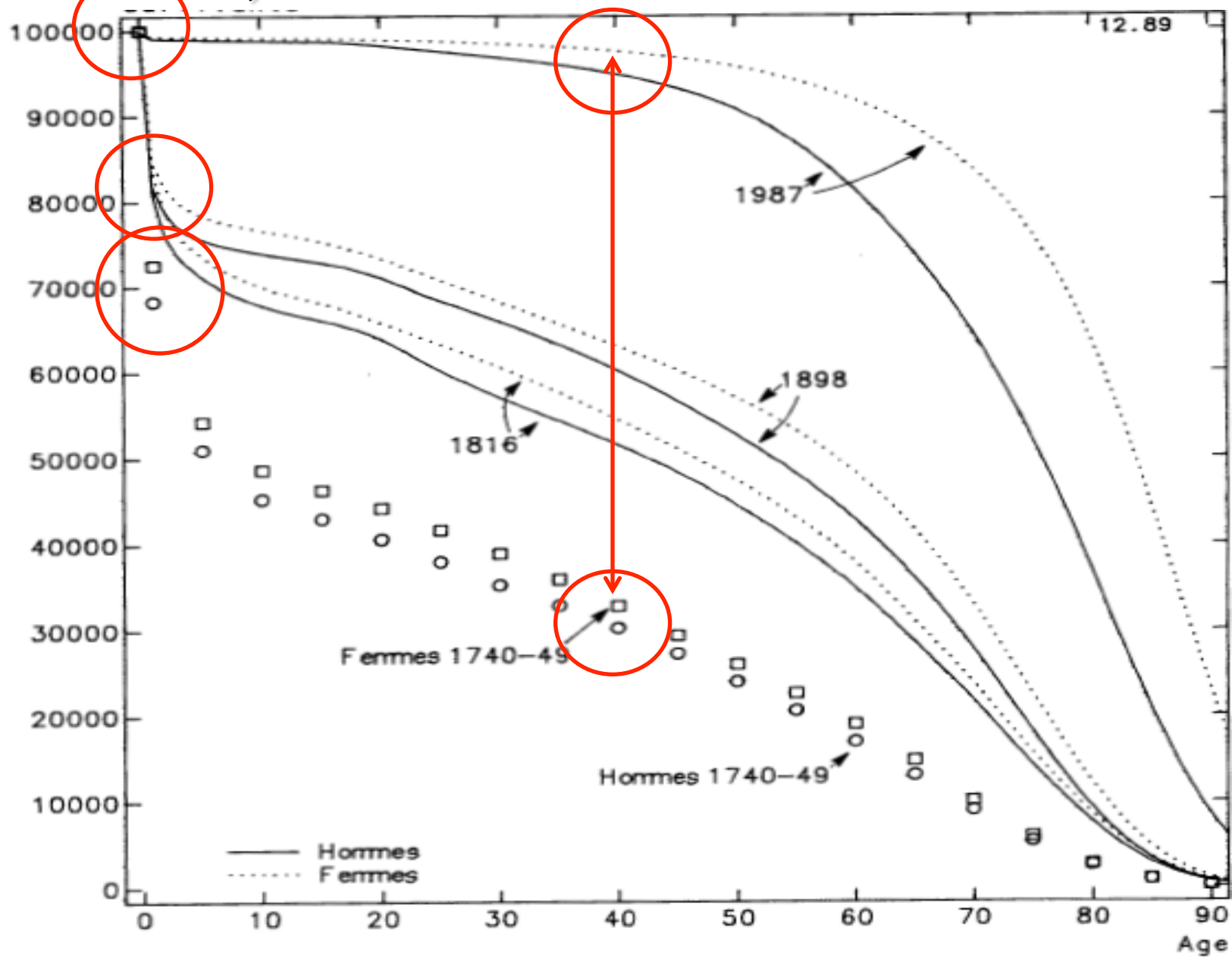
Mortality decrease in the West



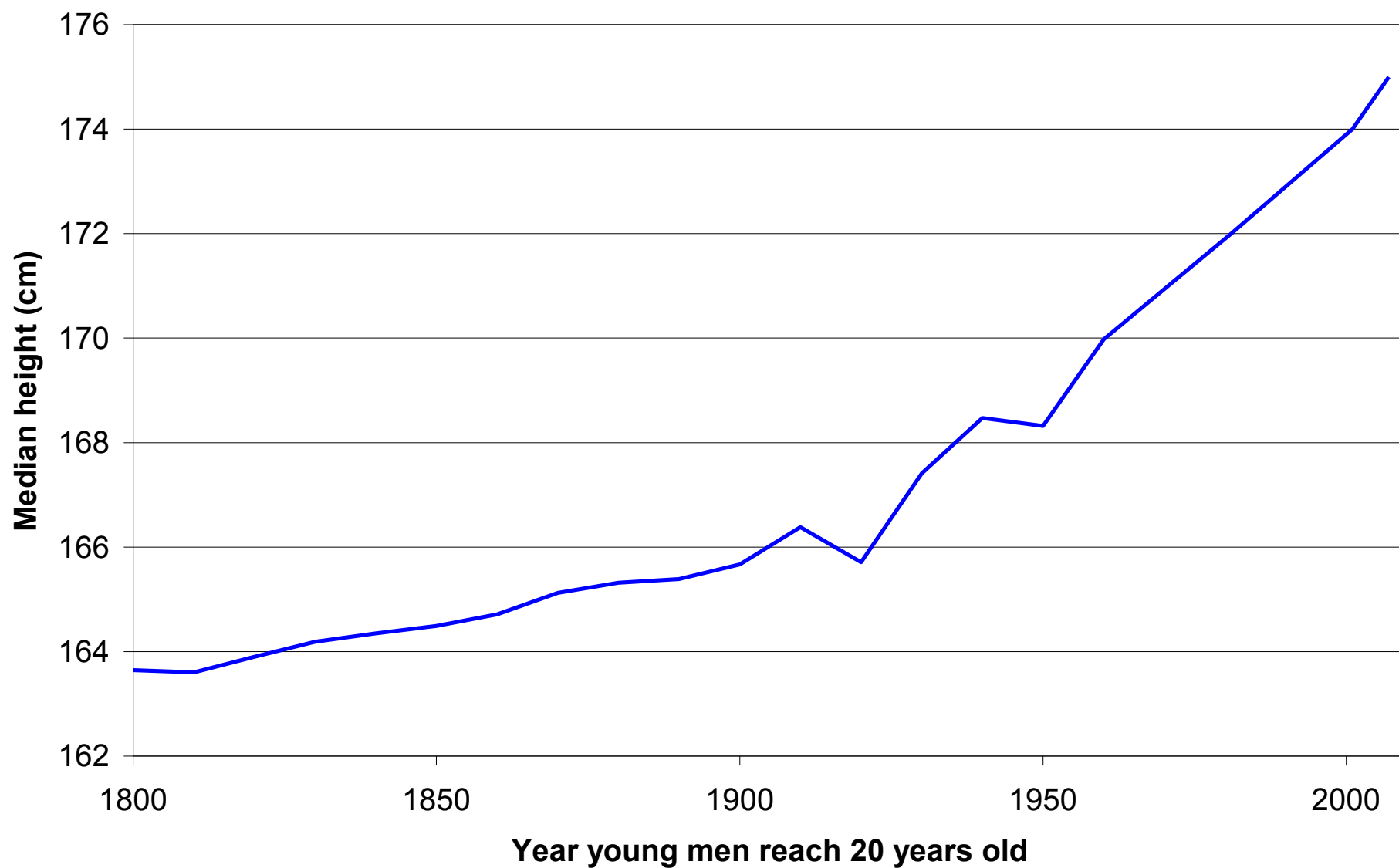
Probability of death by age



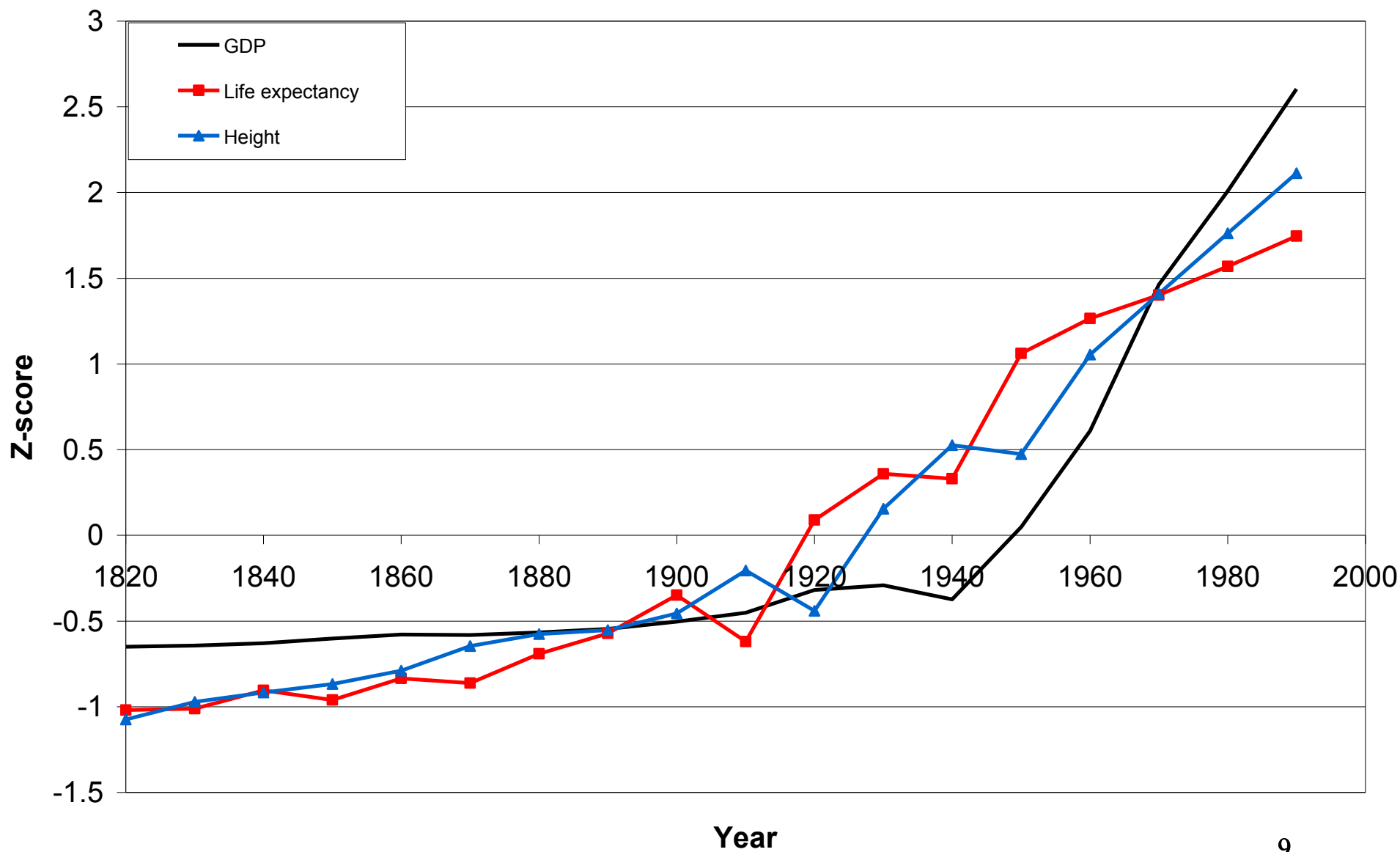
Survival curves, 1740-1900



Median male height in France



Height, life expectancy and GDP in France (standardized)



General settings (1) income and mortality

- Do economic growth reduce mortality?
 - Income produce health.
 - But direct causation difficult to assess.
 - Lack of empirical evidences.
- A more complex pattern
 - Both direct and indirect effects.
 - Combination of public and private health.
 - Long term effects (early life hypothesis, foetal hypothesis, etc.).
- Overall, huge historical changes in mortality not (Directly? Entirely?) linked to increase of income.

General settings (2) health and income

- The capacity to work is limited by health status.
 - Better food produces healthier individuals.
 - Better health produces income.
- Physical capital.
 - Size and shape of the body matter...
 - ...and change also over time.
- Mortality is not the only thing that matters, health is also important.
- In the long run virtuous circle as both physical and economic capital increase.

General settings (3) inequalities in mortality and health

- How does inequality evolve during the health transition?
 - Decrease in overall mortality may combine with stable (or even increasing) inequalities.
 - Historically both a strong wealth gradient and a strong urban penalty.
 - Mortality inequalities are quite high today in developed countries.
- Investigating the mortality transition
 - The evolution of inequalities may depends on the factors underlying the mortality transition.
 - Long term effects.
- Paris at the turn of the 20th century
 - One example of a place with strong inequalities in different dimensions.
 - Allows to test the timing of the historical decrease in mortality.

Mortality and health inequalities in the long run

1. Income growth and the health transition
2. Paris as a laboratory
3. Inequalities in time and space
4. Public goods
5. Concluding remarks

Public policies during the health transition

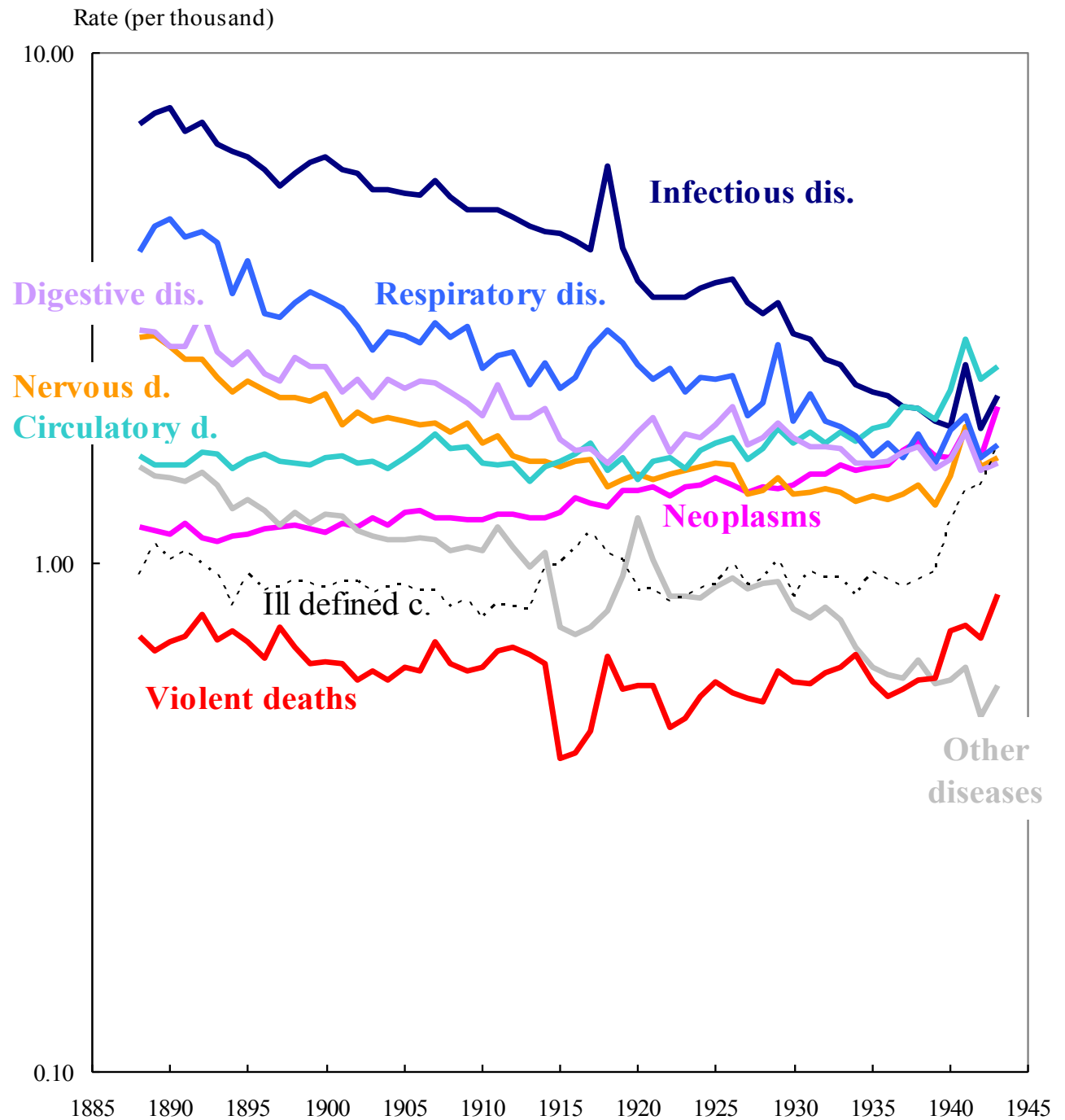
- What drove the health transition? Private vs public goods
 - ❖ Income.
 - ❖ Hygiene.
 - ❖ Medicine.
- Public health policies...
 - ❖ Transfer of medical knowledge.
 - ❖ Everyday application.
- ...but also large scale health improving infrastructures.

The role of income in mortality

- Why would income matters?
 - ❖ Exposure.
 - ❖ Nutrition.
 - ❖ Access to medical treatment.
- On a macro level mortality depends on knowledge.
 - ❖ The role of medicine and health technology.
- Improvement of sanitary conditions.
 - ❖ The role of public health.
- Hygiene and changes in the perception of health.
 - ❖ Home economics.

Changes in diseases structure

(Meslé et Vallin, 2009)



Medical technology

- A game against nature.
 - ❖ Knowledge.
 - ❖ Belief in mankind's capacity to change his health and mortality.
- Different complementary levels.
 - ❖ Best knowledge and practice.
 - ❖ Average practice.
 - ❖ The level of inequality.
- Before 1870, lack of knowledge.
- The emergence of the germ theory.
 - ❖ Pasteur, Koch.
 - ❖ Understanding how diseases are transmitted and the role of water and food.

Public health

➤ Initial interventions

- Control of epidemics.

➤ Market failure

- *Report on the sanitary condition of the British working class*, 1842.
- Public Health Act, 1848.

➤ Inoculation and vaccination

- Jenner and smallpox.
- The concomitant rise of statistics, public health and probability theory.

Sanitary movement

- Rise of statistical data and analysis.
 - ❖ Louis vs Broussais.
 - ❖ Snow, *On the Mode of Communication of Cholera*, 1849.
 - ❖ But also drawbacks and failure (Semmelweis).
- Large-scale publications: public health.
 - ❖ *Annales d'hygiène publique*, 1829.
- Interaction with society at large.
 - ❖ Importance of vector, nutriment, etc.

Hygiene

- How to diffuse new idea in sanitation
 - ❖ Experts and doctors.
 - ❖ Development of hygienist movements, societies, etc.
 - ❖ Direct propaganda.
- Special attention to the children
 - ❖ The role of hygiene at home.
 - ❖ La goutte de lait.
- Home economics
 - ❖ The direct result of the germ theory.

The health-wealth relationship

- How much does wealth influence life chances?
 - ❖ Various indicators: wealth, income, education, etc.
 - ❖ Most studies use occupation as a proxy for affluence.
- Does this relationship change with time?
 - ❖ The gradient is invariant with time.
 - ❖ The gradient appears with the industrial revolution and diminishes during the 20th century.
 - ❖ Most studies focus on one particular place.

Features of the mortality transition

❑ The “urban penalty”

- ▲ Linked to bad living conditions...
- ▲ ...or population concentration?
- ▲ Stay high until the 20th century.

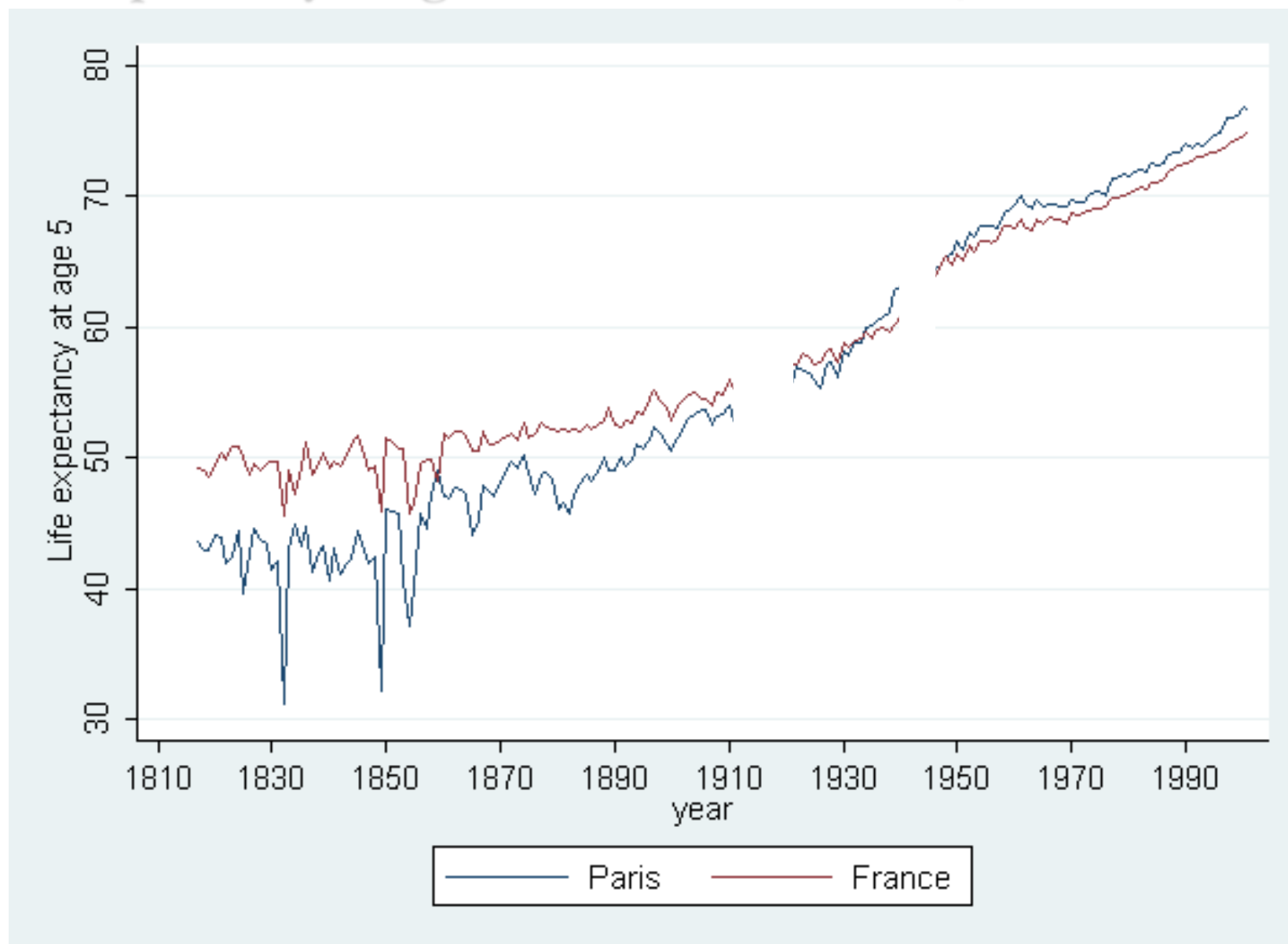
❑ The gender gap

- ▲ A natural advantage compensated (or reversed) by social practices.
- ▲ A spectacular increase in male mortality.
- ▲ Finally social practices and genetics goes hand in hand.

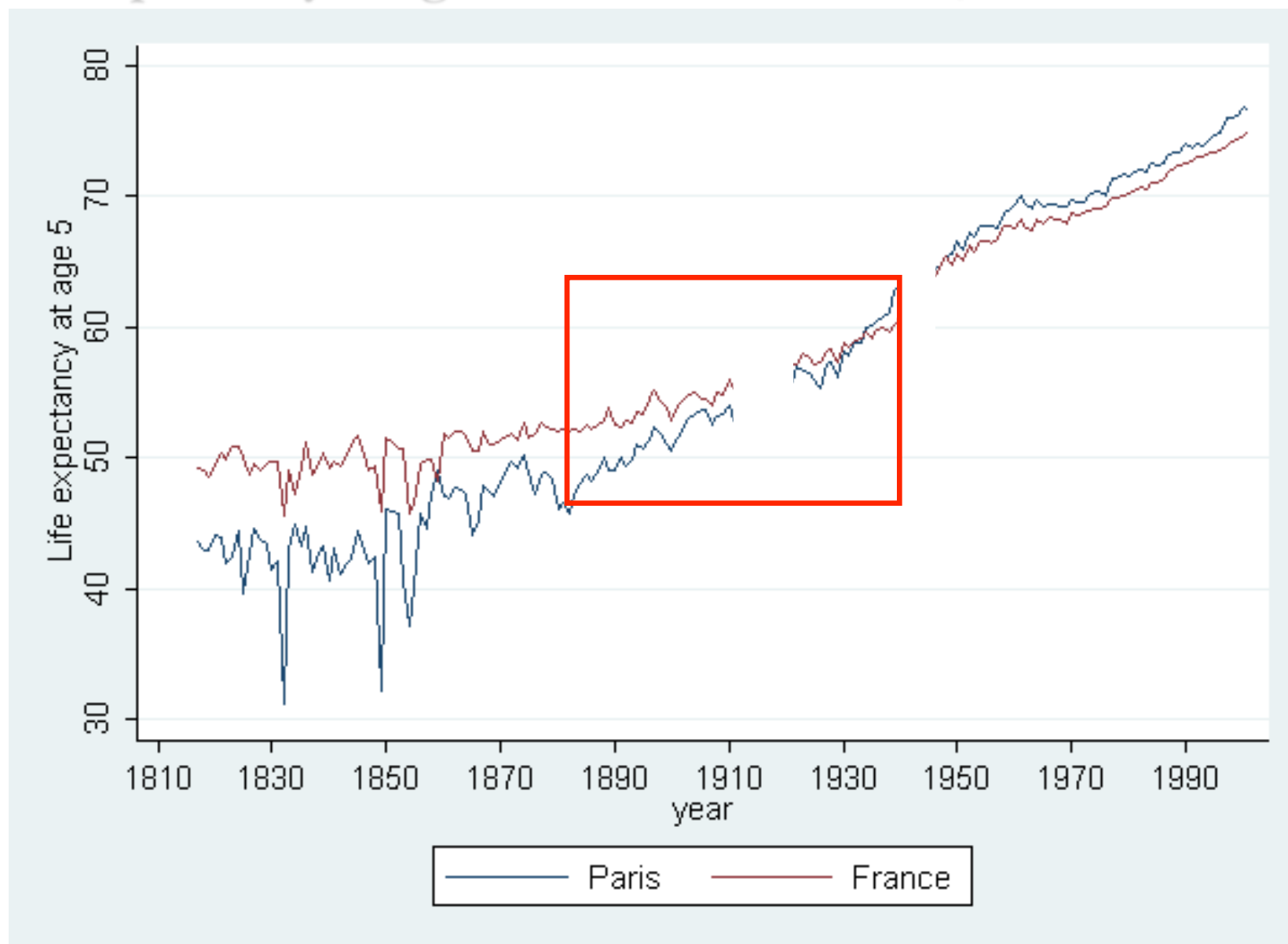
Mortality and health inequalities in the long run

1. Income growth and the health transition
2. Paris as a laboratory
3. Inequalities in time and space
4. Public goods
5. Concluding remarks

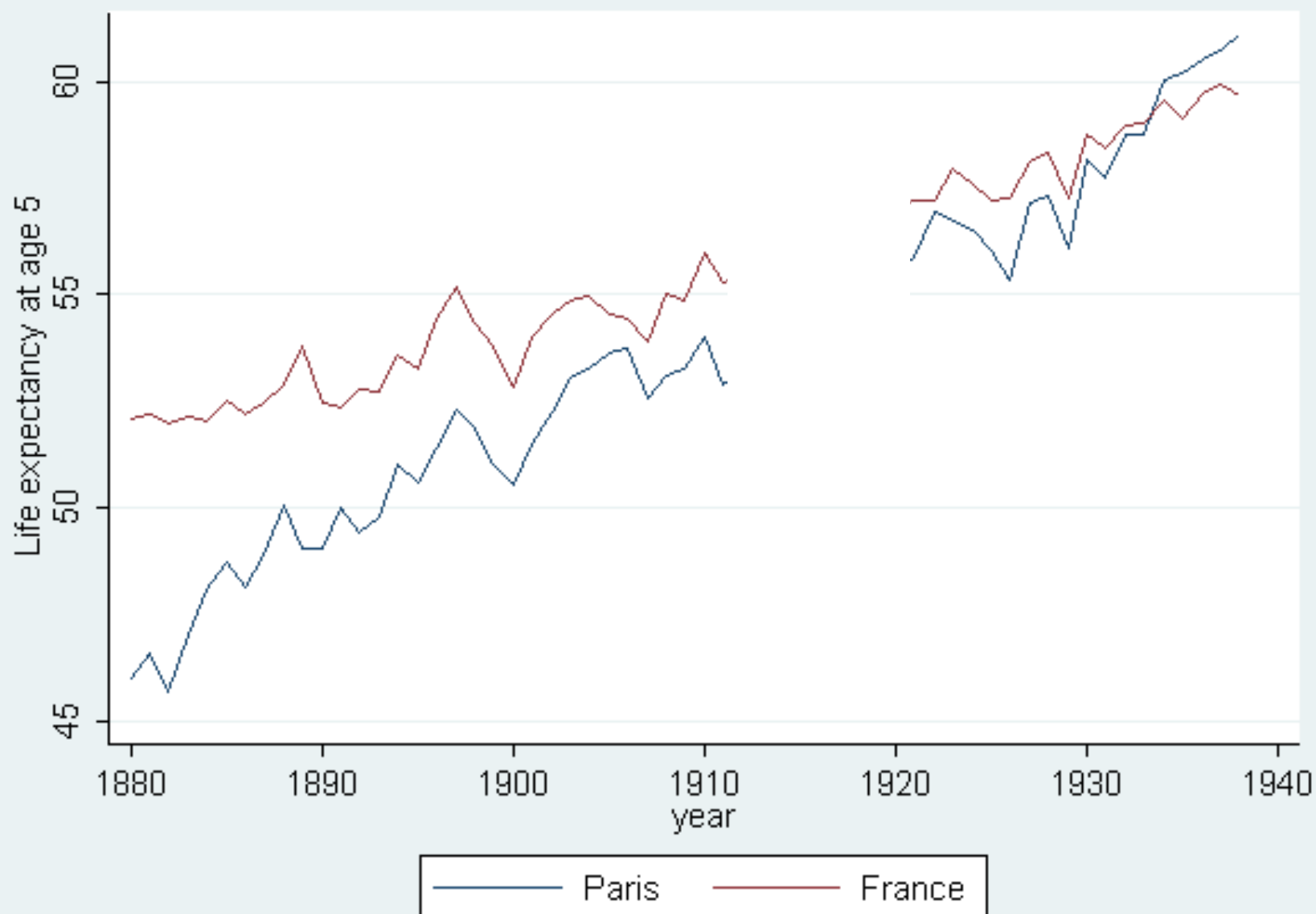
Life expectancy at age 5 in Paris and France, 1817-2000



Life expectancy at age 5 in Paris and France, 1817-2000



Life expectancy at age 5 in Paris and France, 1880-1940



Main arguments

- Large differences in mortality rates within Paris.
- Strong concentration of wealth.
- Mortality inequality *increases* (rather than *diminishes*) within Paris during the transition period.
- Better sanitation explains both the initial increase and the subsequent convergence.

Paris as a laboratory

Early work on inequality and the risk of death

❖ Villermé (1820's); Bertillon L.-A. and J. (late 19th century).

- Large amounts of high quality data

- ❖ Demographic data: *Annuaire statistique de la ville de Paris*.

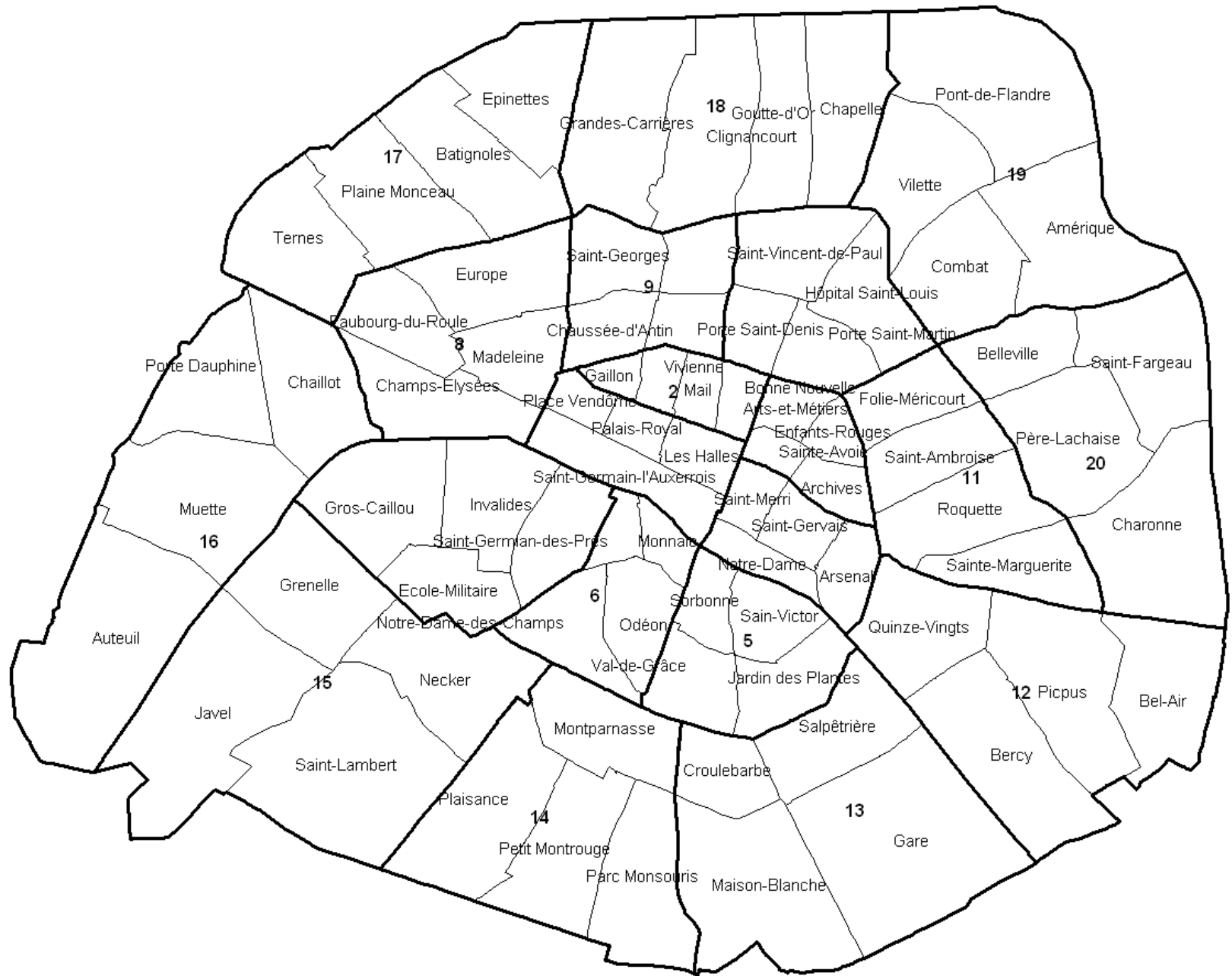
- ❖ Special edition of census results.

- ❖ Fiscal data: *Livre foncier*.

- Homogeneity of many living conditions (e.g. climate).

- Diversity within Paris at the *quartier* level.

The administrative divisions of Paris



Annuaire statistique de la ville de Paris

QUARTIERS et ARRONDISSEMENTS	POPULATION EN 1891	SUPERFICIE en HECTARES	HOMMES DÉCÉDÉS AGÉS						TOTAL
			Moins de 1 an	De 1 à 4 ans	De 5 à 14 ans	De 15 à 34 ans	De 35 à 59 ans	De 60 ans et au-dessus	
		h. a.							
1 ^{er} Saint-Germain-l'Auxerrois.....	9,130	93 55	9	7	3	8	30	20	77
2 ^e Halles.....	30,065	41 00	26	23	6	52	121	74	302
3 ^e Palais-Royal.....	14,525	28 45	10	5	2	15	38	34	104
4 ^e Place-Vendôme.....	14,218	27 00	3	7	4	17	28	38	97
I^{er} arrondissement.	67,938	190 00	48	42	15	92	217	166	588
5 ^e Gaillon.....	8,998	19 20	7	»	2	3	23	21	56
6 ^e Vivienne.....	12,146	23 30	5	8	2	24	23	16	78
7 ^e Mail.....	18,742	27 00	15	18	3	40	84	38	198
8 ^e Bonne-Nouvelle.....	30,041	28 00	37	22	9	60	120	71	319
II^e arrondissement.	69,927	97 50	64	48	16	127	250	146	651
9 ^e Arts-et-Métiers.....	24,478	30 65	35	14	5	57	105	70	286
10 ^e Enfants-Rouges.....	21,082	27 85	21	19	2	44	78	49	213
11 ^e Archives.....	21,115	36 00	24	15	5	38	83	61	226
12 ^e Sainte-Avoie.....	22,005	21 50	26	29	4	43	79	49	230
III^e arrondissement.	88,680	116 00	106	77	16	182	345	229	955
13 ^e Saint-Merri.....	24,864	32 00	48	30	8	63	122	66	337
14 ^e Saint-Gervais.....	41,243	40 85	58	44	17	85	188	111	503
15 ^e Arsenal.....	18,745	48 15	24	18	2	35	51	55	185
16 ^e Notre-Dame.....	13,792	35 50	17	17	3	30	61	43	171

Livre Foncier

ARRONDISSEMENTS.	DÉSIGNATION des QUARTIERS.	De 1 à 299.		De 300 à 399.		De 400 à 499.		De 500 à 599.		De 600 à 699.		De 700 à 799.		De 800 à 899.		De 900 à 999.		De 1,000 à 1,099.		De 1,100 à 1,199.		De 1,200 à 1,299.		De 1,300 à 1,399.	
		Nombre.	Valeur.	Nombre.	Valeur.	Nombre.	Valeur.	Nombre.	Valeur.	Nombre.	Valeur.	Nombre.	Valeur.	Nombre.	Valeur.	Nombre.	Valeur.	Nombre.	Valeur.	Nombre.	Valeur.	Nombre.	Valeur.	Nombre.	Valeur.
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
			francs.		francs.		francs.		francs.		francs.		francs.		francs.		francs.		francs.		francs.		francs.		francs.
1 ^{re} .	S ^t -Germain-l'Auxerrois.	967	158,570	314	102,725	265	112,470	251	129,010	170	105,005	122	87,760	82	66,635	38	34,630	90	90,200	30	33,325	65	78,900	16	21,315
	Halles	3,075	543,972	1,535	497,470	1,622	650,305	881	452,660	705	430,520	423	302,570	331	271,090	182	165,520	301	301,570	91	100,430	181	219,340	60	78,495
	Palais-Royal.....	1,041	172,919	438	143,280	426	179,620	444	226,850	333	204,805	165	119,510	178	144,465	61	55,425	189	189,250	51	56,750	96	115,500	26	34,040
	Place-Vendôme.....	692	122,046	373	119,588	359	148,575	349	177,335	270	164,490	178	126,990	182	146,835	91	82,690	175	175,020	74	81,895	132	159,020	37	48,330
	TOTAUX.....	5,775	998,407	2,660	863,063	2,672	1,090,970	1,925	985,855	1,476	904,820	888	636,830	773	629,925	372	338,265	755	756,640	246	272,400	474	572,870	439	482,180
2 ^e .	Gaillon	370	56,235	202	65,020	177	74,340	196	102,910	185	113,830	124	90,760	133	108,300	38	34,350	158	158,180	11	12,150	82	100,000	25	32,660
	Vivienne	1,086	173,915	393	125,580	380	158,115	363	184,650	297	180,945	182	120,540	222	177,980	88	79,850	225	225,200	36	39,750	94	113,150	39	50,880
	Mail.....	2,524	373,773	906	299,595	851	361,205	648	332,835	473	290,400	281	201,790	242	195,845	87	78,690	201	201,600	34	37,710	120	145,880	23	30,180
	Bonne-Nouvelle.....	3,892	684,250	1,934	642,195	1,598	678,175	1,153	592,070	554	340,500	292	209,490	270	218,110	114	103,560	231	231,450	43	47,780	136	163,825	38	49,855
	TOTAUX.....	7,872	1,288,173	3,435	1,132,390	3,006	1,271,835	2,360	1,212,465	1,509	925,675	879	631,580	867	700,235	327	296,450	815	816,430	124	137,390	432	522,855	125	163,575

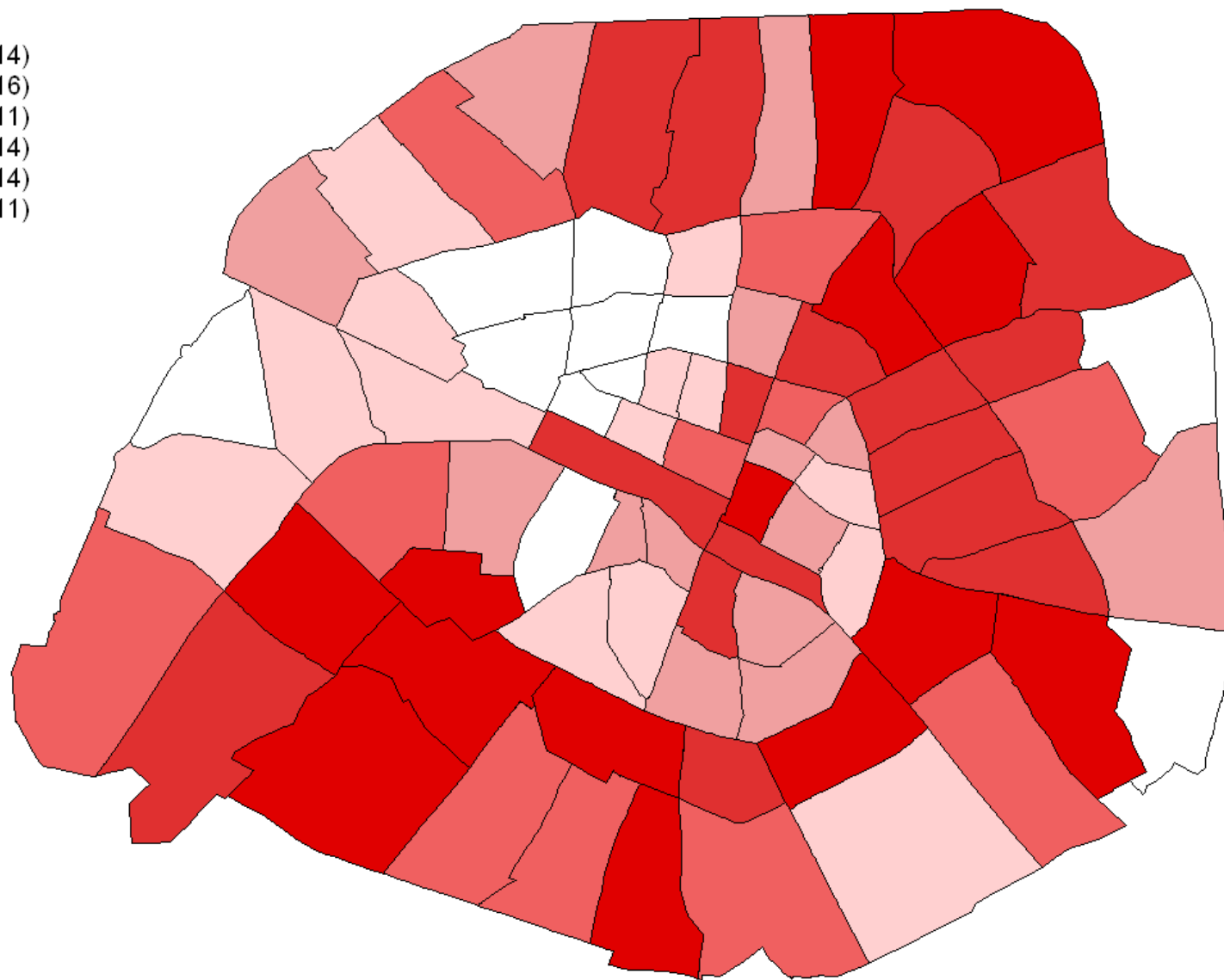
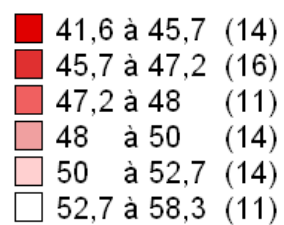
Selection issues

- ♦ Huge migratory flows to Paris
 - ❖ Selection effects.
 - ❖ Previous work showed that migrants were healthier but that their mortality converges to that of city natives.
 - ❖ Migrants go first to poor neighbourhoods.
- ♦ Sorting of Paris inhabitants by neighbourhoods
 - ❖ Higher life expectancy may be linked to characteristics of the neighbourhood itself...
 - ❖ ... or to the high (low) income of those who live here.

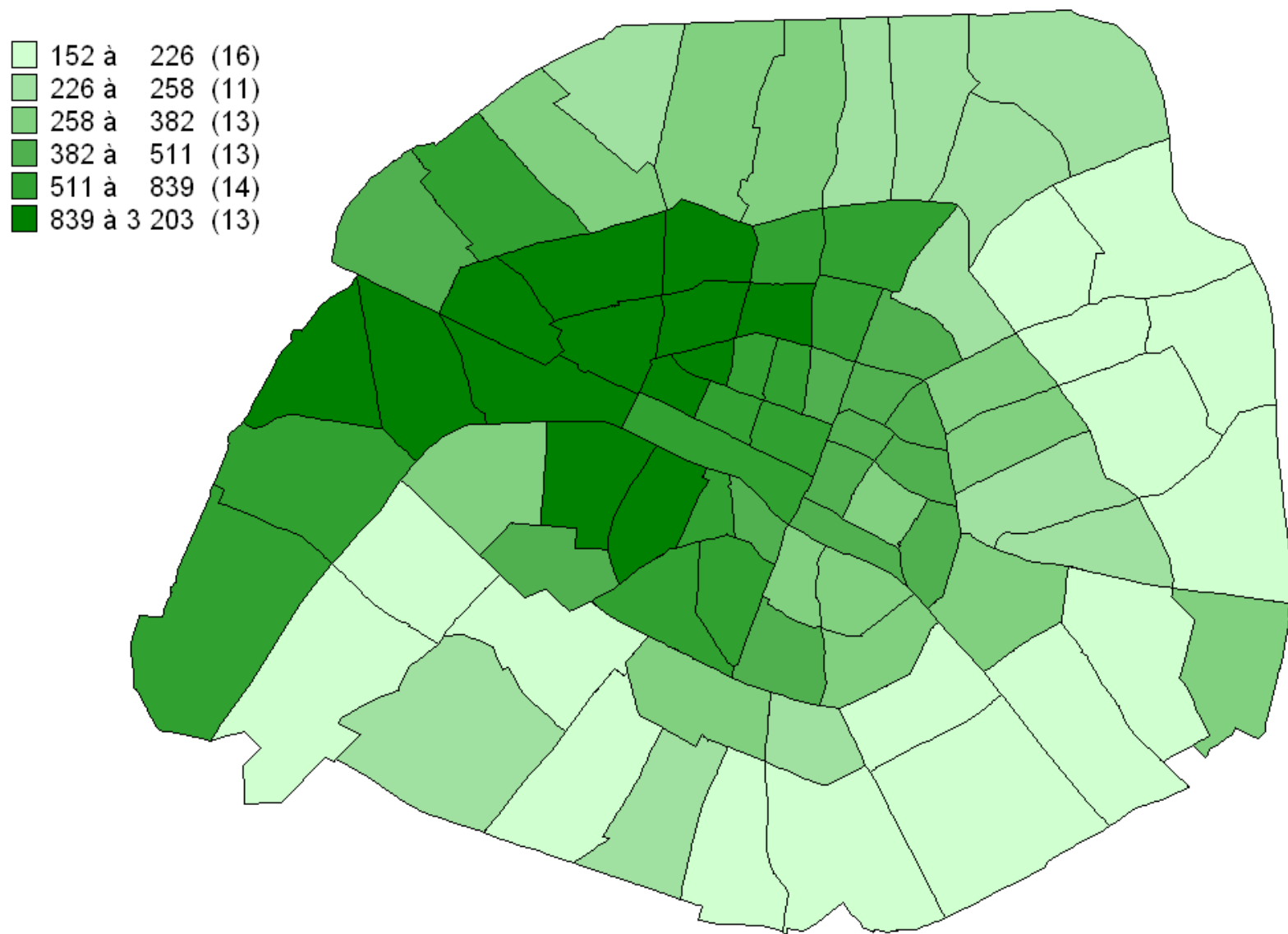
Mortality and health inequalities in the long run

1. Income growth and the health transition
2. Paris as a laboratory
3. Inequalities in time and space
4. Public goods
5. Concluding remarks

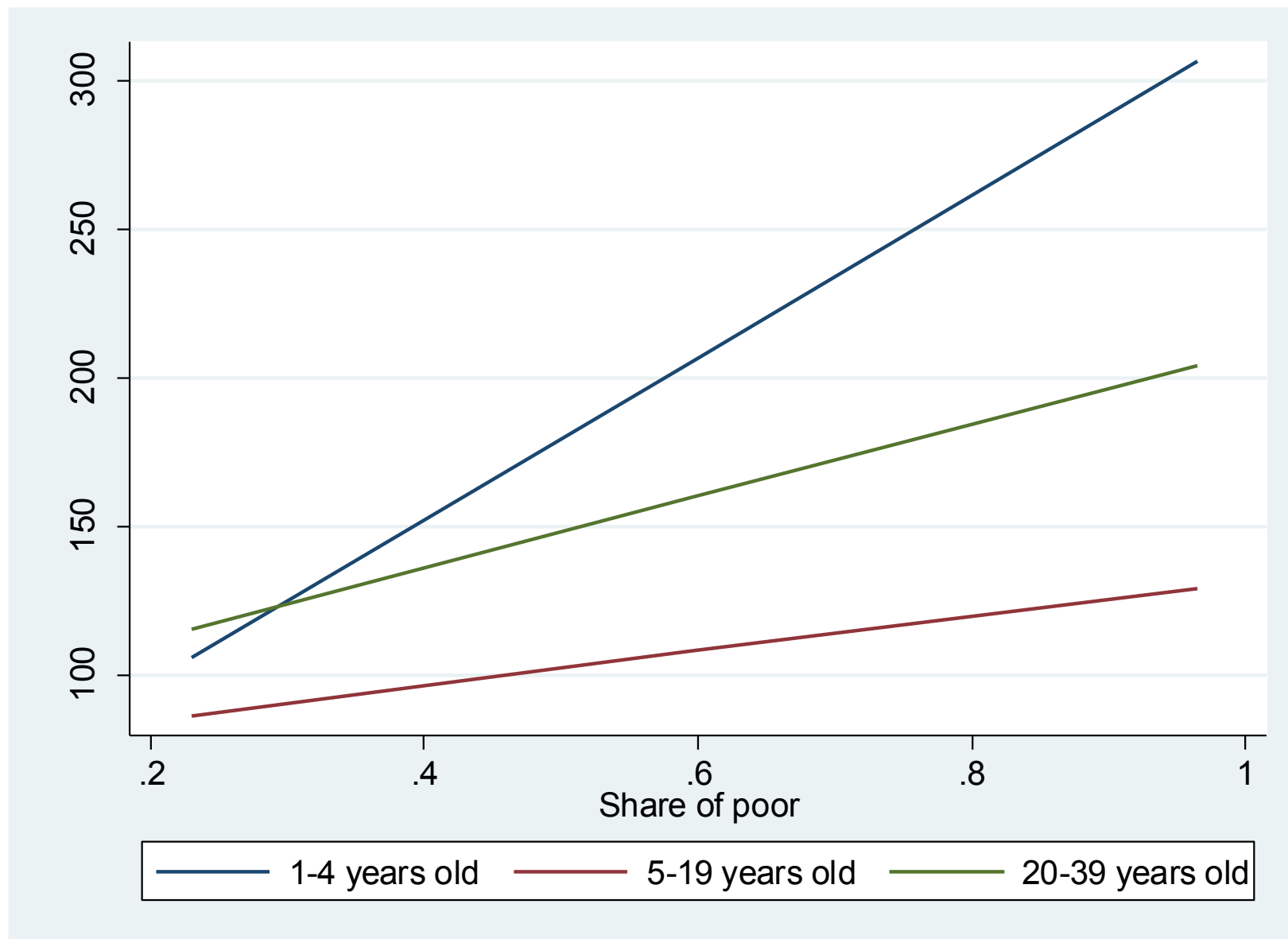
Life expectancy at age 5 by neighborhood in Paris, 1881



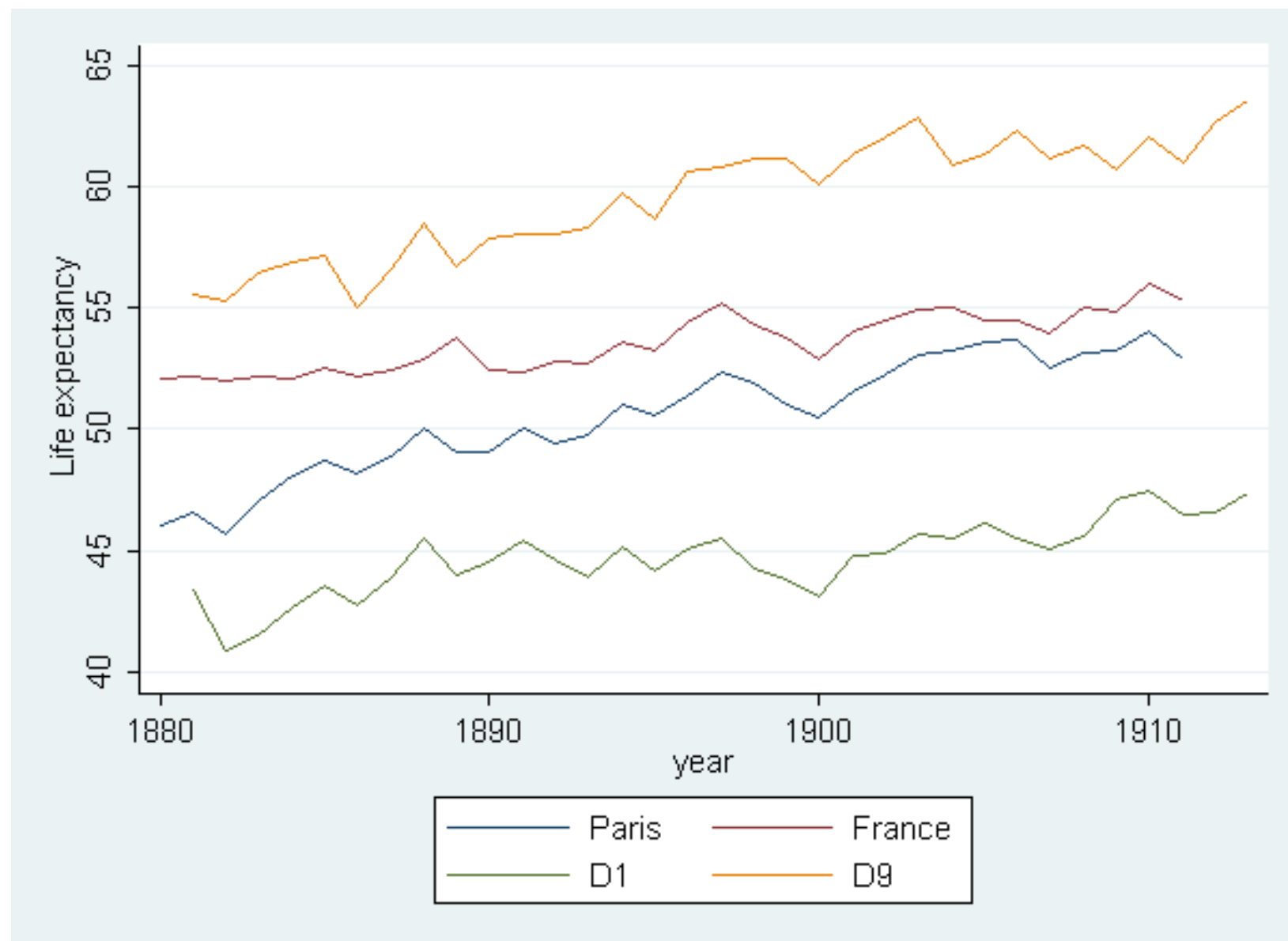
Average rents by *quartiers* in Paris, 1878



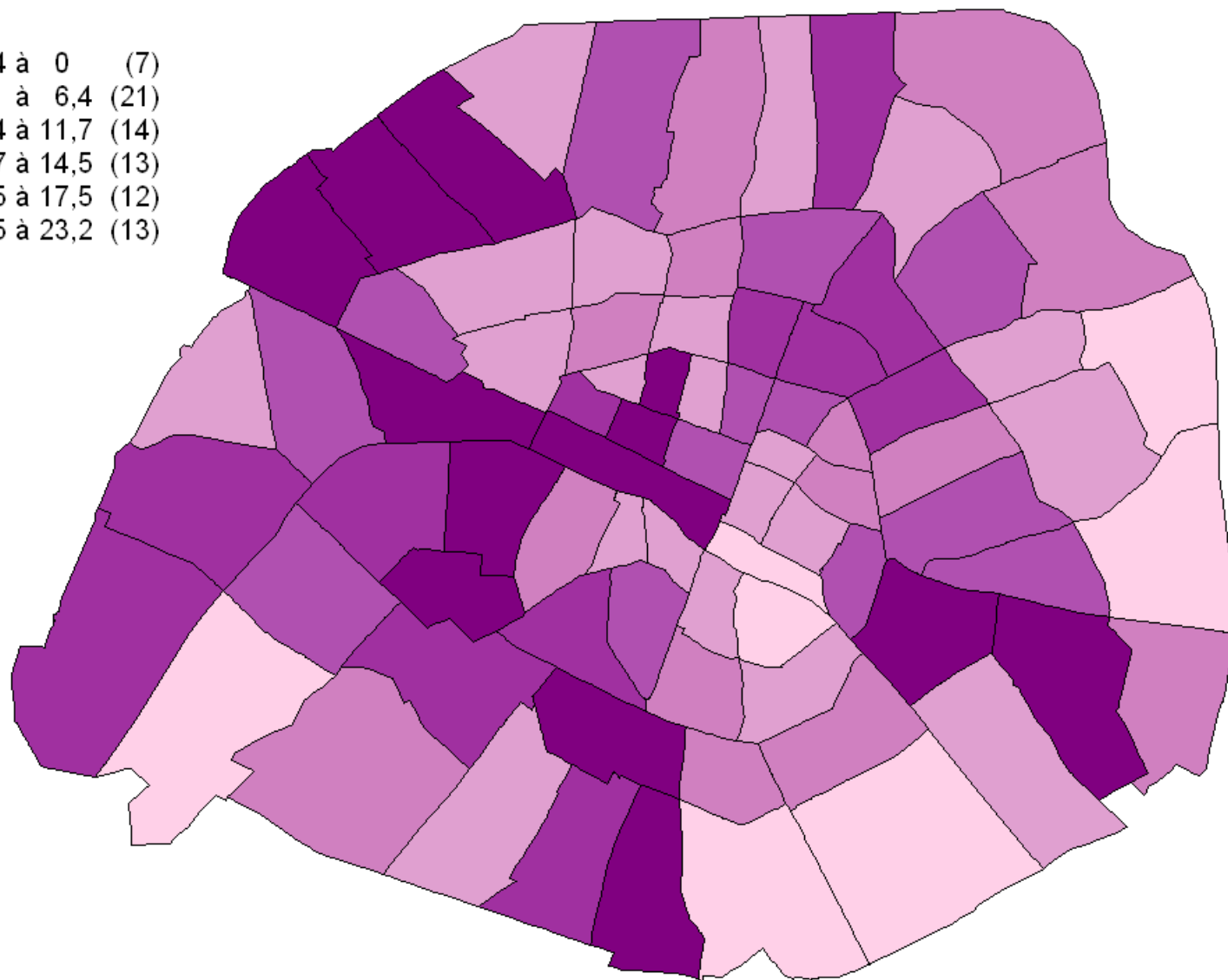
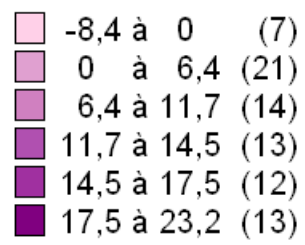
Mortality risk and wealth in 1881



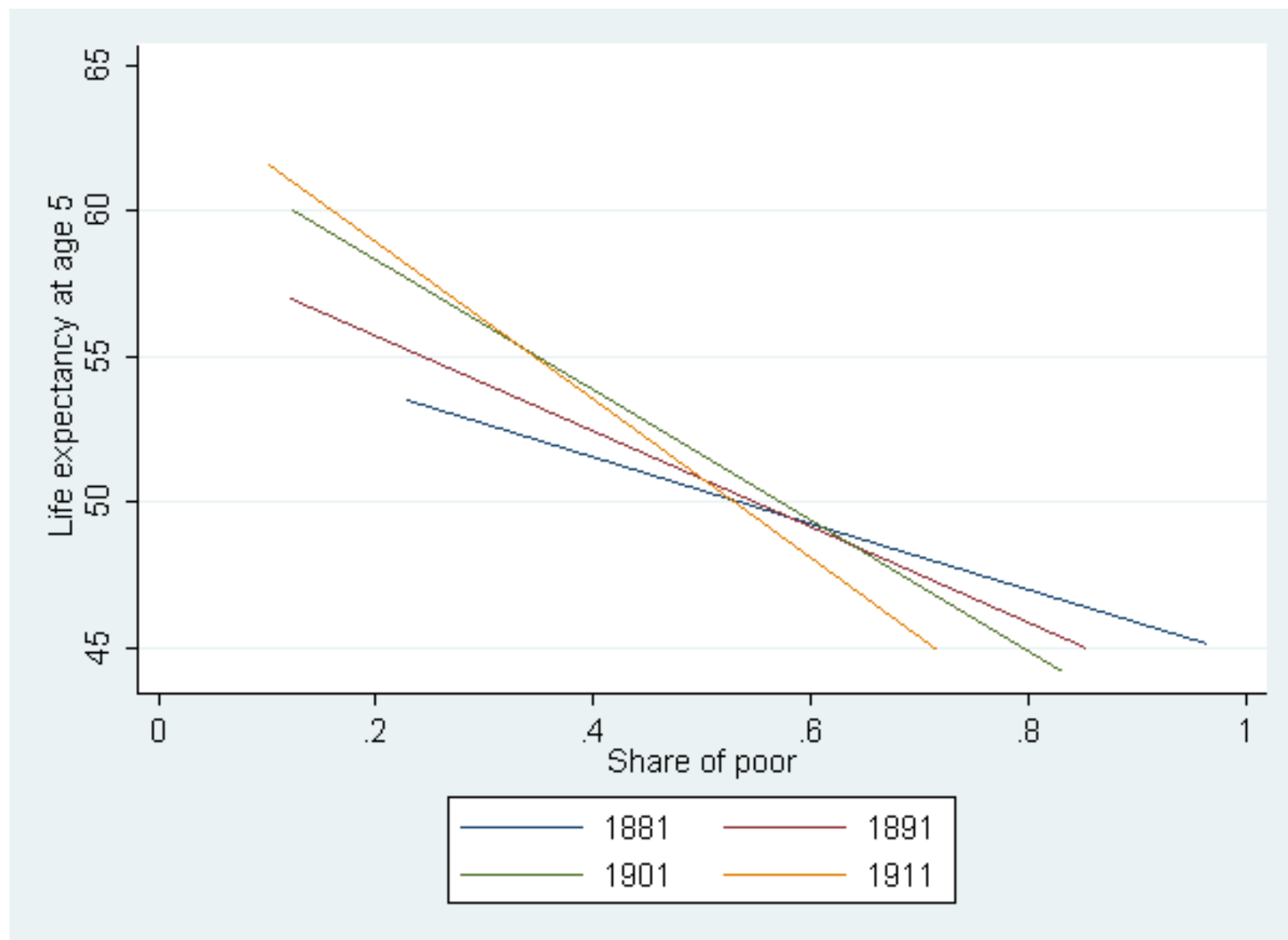
Life expectancy within Paris, the top and bottom decile



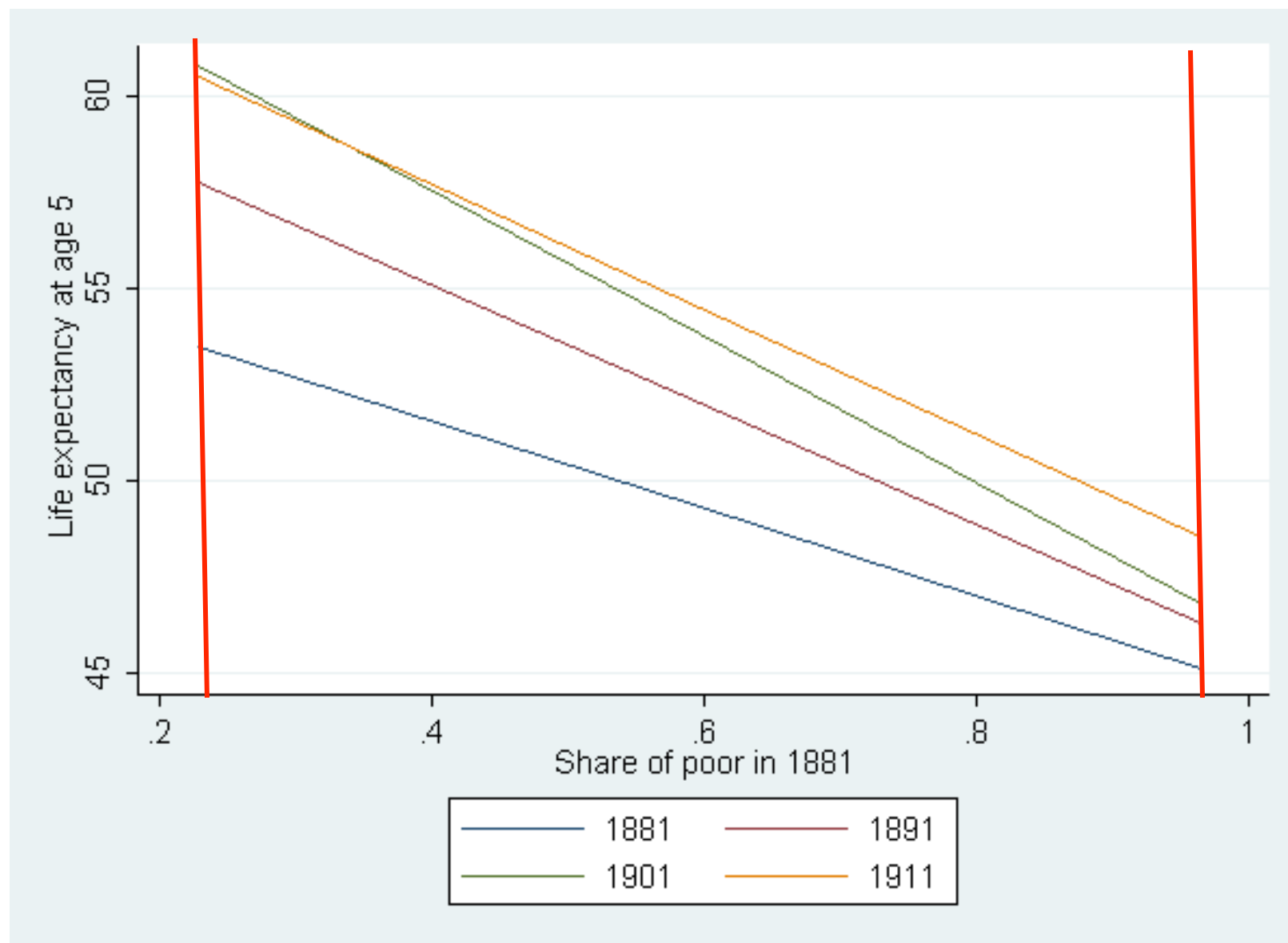
Life expectancy gains between 1881 and 1911 (%)



Life expectancy and share of poor households



Life expectancy and share of poor households in 1881



Mortality and health inequalities in the long run

1. Income growth and the health transition
2. Paris as a laboratory
3. Inequalities in time and space
4. Public goods
5. Concluding remarks

Sewers in Paris

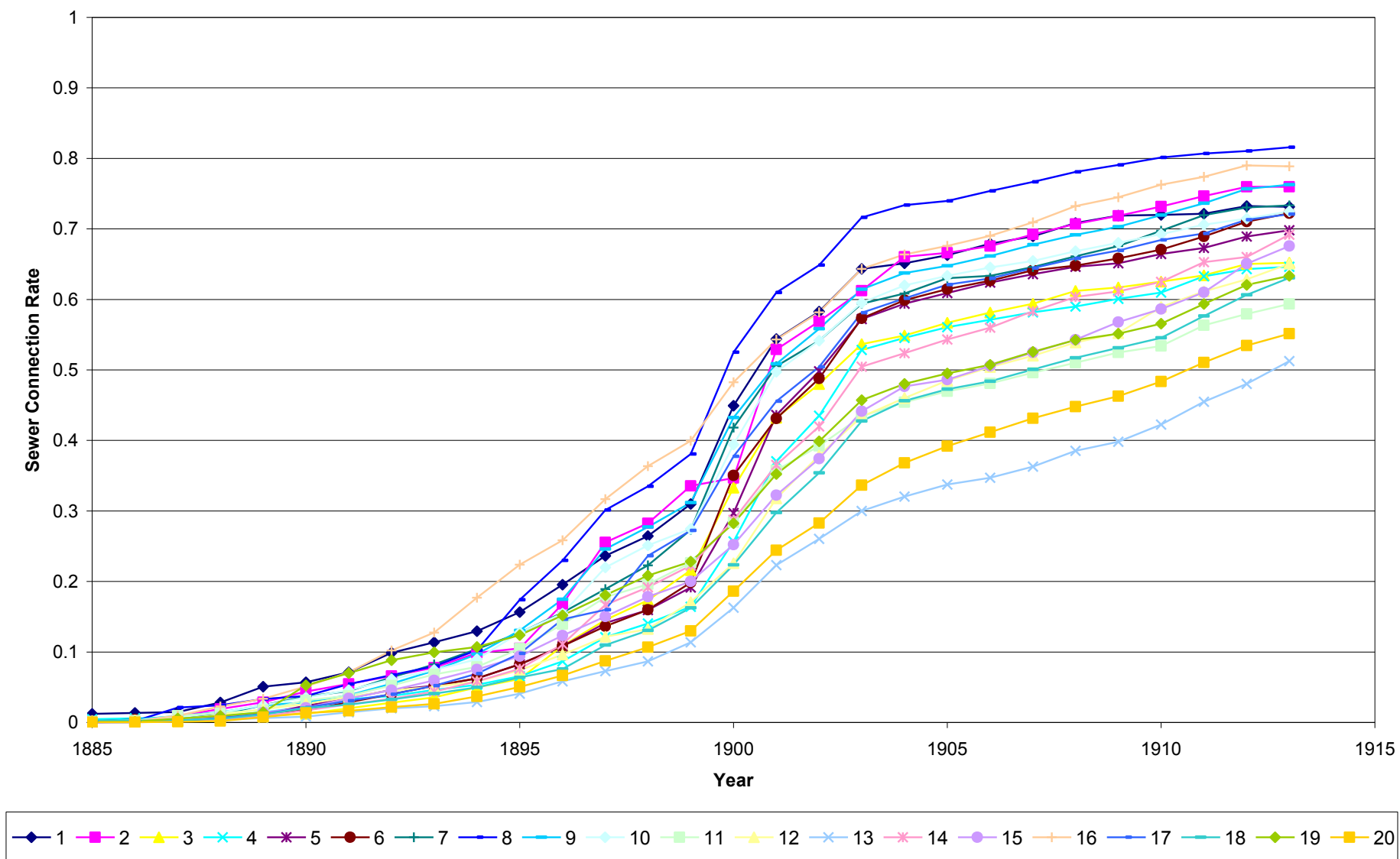


Sanitation

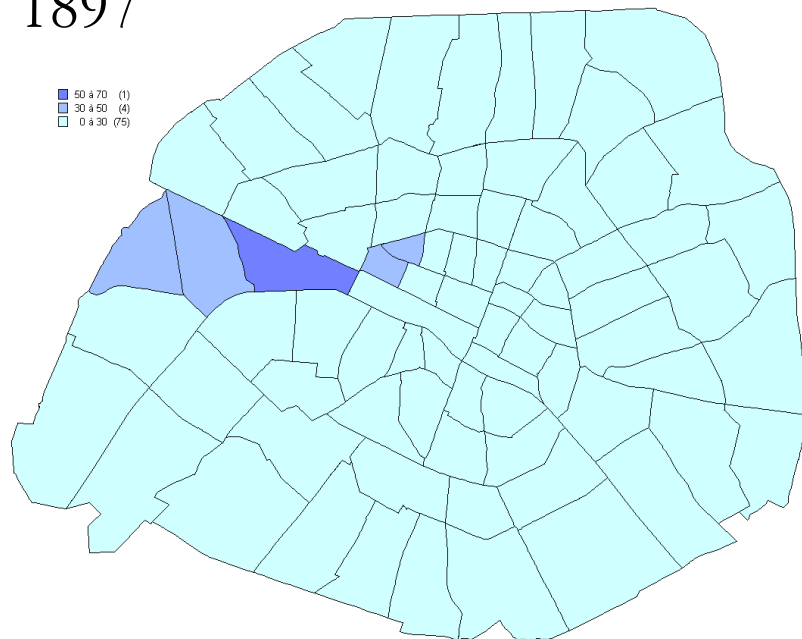
- The other side of public health policies
 - ❖ Need to get clean water inside homes but also waste water out.
 - ❖ A huge issue in hygiene debates.
- A public policy?
 - ❖ 1867 : “tinettes filtrantes” are allowed to be connected to sewer.
 - ❖ 1884: direct connection (tout a l’égout) to sewer is **allowed**.
 - ❖ 1894: direct connection to sewer is **made mandatory** in the street with sewer access.
- But ultimately in the hand of building owners.

	Dependent Variable Life Expectancy-Age 1					
Sewer Connection Rate	3.93 (0.114)	1.33 (0.225)			3.02 (0.087)	1.01 (0.23)
Rents			4.45 (0.102)	1.69 (0.281)	3.74 (0.85)	1.31 (0.29)
Constant	50.15 (0.149)	51.96 (0.473)	50.09 (0.104)	52.43 (0.468)	50.1 (0.84)	52.11 (0.47)
FE-Neighborhood		YES		YES		YES
FE-Year		YES		YES		YES
N	2320	2320	2320	2320	2320	2320
Adj-R ²	0.34	0.90	0.44	0.89	0.63	0.89

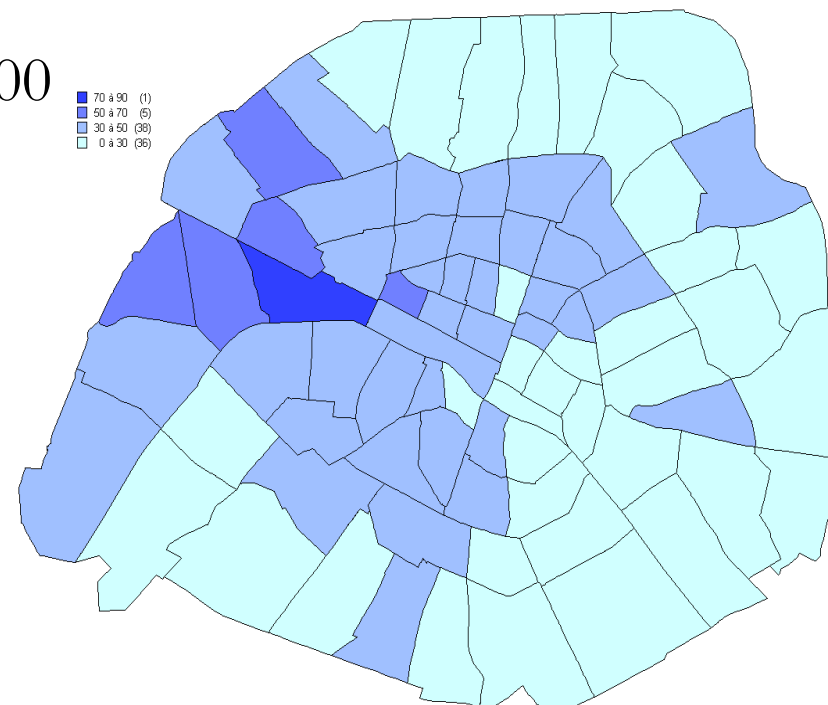
Share of buildings connected to sewers



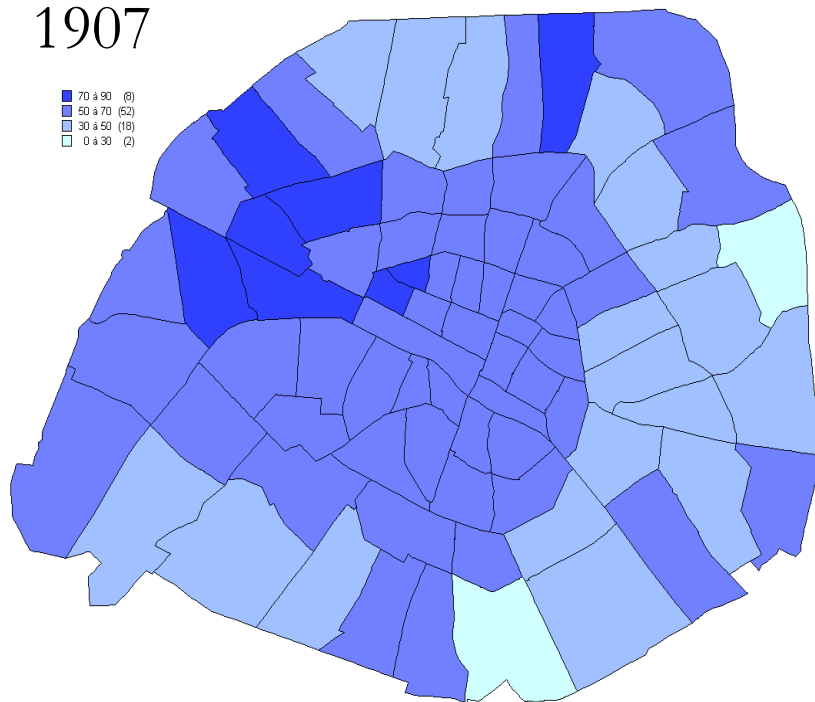
1897



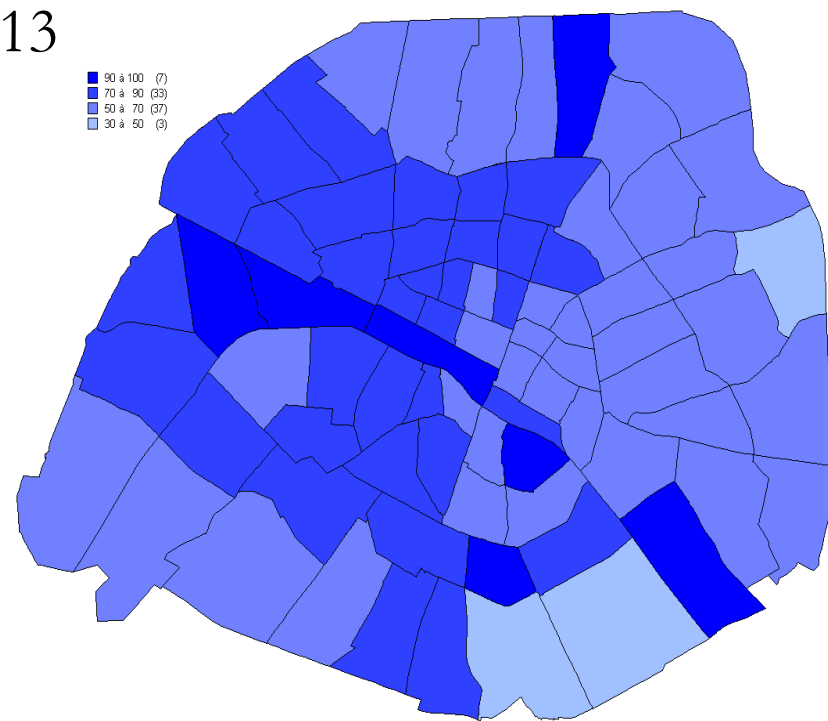
1900



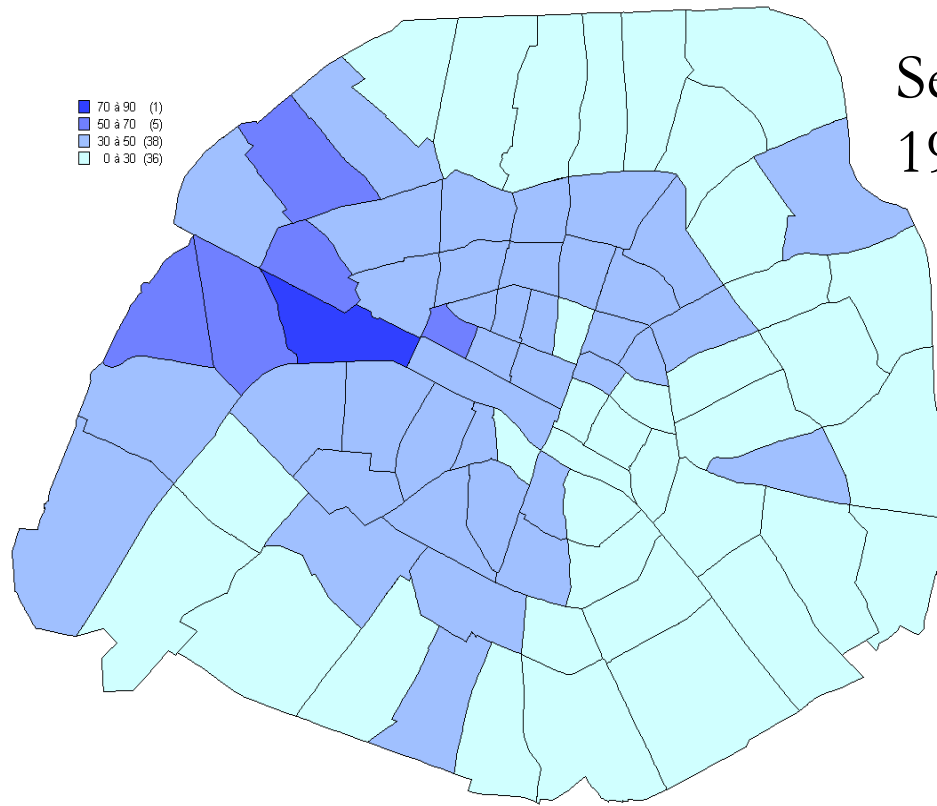
1907



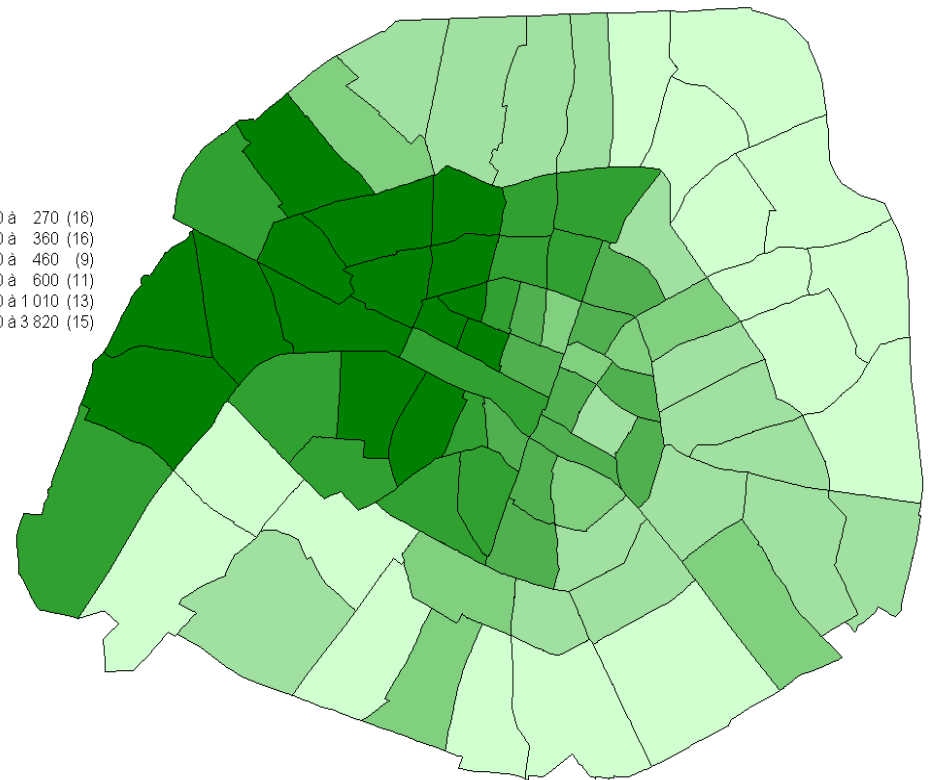
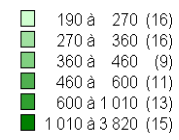
1913



Sewers 1900



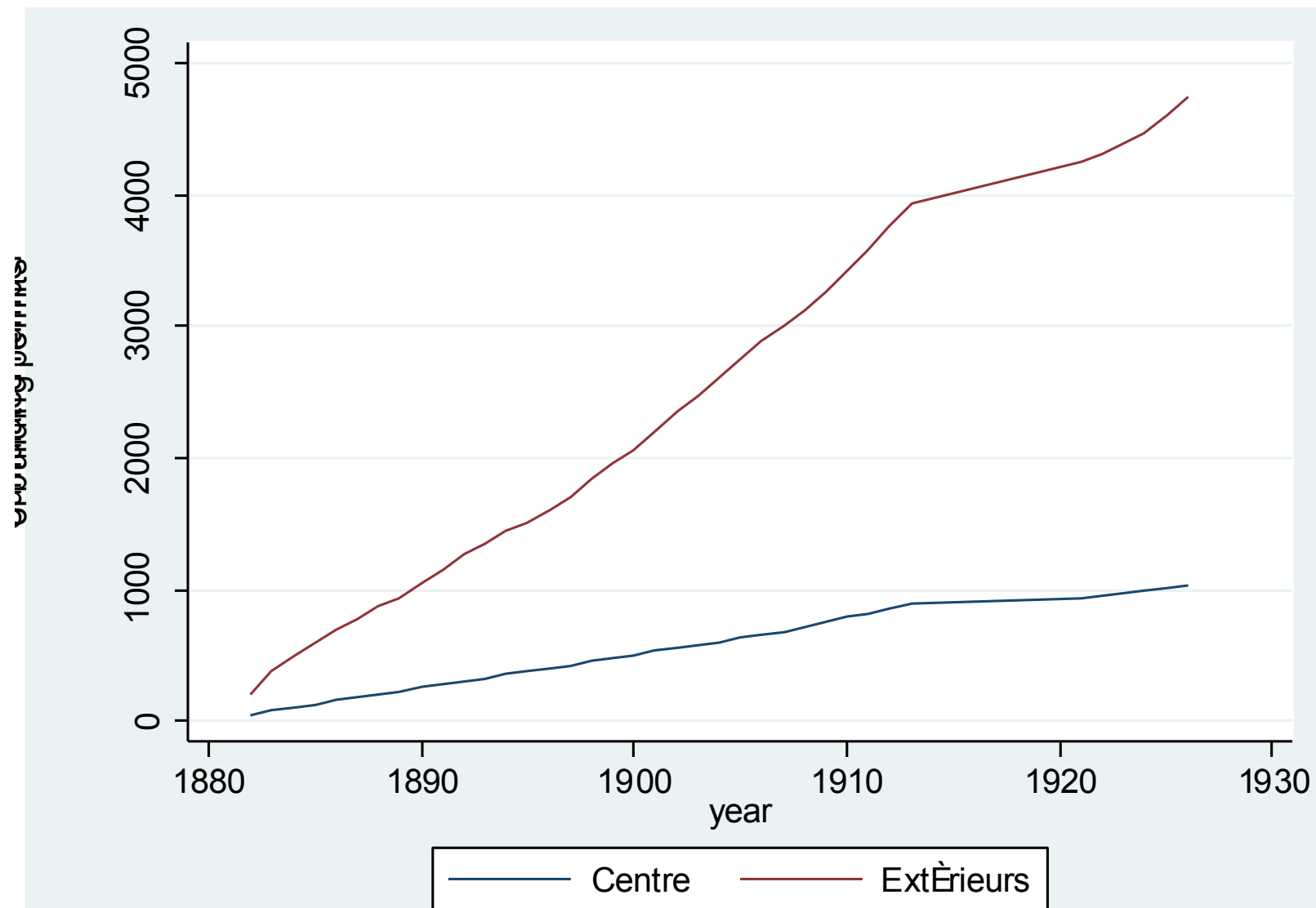
Rents 1900



Endogeneity issues

- Wealth, mortality and sewer system
 - ❖ Wealth influence both mortality and connections to sewer.
 - ❖ We want to get a “pure” sewer effect.
- Solutions? Need to find something that determine connection to sewers independently of wealth.
 - ❖ Using construction rates.
 - ❖ Distinguishing center (1-11) and periphery of Paris (12-20).

Number of building permits



The validity of the instrument

- ❑ Reverse causality

- High mortality areas get attention (“îlots insalubres”).
- But they represent a very limited part of the population.

- ❑ Income effects

- Rich areas get more new buildings (if buildings depend on rents).

- ❑ Higher quality of the new buildings

- We can test looking at new building before sewer connection.

	Dependent Variable Life Expectancy-Age 1 Periphery only			
Sewer Connection Rate	3.14 (0.13)	2.1 (0.33)	1.86 (0.36)	2.96 (1.44)
Rents	3.83 (0.16)	1.94 (0.39)	3.96 (0.21)	1.77 (0.72)
Constant	49.23 (0.13)	47.7 (0.61)	50.27 (0.26)	46.86 (0.94)
Instrumented			YES	YES
FE-Neighborhood		YES		YES
FE-Year		YES		YES
N	740	740	740	740
Adj-R ²	0.59	0.88	0.54	0.88

Results summary

- Effects of wealth and sanitation
 - Wealthiest neighbourhoods get sanitation first
 - Initial increase in health inequality linked to sanitation.
 - As connections to sewers spread the gap falls.
- Overall effect of sanitation smaller than wealth.
 - Consistent with the reduction of the gap.
 - May explain the convergence between arrondissement.

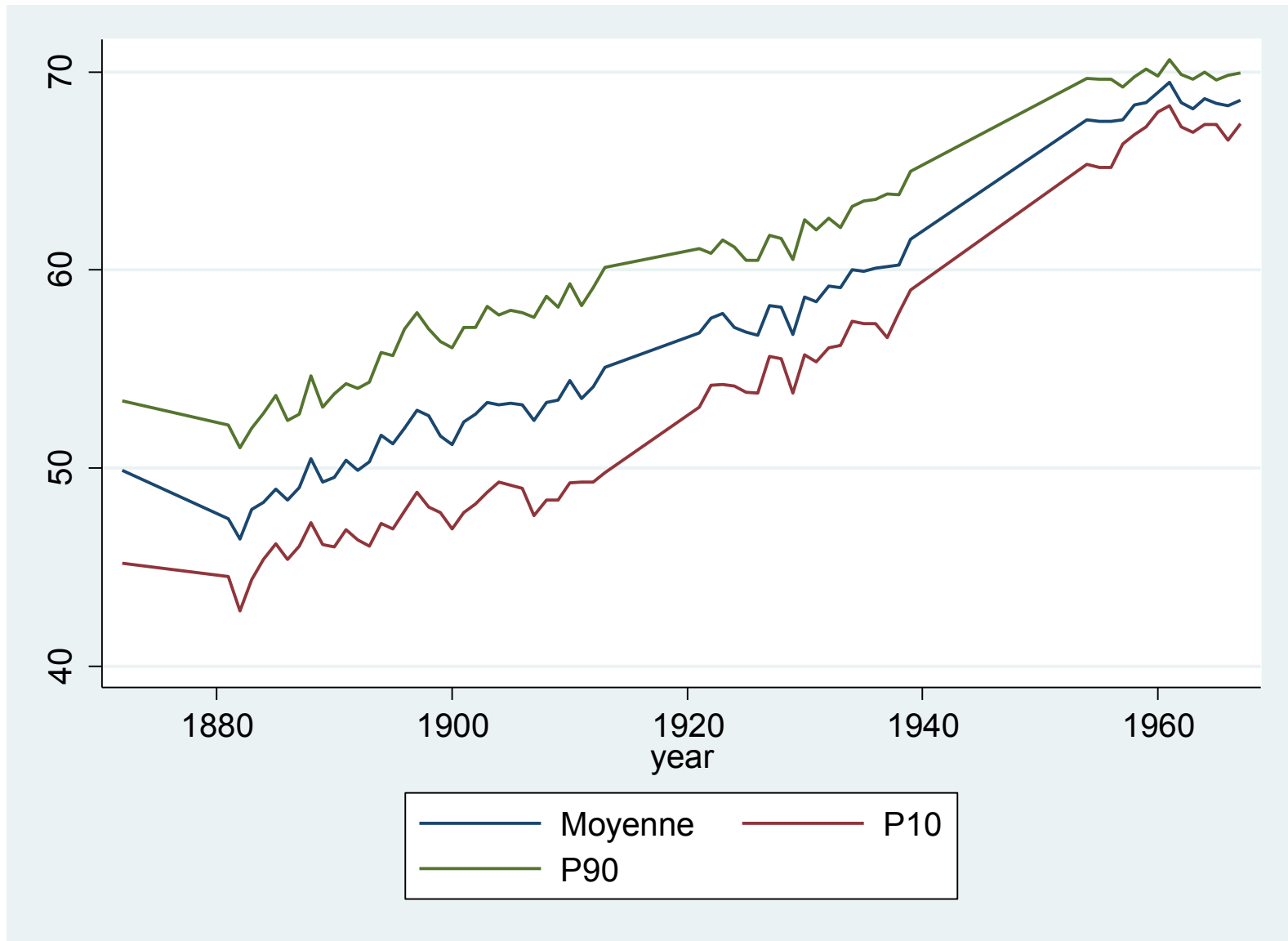
Mortality and health inequalities in the long run

1. Income growth and the health transition
2. Paris as a laboratory
3. Inequalities in time and space
4. Public goods
5. Concluding remarks

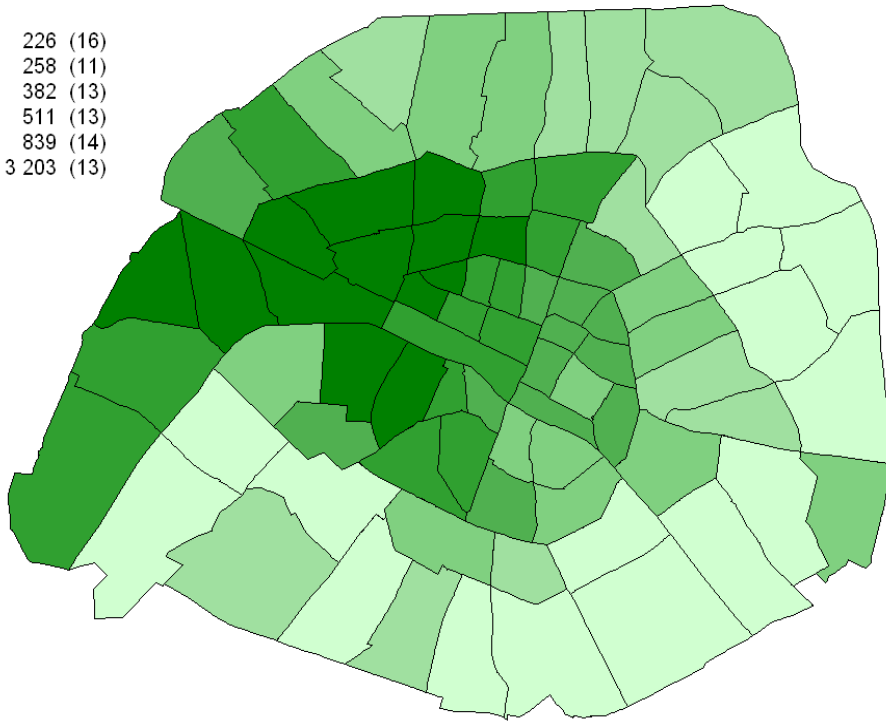
Conclusion: inequality in Paris

- ❑ How specific is the situation of Paris?
 - ▲ The largest and wealthiest city of France.
 - ▲ Various and numerous evidence on mortality patterns.
- ❑ Strong mortality inequalities within the city
 - ▲ They are clearly linked to wealth.
 - ▲ They increase as life expectancy rose.
- ❑ The unequal distribution of public goods
 - ▲ Distribution of sewers reinforce wealth inequalities.
 - ▲ The suppression of urban penalty is made at the expense of the poorer.

Conclusion: History matters because things change...



152 à 226 (16)
 226 à 258 (11)
 258 à 382 (13)
 382 à 511 (13)
 511 à 839 (14)
 839 à 3 203 (13)

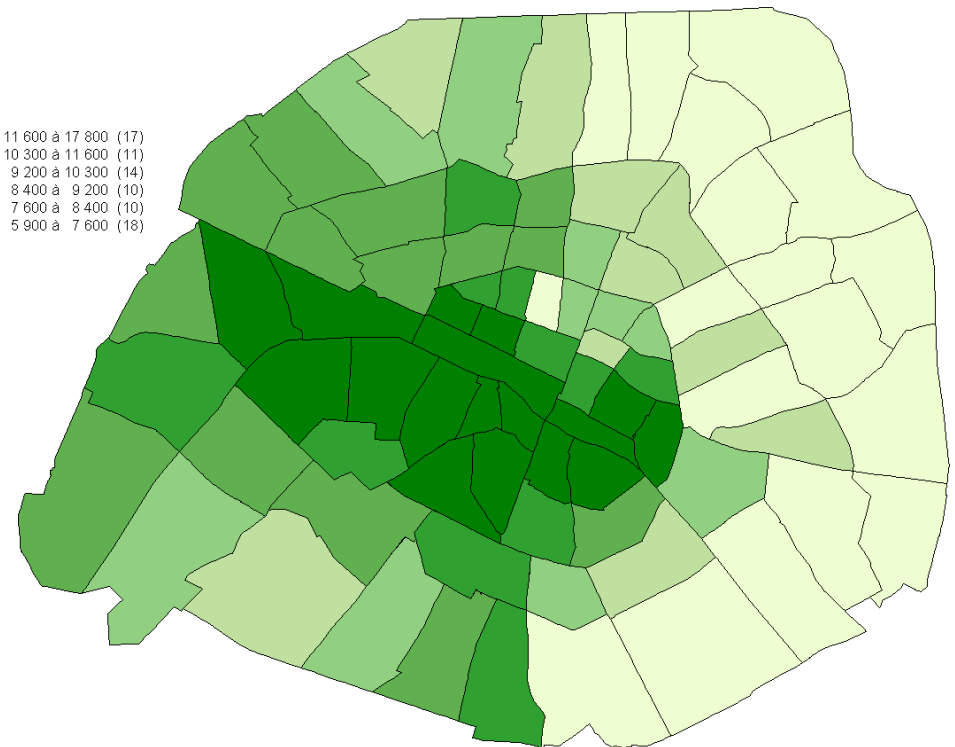


... And
because
they don't

Average rents by *quartiers*
in Paris, 2011

Average rents by *quartiers*
in Paris, 1878

11 600 à 17 800 (17)
 10 300 à 11 600 (11)
 9 200 à 10 300 (14)
 8 400 à 9 200 (10)
 7 600 à 8 400 (10)
 5 900 à 7 600 (18)



General conclusion (1) Why do we care?

- ❑ Recent rise in income inequality
 - ▲ Few studies of the consequences on health inequalities.
 - ▲ May slow down (or even reverse?) the gain in life expectancy.
- ❑ Access to public goods is still limited in many parts of the world
 - ▲ Access to water or sanitation is an issue in many developing countries.
 - ▲ History may help to assess the costs and benefits.

General conclusion (2) Mortality decrease in the long run

- ❑ The mortality transition was heterogeneous
 - ▲ Between countryside and cities.
 - ▲ Between rich and poor.
 - ▲ Between men and women? Between occupations? Etc.
- ❑ Its results are also heterogeneous
 - ▲ Different paths to the modern mortality regime.
 - ▲ Divergence between countries on the end point.
 - ▲ Divergence even among the frontrunner countries.
- ❑ The decrease of mortality is not a linear process
 - ▲ Improvements may stop or even reverse.
 - ▲ Not everyone benefit of that decrease the same way.

What next?

- ❑ Early life hypothesis

- Strong inertia (at the individual level).
- Many outcome later in life may depend on early life living conditions.

- ❑ Foetal hypothesis

- Even before birth, health conditions matters.
- Still controversial and hard to demonstrate (precisely).
- Interactions with inequalities is not clear.

- ❑ Shocks and trajectories

- Shocks have long-term consequences even at the individual level
- Need to assess the whole trajectories.

Next conference:

Tomorrow at 6:00 pm

**La demografía histórica: Sus retos, fuentes y
métodos actuales**

lionel.kesztenbaum@ined.fr

GRACIAS!!!

lionel.kesztenbaum@ined.fr

References and sources (1) stylized facts

Life expectancy in France

- Louis Henry and Yves Blayo (1975), "La population de la France de 1740 à 1860", *Population*, p. 71-122.
- France Meslé and Jacques Vallin (2001). Tables de mortalité françaises pour les XIXe et XXe siècles et projections pour le XXIe siècle. Paris, INED.
- France Meslé and Jacques Vallin (2009). Cause-of-death trends in Paris from 1888 to 1943, Communication at the IUSSP Congress. Marrakech.

Mortality rates in England

- Anthony Wrigley and Roger Schofield (1981). *The population history of England 1541-1871 : a reconstruction*. London, Arnold.
- Human Mortality Database (UCLA and MPIDR)
<http://www.mortality.org/>

Height in France

- Marie-Claude Chamla, (1964) "L'accroissement de la stature en France de 1880 à 1960 ; comparaison avec les pays d'Europe occidentale.", *Bulletins et Mémoires de la Société d'anthropologie de Paris*, XI^e Série, tome 6 fascicule 2, p. 201-278.
- Jean-Claude Pineau (1993), "La stature en France depuis un siècle : évolution générale et régionale", *Bulletins et Mémoires de la Société d'anthropologie de Paris*, Nouvelle Série, tome 5 fascicule 1-2, p. 257-268.
- David Weir (1993). "Parental consumption decision and child health during the early French fertility decline, 1790-1914." *Journal of Economic History* 53: 259-274.

References and sources (2) Paris

- Kesztenbaum, Lionel, and Jean-Laurent Rosenthal. 2011. "The health cost of living in a city: The case of France at the end of the 19th century." *Explorations in Economic History* no. 48 (2):207-225.
- Kesztenbaum, Lionel, and Jean-Laurent Rosenthal (forthcoming). "The democratization of longevity: How the poor became old. Paris, 1870-1940." in Michel Oris, Lucia Pozzi, and Diego Farinas, *New approaches to death in cities during the health transition*, Springer-IUSSP.
- Kesztenbaum, Lionel, and Jean-Laurent Rosenthal. "Income versus sanitation. Mortality Decline in Paris, 1880-1914.", Working paper.
- The pictures of sewers by Félix Nadar comes from *Le Paris souterrain de Félix Nadar: 1861, des os et des eaux*, Caisse nationale des monuments historiques et des sites, 1982. I am grateful to François Lagarde for drawing my attention to it.