The Duration of Civilizations – Preliminary Recalculations (A short note)

Daniel Linotte, DPhil (Oxon)

INTRODUCTION

In an article published on the BBC website, referring to a set of criteria – a civilization would correspond to a society with agriculture, multiple cities, military dominance in its geographical region and a continuous political structure –, Luke Kemp (Cambridge University) identifies a series of civilizations over the period 3000BC-600 and presents data on their life span. According to Kemp's calculation, the average duration of a civilization is 336 years. In addition, the author considers the factors that may contribute to the collapse of civilizations – climate change, environmental degradation, social and political factors, complexity, external shocks, random events, etc. He also asks a key-question – *What can this tell us about the future of global modern civilization?*

Another data base covering 74 civilizations is proposed by Larry Freeman (Kenwood Academy, Chicago), who reports 349 and 330 years as average and median values.

Relying on these data sets, we propose new calculations and an elementary linear regression analysis. Moreover, we underline some of the limitations of our exercise and the need for further discussions on the meaning of civilization for the identification of past and existing civilizations.

Tables and figures are presented in the ANNEX.

I. FINDINGS

Basic statistics

Relying on the two sets of data, we calculate basic parameters: averages, medians, standard deviations and variation coefficients. Considering the averages reported in table 1, the values between the two data sets are rather similar and also comparable to what Kemp and Freeman estimated. For the median, our estimate differs from the Freeman's one: 301 versus 330 years. The difference can be explained by the fact we could only identify 72 civilizations in Freeman's data, which is less than the figure he reports, namely 74. Standard errors and variation coefficients are about the same for the two data sets. What can we conclude? Considering the last two coefficients, the dispersion of the lifespans is quite large, which makes predictions difficult perhaps. In addition, figure 1 (histogram) shows that a majority of cases display a duration below 400 years, and a mode (peak or maximum frequency) which is much shorter.

Regional differences

Relying on Freeman's data, we compare different regions/continents – Africa, Mesopotamia and India (see table 2): for averages and medians, durations are dissimilar. Dispersions are also very different between India and the two other sets of civilizations. As mentioned in the introduction, Kemp lists a number of factors that can explain the duration and termination of civilizations. In addition, the duration of civilizations could be related to other factors such as the existence natural barriers, rendering difficult invasions, and the size of the territories and populations controlled by the rulers, which may matter for the mobilization of resources, military power, deterrence and security. The multiplication of civilizations in given regions can also be a source of fierce rivalry and wars, with winners and losers, etc.

Statistical tests (with t-statistics and contingency tables) could be used for further analysis and being more conclusive about differences and causal relations, assuming sufficient and reliable information is available on the factors mentioned.

Linear regression analysis

Relying on linear regression analysis and Freeman's data, we check the existence of a possible negative relationship between the duration of civilizations (the y-explained variable/axis) and their time of occurrence (the x-explanatory variable/axis, with x corresponding to the middle-year of the occurrence period).

Intuitively, the idea is that older civilizations could last longer because of their relative isolation, partly as a result of a combination of factors, including geography and the technological level of transportation systems, on land and by sea. Various innovations will contribute to the development of these systems and facilitate migrations between territorial entities, including hostile invasions leading to the termination of civilizations and the emergence of new ones – the existence of such a relationship would correspond to a negative slope when estimating the parameters a and b of the linear regression line $y = a x + b$.

We report the estimates in figure 2 and the box below. After the exclusion of what is seen as two outliers, with durations equal or above 1000 years, the estimated slope is negative (figure 2), which suggests that the duration of civilizations may tend to decline over time. However, the low correlation coefficient indicates a rather weak x-y relationship.

II. LIMITATIONS

The meaning of civilization

Different sources can certainly be used and combined to define civilizations and measure their durations. They may include dictionaries, encyclopedias, the work of influential scholars, especially in the field of global history (see for instance Arnold Toynbee – who is mentioned by Kemp, Fernand Braudel – with the so-called *Annales School*, Samuel Huntington, John Hobson, Francis Fukuyama, Yuval Harari, and even Ibn Khaldun, who wrote about the collapse of civilizations six centuries ago). As mentioned in the introduction, Kemp proposes a definition combining at least four dimensions. For future work, it is perhaps worth attempting to reconsider and refine the concept of civilization, questioning also, among other things, the importance of political unity and insisting more on traditions, ways of living and culture.

Actual/potential debates

In addition to questions raised by the definition of civilizations, periodization is another key issue.

Considering ancient Egypt, it is commonly accepted to mention three kingdoms, namely the old, the middle and the new ones, with two intermediate periods in between. Such a partitioning is questionable when identifying civilizations with kingdoms only. For instance, during the First Intermediate Period that follows the Old Kingdom, the middle and low ranks nobility, officials, and even ordinary people, would copy the afterlife artefacts of the former pharaohs and upper elites of the Old Kingdom – this would correspond to a reduction of inequalities with the spread of a certain way of life and … death, which means that the collapse of the Old Kingdom led to the propagation of specific traditions beyond limited circles and the reproduction of works of art (furniture, dishes, paintings, sculptures, jewelry) by the lower levels of the Egyptian society. In other words, the traits of the first Egyptian civilization are reaching more people.

Another option to identify civilizations can also be suggested. The Old Kingdom could itself be divided into subperiods, separating pre-pyramid times from the pyramid ones. Such a partitioning would make sense – the building of the pyramids may have required innovative organizational/managerial/planning approaches, with – in addition – the adoption of new construction techniques and scientific (mathematics) developments/discoveries for various calculations related to volumes and time, and the mobilization of resources and labor force. The construction of a pyramid could also a represent a major activity affecting many aspects of life in Egypt, creating new habits and shaping beliefs.

Similar issues can be raised for the very first Greek civilizations. Thus, a line is often drawn between the Minoan and Mycenean civilizations. Some scholars do not seem to agree with such a division and prefer to combine the two periods into a single one, referring to a unique label – Palatial Greece.

The interaction between civilizations

Relations between civilizations also matter to explain developments and termination events, processes and influences, for instance, between Mycenae and Egypt, Jews and Persians, and even between Greece and India – with Alexander the Great. In the latter case, there are examples of Greco-Buddhist art. Moreover, Greek philosophers could have been influenced by thoughts and ideas developed in Persia and India.

B.C. versus A.D. times

The data we used are mainly for antique times. For A.D. times, periodization may even become more complex. Sub-Saharan Africa has to be included in full with the Mali and Ghana Empires, the Kingdom of Kongo, and several other important political entities. The interface between the Arab-Islamic and Christian worlds must also be carefully studied, with the influences of an early Renaissance in *Al-Andalus* on other less flourishing places in Europe.

The impact of globalization is another challenge for the periodization of recent history, with growing trade, technological, financial, information and migration flows between most parts of the world.

FINAL REMARKS

Our work is based on the periodization of ancient history proposed by Kemp and Freeman. The estimates indicate that most civilizations last for just a few centuries, however the lifespan range is quite broad and does not seem to be useful for forecast analysis. Complex models must be developed, including many variables and influences. However, periodization can hardly escape from the combination of both objective elements and judgmental ones, allowing for sensitivity analyses and different sets of hypotheses.

REFERENCES

[1].   Larry Freeman, How Long Did the Empires of Ancient Civilizations Last? Updated on March 25, 2020.https://owlcation.com/humanities/How-long-do-empires-last(Accessed 26 June 2020).
[2].   Luke Kemp, The lifespans of ancient civilizations, BBC website, 20th February 2019. https://www.bbc.com/future/article/20190218-the-lifespans-of-ancient-civilisations-compared(Accessed 26 June 2020).
[3].   Luke Kemp, Are we on the road to civilization collapse? BBC website, 19th February 2019.https://www.bbc.com/future/article/20190218-are-we-on-the-road-to-civilisation-collapse

The author has PhD's from Oxford and Fribourg Universities. In 1986, he was the laureate of the Joseph Vigener prize, awarded by the Faculty of Law, Economics and Social Sciences of Fribourg University, for his work on East-West relations. He held professorship positions and taught international political economy, transition economics and European institutions and policies, in the US (Boston University), Russia (Higher School of Economics) and the EU (Catholic University Leuven, European Institute of Public Administration, European Business School/Brussels). In 2008, he became senior member of St. Antony's College, Oxford.

ANNEX – TABLES AND FIGURES

| Table1 – The duration of civilizations: basic statistics (years)		
Parameter/value	Kemp's data	Freeman's data
Population size	87	72
Minimum	14	14
Maximum	1150	1100
Range	1136	1086
Average	(336) 336	(349) 351
Median	250	(330) 301
Standard deviation	255	233
Variation coefficient, %	76	67
Sources: Kemp, Freeman – see references.		
Note: Between brackets, the values computed by the reference authors.		

| Table 2 – The duration of civilizations: basic statistics / regional perspective (years)					
Regions	# civ.	Average	Median	Standard Deviation	Variation coefficients, %
Africa	11	453	400	238	52
Mesopotamia	12	185	203	101	54
India	22	310	137	304	98
Source: Freeman – see references.					

Figure 1 – Histogram
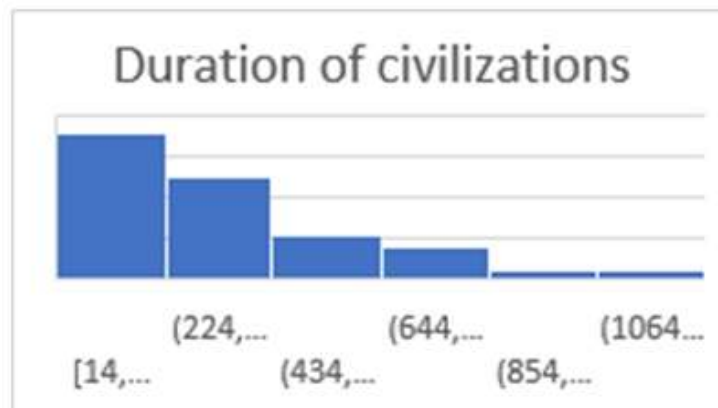
Source: Kemp – see references.
Y-axis: Number of cases; a line corresponds to 10 units. X-axis: Duration, in years.

Figure 2 – Regression analysis
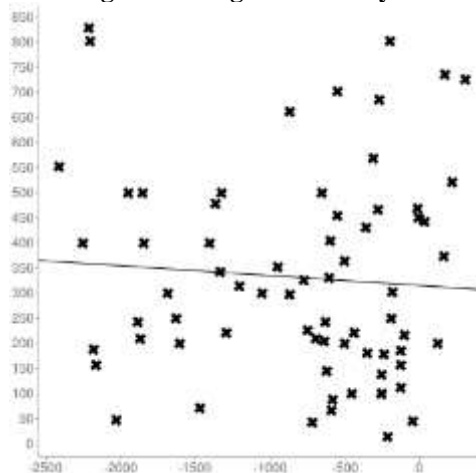
Source: Freeman – see references.
Y-axis: Duration of civilizations, in years.
X-axis: the middle-year of the reference civilizations occurrence period.
Notes:
- The linear regression line is calculated with OLS and drawn by the ALCULA webtool.
- Two outliers are excluded from the population, namely the civilizations with lifespans equal to or above 1000 years.
- The results reported in the box below also show the estimates obtained with the XURU webtool.

LINEAR REGRESSION RESULTS – ESTIMATED PARAMETERS
With http://www.alcula.com/calculators/statistics/linear-regression/
Sample size: 70 Mean x (x̄): -807.85 Mean y (ȳ): 330.72857142857 Intercept (a): 314.83173911104 Slope (b): -0.019677950507558 Regression line equation: y=314.83173911104-0.019677950507558x
With http://www.xuru.org/rt/
Result: y = -1.967795051·10-2 x + 314.8317391 Correlation Coefficient: r = -7.106678889·10-2 Residual Sum of Squares: rss = 2901000.003 Coefficient of Determination: R2 = 5.050488484·10-3