

Angus Maddison's Mission to Understand the World and its History through Numbers¹

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Abstract

Angus Maddison's contribution to the analysis of long-run developments in the world economy has been monumental. His continuous cumulative work on an ever expanding data-set of national accounts and his in-depth analysis of changes in the main trends in the world's economic history has given us fundamental tools for a better understanding of past secular trends and future scenarios. His tentative estimates of total and per capita income in remote times must be considered important preliminary building stones in the process of cumulative learning. His main contributions to our knowledge of world economic changes, briefly surveyed in this paper, will be treasured by generations of scholars of comparative growth and development and of economic historians.

JEL Classification: C80, E20, N1, O11, O57, P50

Keywords: Angus Maddison's contribution, comparative economic growth and development, quantitative economic history

In his fascinating concise autobiography² Angus Maddison defined himself as a "chiffrophile", a person seeking knowledge through the hard facts provided by statistical data. He was perfectly conscious that data are only very rough estimates of reality, but he was sure that they can give a great help to a better understanding of complex economic and historical phenomena. Moreover, he thought that the work on data is a cumulative process, on which you can build, a bridgehead which you yourself and other scholars can constantly expand, refine and consolidate, so that your work would not be vain. It would be the cornerstone on which a solid building gradually takes shape.

However, his works were never "facts without theory". His analyses consisted of a complex and difficult fusion of facts, economic theory and history.

Maddison's objectives were indeed ambitious: to understand the world's trends and destiny through an analysis of long-run changes in main economic data and systems. His research interests were strongly influenced by his university studies in history and economics and by his early readings. Keynes's *How to Pay for the War*, Colin Clark's *Conditions for Economic Progress* and Schumpeter's *Capitalism, Socialism and Democracy* were seminal inputs in his formative years.

The long period, since 1953, spent at OEEC (which later became OECD) helped consolidate his rich economic and statistical background. His first survey on aspects of

¹ Angus Maddison serenely passed away on April 24, 2010. His outstanding contribution to comparative economics and to quantitative economic history will be celebrated in next EACES conference in Tartu (August 26-28, 2010). An obituary by Bart van Ark (2010) may be seen in the GGDC website (GGDC, 2010), on which can also be found Maddison's main bibliography and a substantial part of his data collection. Another part is available in <http://www.ggdc.net/maddison/>.

² See Maddison (1994). Unfortunately the autobiography ends in 1994 and thus does not cover the last, very productive, sixteen years of Maddison's life. However his "Research objectives and results: 1952-2002" on the GGDC website (GGDC, 2010) give a useful insight on his contributions up to 2002.

the world economy was an article published in 1962 in *Banca Nazionale del Lavoro Quarterly Review* whose title is “Growth and Stagnation in the World Economy: 1870-1960”. In the author’s own words “the essay was concerned with the transmission of cyclical fluctuations in trade and the impact of trade on growth. It involved the construction of annual estimates of GDP, trade volume and unit values for the main trading countries, revising earlier trade volume estimates by Hilgerdt and by Arthur Lewis”.³

His first book *Economic Growth in the West* (1964) contained a detailed quantitative analysis of the patterns of growth of the main Western industrialized economies. It also furnished the basic core of his ever expanding data-set on long-run growth.

The work at OEEC with Milton Gilbert, who had prepared with Kravis the first comprehensive set of national PPP (Purchasing Power Parities) data, making possible a better comparison among countries of levels of growth for the post-war period,⁴ had also strongly contributed to improve the quality and coverage of OEEC data. However, it was Maddison’s solid background in history and his research interests in long-run analysis which made it possible to build estimates also for the years preceding the Second World War, starting from 1870 or 1820. On that task he was helped and influenced by the seminal and extensive work done by Simon Kuznets on the long-run national accounts of the US and other industrialized countries⁵. However “Kuznets’ evidence was fairly Euro-centric” and did not provide measures for the performance of the world at large.⁶

Maddison badly desired to have a much wider coverage both over space and time, but he knew that knowledge gathered through books, articles and scanty statistical data is not enough in order to fully understand the difficult and complex working of developing countries and also the diverse growth conditions of countries such as Japan and the Soviet Union.

This was probably the inner motivation of a series of experiences in Japan, USSR and in several developing countries, vividly described in his autobiography. He went to Brazil, Guinea, Mongolia, Pakistan, Ghana, Mexico as an OECD expert or as a member of a Harvard advisory group. Drawing from these experiences, as well as from the continuous expansion of his data-set and his deepening economic analysis, he published in 1969 a book on *Economic Growth in Japan and the USSR* and in 1971 another volume on *Class structure and economic Growth* in India and Pakistan.⁷

In 1970 Maddison published a book on 29 developing countries, *Economic Progress and Policy in Developing Countries*. The methodology he used (growth accounting) was

³ See Maddison’s “Research objectives and results: 1952-2002” in the GGDC website (GGDC, 2010)

⁴ See Gilbert and Kravis (1954). See also Gilbert and associates (1958).

⁵ See, for example, Kuznets (1966). For a general assessment of Kuznets’s contribution, see Maddison (2007), pp. 301-4.

⁶ *ibid.* p. 302.

⁷ See Maddison (1969) and (1971).

strongly influenced by Denison's contributions,⁸ but Maddison added some original aspects. In particular he gave a "bigger weight to capital and introduced domestic policy and foreign aid as part of the explanatory framework".⁹

Then, back in OECD, Maddison got himself involved in a series of studies, report-writing and deep methodological improvements in three areas which he had found crucial for successful development experiences, namely employment, education and social policy.

The attention to employment was not only fostered by increasing problems of unemployment in some industrialized and developing countries, but probably also by the bleak memories of his childhood in Newcastle-on-Tyne and Gateshead, which he described in almost Dickensian words:

...The unemployed were not only poor but depressed. Many loitered aimlessly at streetcorners, looked haggard, wore mufflers and cloth caps and smoked fag-ends. Their children were often sickly or tubercular. My father took me to Gateshead every Sunday to see my grandmother. The double-decker bridge across the Tyne had openwork iron girders with a long drop to a dirty river that flowed between laid-up ships and a long line of derelict factories. The bleak image of the dead economy was sharpened by the noise and vibration above. Trams rattled down the middle of the roadway, and trains rumbled ominously overhead. At the Gateshead end, the buildings were blacker, and the clusters of unemployed thicker than in Newcastle. I saw nowhere so depressing until visiting Calcutta thirty years later....¹⁰

Since, to Maddison, increases in employment and in the quantity and quality of education were essential for a successful economic development, he tried to improve and enlarge our knowledge of the labour market and education processes in OECD countries. So, thanks also to his impulse, OECD began to prepare detailed statistical comparative surveys on education and on the labour market and other social issues, which provided useful tools for policy-makers.

In 1978 Maddison decided to leave OECD and join the University of Groningen where he could enjoy an excellent academic environment and complete freedom of research. He gradually gathered a working group on comparative long-run growth and development. This in 1992 led to the creation of GGDC (the Groningen Growth and Development Center), which has continued to extend and update the original Maddison data-set on long-run growth levels in PPP, gradually reaching a world-wide coverage.

In the Groningen period Maddison, with the help of his research group, constantly broadened the statistical coverage and historical depth of his work. He also introduced a possible alternative to the current statistical measures of PPPs estimates. He gave an explanation for his new approach: "In 1983 I compared the results of my 1970 output approach, which I called ICOP (international comparisons of output and productivity) to contrast with the ICP results of Kravis, Heston and Summers from the

⁸ See Denison (1962) and (1967). Denison, in turn, based his analysis mainly on Solow's, Schultz's, Abramowitz's and Kendrick's theoretical insights.

⁹ See Maddison (1994), p. 15

¹⁰ See Maddison (1994), p. 1.

expenditure side. I argued that the ICP approach tended to exaggerate levels of output in poorer countries, and that manipulation of ICP expenditure results to produce proxy measures of real output by sector were misleading. Since then, members of the ICOP group at the University of Groningen have developed this approach much further.¹¹

On the basis of his ever- expanding data-set Maddison could write an influential survey in the *Journal of Economic Literature* and three volumes on different aspects of the world economy, which culminated in *Monitoring the World Economy* (1995)¹². This important book was commended by Charles Feinstein in 1996:

The publication of this volume represents a magnificent extension of historical national accounts both in time and by region. In a prodigious sequel to his previous studies Angus Maddison now provides consistent estimates of GDP, population and GDP per capita for the period from 1820 to 1992. The main data set is based on 56 countries which together accounted in 1992 for 93 per cent of world output. The richness of this banquet can be contrasted with the thin gruel which was all that was available when Maddison published his first study of comparative growth (*Economic Growth in the West*: Allen and Unwin, 1964). At that time he was able to include estimates for only 12 countries, ten in Europe and two in North America: there were no data prior to 1870 and many omissions after that, and the supplementary information was similarly restricted. His splendid volume will surely stimulate subsequent studies in both theory and history and will thus contribute both to further advance in the coverage and reliability of national accounts data, and to better understanding of the processes of economic growth and of international convergence and divergence.¹³

Maddison's and GGDC data-set had been made freely available to other scholars, so that a great number of important comparative empirical analyses on world growth are debtors to the life-long effort of data collection of Maddison and his associates. Many researchers appreciated his contributions even more for their rich collection of data than for their very important analytical contents.

In the succeeding years Maddison continued to broaden both the time span and the geographic coverage of his research. As regards time, he boldly tried to expand his collection of quantitative evidence back to the epoch of Roman empire, while from the geographic point of view, he deeply involved himself in the study of China, a great emerging economic power.

The research on China led to the publication in 1998 of an OECD book, *Chinese Performance in the Long Run*, then extended and up-dated in the second 2007 edition. This volume furnishes not only an in- depth explanation of the rapid growth of the Chinese economy since 1978, but it also provides us with a long-run concise economic history and a wealth of empirical data and materials on that great country.

Since 2000 Maddison has published several essays and four books on the world economy. One of the volumes, *The World Economy Historical Statistics*, (OECD, 2003), presented his data-set. The other three volumes were *The World Economy. A Millennial*

¹¹ See Maddison (1983), Maddison, van Ark (1988) and (1994), Szirmai, van Ark, Pilat (1993).

¹² See Maddison (1982), (1987), (1991) and (1995).

¹³ See Feldstein (1996)

Perspective, (OECD, 2001), *Growth and Interaction in the World Economy*, (The AEI press, 2004), and his final great book, *Contours of the World Economy, 1-2030 AD* (2007).¹⁴ The latter can be seen as a summing-up of the main results of the giant task that Maddison had begun to take when a young scholar: the attempt to illuminate the main trends of the world economy through an increasing wealth of statistical measures. Not only did he try to analyze these trends from 1 AD up to 2007, but he also presented, in chapters 5 and 6, an excellent survey of the advances of macro-measurement since Petty's *Verbum Sapienti* of 1655. Finally, he tried to imagine, in chapter 7, how the world economy will change until 2030, through the inexorable economic ascent of the two great Asian countries, China and India, and through the global battle against our great environmental problems, energy scarcity and global warming.

There have been extensive arguments regarding at least five issues in Maddison's outstanding work.

First, there is his measure of the levels of GDP in PPP for emerging countries, like China and India. Until 2007 his estimates, incorporated in the Conference Board–GGDC data set, did not differ much from World Bank estimates. But then World Bank drastically revised its data, especially for China and India, on the basis of a new ICP survey, publishing since 2008 its new PPPs national accounts data in *World Bank Development Indicators*. In this revision China's and India's estimates were substantially reduced and were 30-40% lower than Maddison's estimates. I had the opportunity to discuss this important issue with Angus in 2008. He was very sceptical of World Bank's radical revisions. He told me that, without a drastic change in the rates of growth series, the new figures would not permitted a sufficient subsistence level for China in 1950. Moreover, the price measures on which these large revisions were based were debatable because of the difficulties of taking an appropriate account of the real purchasing power of people living in rural areas. A more articulated discussion on China's estimates can be found in Maddison and Wu's 2008 article¹⁵. My personal opinion on the matter is that the real size of China's and India's GDP in PPP is closer to Maddison's estimates than to the new World Bank data, whose methodology gives an excessive weight to urban prices and urban consumption patterns and underrates the lower prices and the sizable role of self-production in rural areas.

Another controversial issue was Maddison's attempt to give quantitative measures for very remote times. In his recent books he tried, for example, to make tentative estimates of the income level of the different provinces of the Roman Empire, and even to give figures of the world per capita GDP in the year 1 AD and the rate of economic growth during the first millennium. Maddison was perfectly conscious that as long as his measures went increasingly back in time they became less and less precise and founded on more fragile, although gradually improving, bases. But he vigorously defended his enterprise. In the introduction of his 2007 book he wrote:

Scrutiny of distant horizons is a meaningful, useful, and necessary exercise because differences in the paces and pattern of change in major parts of the world economy have deep

¹⁴ See Maddison (2001), (2003), (2004) and (2007). On the latter volume, see also my review (Valli, 2008).

¹⁵ See Maddison, Wu (2008)

roots in the past [.....] Quantification clarifies issues which qualitative analysis leaves fuzzy. It is more readably contestable and likely to be contested. It sharpens scholarly discussion, sparks off rival hypotheses and contributes to the dynamics of the research process. It can only do this if the sources of the quantitative evidence and the nature of the conjectures and proxy procedures are described transparently so that a dissenting reader can augment or reject parts of the evidence, or introduce alternative hypotheses.¹⁶

Maddison estimates have thus to be considered as building blocks - often the cornerstone- of a long process of cumulative scholarly learning.

However, Maddison was also conscious of the limits of quantification and of the need to integrate the analysis with other important elements:

Although quantification is important, no sensible person would claim that it can tell the whole story. One needs to probe beyond quantifiable causes to deeper layers of explanation. This is a complex task because there are many interactive forces whose individual impact is difficult to specify. Countries have widely different institutions, traditions and policies which have a powerful impact on the operation of atomistic market forces. Hence the need to use a blend of evidence on proximate and deeper layers of causality.¹⁷

Here we find an important aspect of his methodological approach. As Bart van Ark has remarked, "Angus was also an early advocate of the need to take economic institutions much more seriously by developing a model that distinguished between proximate (directly measurable economic inputs, such as labour, physical and human capital and land) and ultimate (institutional, political, social and cultural) sources of growth".¹⁸

A third element on which Maddison's work has provoked a vast debate is his forceful opposition to simplified historical visions which over- emphasize the importance of the "industrial revolution" greatly underestimating the significant economic advances, the "long apprenticeship", made in the merchant capitalist era. In Maddison's own words:

"There is a school of thought which attributes modern economic growth to an "industrial revolution" in Manchester, preceded by centuries of Malthusian stagnation. The metaphor was first popularized by Arnold Toynbee in 1884, and has continuing resonance, e.g., in Rostow's (1960) "take-off", and Mokyr's (2002) history of technology. Nordhaus (1997) and DeLong (1998) have constructed fairytale scenarios which greatly exaggerate progress since 1800, before which they seem to believe that people lived as cavemen. These views are fundamentally wrong, and I present my

¹⁶ See Maddison (2007), p. 1

¹⁷ Ibid., pp. 1-2

¹⁸ See van Ark (2010), p. 2. See also Maddison (1988).

evidence for believing that the roots of modern economic growth lie in advances achieved in a long apprenticeship during the merchant capitalist era”¹⁹

On this issue I agree with Maddison’s more gradualist approach and with the fact that Nordhaus and DeLong’s approach greatly overestimated the acceleration of growth in the XIX and XX century, somewhat abusing of the concepts of quality changes and hedonic prices. In the last two centuries there has been a substantial increase in the rate of growth mainly in Europe, in the US and then in East Asia, but there was before, in particular in Europe, a gradual phase of important advances in science, in technology and in institutions.²⁰

A fourth element, in which Maddison’s vision appears instead to be rather different from mine, is the importance of economies of scale. While Maddison gives a limited importance to their impact on XX century economic growth, I maintain that they were an essential contributory explanation to the rapid economic growth of the US in the 1908-1928 period, to Japan’s and Western Europe’s “golden age” in the 1950s and 1960s, China’s very rapid growth since the 1980s and, at least partly, to India’s economic ascent since 1992.²¹ Probably his ideas about economies of scale had been influenced by his early 1952 work on the comparison between productivity dynamics in Canada and in the United States²², and later on by his extensive use of growth accounting techniques. One of the major weaknesses in the use of growth accounting techniques consists in the fact that they cannot consider the possible complex feedback existing between the factors of economic growth. Capital, labour and technical progress are considered as distinct independent variables, while modern endogenous and neo-Keynesian growth theories have shown that a greater capital accumulation may be associated to more technical progress and more human capital growth, as well as to a rise in the general level of knowledge. At the same time, if economies of scale can increase productivity and this increase can foster physical and human capital accumulation and therefore technical progress, there can, in certain historical phases, be a cumulative process, the use of a sort of *Fordist model of growth*, in which feedbacks among productive factors are particularly strong.

The fifth aspect of Maddison’s approach which appears controversial has been his apparent discounting of globalization processes. His analysis is principally based on the study of the long-run growth of major countries in the world. Relatively less attention has been devoted to the two great waves of portfolio capital movements, FDI flows and the expansion of multinationals at the beginning and in the last quarter of the XX Century and in the first decade of the XXI Century. If this is partly true, one cannot certainly say that Maddison was oblivious of globalization processes. He indeed gave us, for example in chapters 2-4 of his 2007 great book *Contours of the World Economy*, a fascinating assessment of the complex and often dramatic interrelations between countries and regions through external trade, colonization and de-colonization

¹⁹ See Maddison (2007), p. 6. The author devotes a wider space to the demonstration of his viewpoint: see 315-6, 319-21.

²⁰ Wagener (2009) gives an interesting and well balanced interpretation of the European long-run economic ascent.

²¹ See Valli (2009) and (2010).

²² See Maddison (1952)

processes and through the exchange and diffusion of cultures, institutions and technical knowledge.

In retrospect, if one looks at Angus Maddison's huge contribution to such vast fields of research as comparative economic growth and development, the methodology of national accounts and to quantitative economic history, one must marvel as how he was able to combine a full and intense personal and family life with such important scholarly achievements. Indeed, his luminous example will be precious for current and future generations of comparative economics scholars and economic historians.

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