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Óscar Carpintero
El metabolismo de la economía española: Recursos naturales y huella ecológica (1955-2000)
Fundación César Manrique, Madrid 2005, pp. 636.

John R. McNeill

One of the underappreciated facts of recent economic history is the performance of the southern European “tigers” since 1950. The rates of GDP growth in Greece, Italy, Spain, and Portugal 1950-1998 easily outstripped those of Europe on average, even plucky Ireland, often held up as a Celtic “tiger”.¹ In the 1950s in Mediterranean Europe, true poverty remained widespread and malnutrition was not rare. Today, poverty and malnutrition are both rare in southern Europe. One can see evidence of the economic and nutritional changes just by walking the streets of Madrid or Naples or Athens: young adults are on average several centimeters taller than their grandparents.

This is an extraordinary achievement that has made the lives of millions much more agreeable than they otherwise could be. How did it

¹ A. Maddison, *The World Economy: A Millennial Perspective*, OECD, Paris 2001, pp. 272-4.

happen? Was it peace? Skilled macroeconomic management? The fruits of trade and specialization? It may be all these things and more, but one thing certainly involved was the mobilization of massive quantities of energy and other materials on scales never hitherto approached in the history of southern Europe. With respect to energy in particular, southern Europe had suffered prior to 1950 as a region with little coal in the age of steam. Coal cost more there than in Britain, Belgium, or Germany. Southern Europe has even less oil, but it is close to the giant oil fields of the Middle East, and since these opened up in the late 1940s, is no longer at an energy-cost disadvantage vis-à-vis the rest of Europe. The transition to oil proved a great economic boon to southern Europe. But it came, of course, at a cost, in terms of dependence on Middle East oil deliveries and the US Navy as protector of the oil routes; in terms of environmental damage; and in terms of sustainability.

It is the latter issue, sustainability, and the case of Spain since 1955, that concerns Óscar Carpintero in this book. It will be quite some time before anyone needs to write another history of resource use in the Spanish economy in the second half of the twentieth century. Carpintero has covered the subject in great detail and with great insight. It might be worth updating the book in a decade or so, but there will be no point in writing another book on the subject.

Carpintero comes to the subject from the field of ecological economics. His intellectual framework includes notions that have become routine in that field, such as ecological footprint, social metabolism, and material flow accounting. He works in the intellectual tradition of Frederick Soddy, N. Georgescu-Roegen, and Herman Daly, and is influenced by current scholars such as Marina Fischer-Kowalski, Joan Martínez Alier, and J.M. Naredo. Like the latter two, both Spaniards like Carpintero, he takes a historical approach to the subject, grounding his arguments in meticulously collected historical data. His work bears comparison to the energy-centered history produced in Italy by Paolo Malanima and Silvana Bartoletto, or in Austria by Fridolin Kraussmann and others.

The first observation to make is the sheer mass of the book and the work behind it. Its 636 pages are arranged in 8 chapters and 57 sub-chapters. It includes 138 tables and 107 graphs. The bibliography stretches over 28 pages and includes about 650 entries, mainly in English and Spanish. Carpintero has synthesized an enormous quantity of

information about the Spanish economy, and a fair bit about some other national economies in support of his arguments. He cannot be faulted for lack of effort. The publisher showed commendable courage in printing such a large tome with so many tables in it.

The first two chapters lay out the book's intellectual lineage. They discuss the history of economic ideas and the place of ecologically-aware thinking in economics. The authors under discussion are mainly those who wrote in English and mainly worked in the USA. This part of the book covers what is fairly familiar terrain to those with an acquaintance with ecological economics, although it goes into far greater detail than is typical for a review of a book's theoretical underpinnings. For example, Carpintero resurrects the neglected Paley Commission report of the early 1950s, an American inquiry into the sufficiency of raw materials in the US economy. This exhaustive study in five volumes was an important document in its day, and remains useful as a means of penetrating the outlook and concerns of American officialdom and elite policymakers of the early Cold War years. Yet it is almost completely forgotten now. And even if it deserves to be remembered, it is in any case a very small piece of the intellectual puzzle. Carpintero gives far more attention to Georgescu-Roegen, Daly, and other major figures in the history of ecological economics, as is appropriate.

The third and fourth chapters consider the material flows in the Spanish economy from 1955 to 2000, divided into the non-renewable (e.g. fossil fuels and minerals) and renewable or biological flows (e.g. timber, firewood, fish). The chapter on biological flows includes an extended discussion of Spanish agriculture as it has evolved toward a more chemical-intensive, mechanized and (in terms of gross output) productive form. But of course in terms of energetics – that is, the quantities of energy used as inputs compared to the quantities available as outputs – modern Spanish agriculture, like that almost everywhere, is a losing proposition: it takes more energy to produce food than that food represents in terms of energy. These two chapters abundantly document the degree to which the modern Spanish economy has become unsustainable in its recent form.

The fifth chapter brings in some comparative perspective, mainly from Europe, the USA, China, and Japan to analyze the evolution of the material requirements of the Spanish economy. This section will not make Spaniards proud. Carpintero's data show how the Spanish economy continues to use resources intensively, indeed in most respects has increased

its resource-intensiveness, while other national economies have decreased theirs. That is to say, for each unit of economic production, Spain requires more raw materials than the other economies surveyed, and, more strikingly, more than Spain itself required a quarter century ago.

Graph 5.15, for example, shows that in 1994 Germany, Japan, and the USA used between 60% and 80% of the volume of material inputs per unit of economic output as they did in 1975; Spain meanwhile used 110%. In Spain there is no evidence for any 'dematerialization' of the economy, as there is in some other prosperous lands. To the contrary, Spain's economy has grown *more* resource-intensive in recent decades, bucking the general trend of industrialized countries. What this chiefly reflects is the later industrialization and adoption of fossil fuels in Spain as opposed to Germany, Japan, and the USA. It also means that the study of material flows is probably more important in the Spanish case than these others, precisely because they remain so essential to the economy.

Chapter Six analyzes the ecological footprint of the Spanish economy in international perspective. There are of course many objections to the concept and methods of ecological footprint analysis, and some readers will not appreciate its use here. Carpintero recognizes the methodological controversy, and makes his calculations in various ways, involving varying assumptions. This of course will not satisfy everyone. But for those who accept it, or at least find it suggestive, there is much to ponder in this chapter. Spain, like all rich countries, operates at a deficit in terms of the territory needed to generate the inputs its economy requires. In this respect it is much like the rest of Europe: in 1996 Spain's ecological footprint deficit (in terms of hectares per capita) stood at 3.0 and that of the European Union collectively at about 3.3. Japan's was 5.1 and the US' 6.7. Since 1955 Spain's ecological footprint has grown steadily, while of course its national territory has not. As of 2000, Spain would need 2.6 time its national territory merely to offset its carbon dioxide emissions. Almost all rich countries are similarly in deficit in this respect.

The seventh and eighth chapters consider the role of international trade and finance in shaping the ecological character of Spain's economy. In the 1950s, Spain as a matter of policy, and to some extent of necessity (Franco's regime had few friends internationally), pursued an autarkic course that was out of step with its times. Increasingly, however, and especially since the 1970s, international trade and financial flows have loomed large in Spain. That is, the Spanish economy has become more

and more globalized. This is most decidedly the case when it comes to raw material flows, which a half century ago were small; it was too costly to ship bulk goods internationally. But cheap energy makes all things possible, and Spain can import or export vast quantities of chemicals, cement, timber, and so forth. Like most rich countries, Spain has come to import far more in material terms than it exports.

Throughout the book the unit of analysis remains the national economy. While international comparisons abound, there is almost no effort to consider the variations within Spain, a country with great regional variability in most respects, including economic life. Catalonia and Extremadura are worlds apart by most conventional approaches to economic analysis. Are they in terms of their ecological realities? Carpintero does not tell us. Obviously regional or local differences would take another book (or several) to explore, and this one is already large enough. My point is merely that while this book will help readers understand where Spain stands in relation to some other countries, it will not help those who want to know how some parts of Spain compare with others.

One reason, I expect, why Carpintero has chosen the national economy as his unit of analysis is that this is the way the official data on which he relies are arranged. He has combed the publications of Eurostat and INE (the Spanish statistical service) for the figures on which his arguments rest. While INE publications typically provide disaggregated data for regions and provinces of Spain, those of Eurostat (or the United Nations) are not often broken down below the level of the nation-state. As for accuracy of the data, always a problem in studies of social metabolism or ecological footprint, it is hard to know. Carpintero uses the same sorts of sources as other scholars working in this field, and the fact that he goes back no further than 1955 (some of the work on Austria and Britain goes back centuries) means that official inaccuracies are likely to be less of a problem here than elsewhere. But they are still a problem. In all such studies it is prudent to recall the wise words of the British tax statistician, Sir Josiah Stamp:²

The government is very keen on amassing statistics. They collect them, add them, raise them the n^{th} power, take the cube root and prepare wonderful diagrams. But,

² Quoted in Janet Abu-Lughod, *Before European Hegemony: The World System A.D. 1250-1350*, Oxford University Press, New York 1989, pp. 28-29.

you must never forget that every one of these figures comes in the first instance from the village watchman, who just puts down what he damn pleases.

In the end, it is very hard to know how accurate the official data may be on things such as cement use.

Even for those who read Spanish more effortlessly than I do, I suspect this book will not be an easy read. The prose is peppered with acronyms, which while fully identified at first mention, sometimes do not recur for long stretches. So I found myself hunting through earlier pages trying to find the explanations; an appendix listing all the acronyms would have helped. The book includes huge amounts of quantitative data, a necessity in studies of this kind. But that does not make for light reading. It is not, however, a mathematically challenging text. I noted only two pages with equations on them, and one can gather the gist of Carpintero's points without understanding the equations.

In the final analysis, then, the book is essential reading for anyone hoping to understand the Spanish variant of the modern economic condition, even if it does not rank high in entertainment value.

For most of the history of humankind our ancestors struggled to get enough to eat and to stay warm. The most important problem of the human race was what John Maynard Keynes simply called the economic problem. The chief reason that people struggled to get enough in times past was they did not have access to much in the way of energy to do work, above and beyond what their own feeble bodies could generate. They lived in an organic economy, dependent on solar energy as channeled through plants and photosynthesis. The sun provided energy, plants converted it to chemical energy which human (and animal) bodies could translate into muscular exertion. In a few favored locations a bit of wind and water power contributed to the total of available energy. This energy regime was inefficient, and limited what work societies could do and what wealth they could generate. Poverty, famine, and demographic crises were normal features of life under this energy regime. Its chief virtue was that it was almost sustainable in many landscapes, and resilient in the event of shocks such as bad weather or epidemics. It relied on near-constant flows of energy rather than upon accumulated stocks. The study of economic life in this energy regime seemed unremittingly grim, a Malthusian tale of limits and suffering,

making the discipline of economics truly the 'dismal science', as the Scottish philosopher and historian Thomas Carlyle termed it in 1849. By that time, however, at least in Carlyle's island of Britain, the old energy regime was already on its way out.

Fossil fuels and steam engines brought a new one. By tapping the accumulated solar energy of eons of geological time in the form of coal and oil, basic constraints on economic life were shattered during Carlyle's lifetime (he died in 1881). In the contexts of unprecedentedly fast demographic and economic growth in Europe and elsewhere, economists increasingly turned sanguine about their science. Proper policy, it seemed, could ensure perpetual growth and the end of poverty, hunger, and want. Economics, especially during the era of fastest growth (1950-73) became a cheerful science, forecasting abundance without end if only its policy prescriptions were followed. Ecological economists meanwhile began to say that growth without end is an illusory goal and technically impossible within the confines of planet earth. They were widely regarded as killjoys, purveyors of an unnecessarily dismal science.

The record of the Spanish economy in the years after 1955 show remarkable growth if measured conventionally. In the 45 years to 2000, the economy grew about 6-fold, a good deal faster than the European average. Hunger and poverty became rare. This is an achievement not to be dismissed lightly. But Carpintero wants to draw attention to the costs of this achievement, in terms of ever-rising consumption of material inputs, the unsustainability of it, and the inefficiency of it. That is, he wants to underline the dismal rather than the cheerful aspects of recent Spanish economic history. This is a useful and sobering exercise.

The implications of Carpintero's analysis, and of the approach of ecological economics in general need not be dismal. Unsustainability need not bring collapse and a return to pervasive poverty or hunger. What is unsustainable must of course change, but it need not collapse to do so. Nor must an unsustainable economy necessarily become sustainable. It can merely become unsustainable in different ways. One unsustainable regime may be piled (chronologically) on top of another.

This is the interpretation of the long-term economic history of China offered by Mark Elvin in a remarkable article from 1993.³ Elvin

³ M. Elvin, "Three Thousand Years of Unsustainable Growth: China's Environment from Archaic Times to the Present", in *East Asian History*, 6, 1993, pp. 7-46.

finds, broadly speaking, three different eras in Chinese economic history starting around 1000 B.C. None of them was ecologically sustainable. Each had to change, indeed to disappear, and make room for something else, a new regime which applied new and different pressures upon the natural environment. But collectively they have amounted to a sustained growth of the Chinese economy.

For this reason I think the analysis of the Spanish economy provided by Carpintero is not necessarily bleak in its implications. Spain, and any of the dozens of prosperous countries that currently feature unsustainable economies, can conceivably make the necessary transitions, either to sustainability or to (what may be easier) another but different unsustainable format. Such a future might not please ecological economists, of course, as it would not constitute a durable solution, only a temporary fix that would, in time, require a new fix.

But in a world of flux can a national economy ever achieve true sustainability? The biosphere evolves in ways we influence but do not control. Every set of economic arrangements, every bargain we strike with nature, is necessarily provisional. None can last indefinitely, even those that seem sustainable on ecological criteria.

Carpintero's book shows that Spaniards, like most humans, must change their economic ways because they are truly unsustainable. But what the future holds for them, as for the rest of us, is likely to be a new and different sort of unsustainable economy, from which we will one day need to change once more. Flexibility and improvisation is our future, as it has been our past.