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A modest proposal for generating useful analyses of economies: a brief note

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I propose that economists leave philosophy alone for a while and instead try analysing some actual economic observations.

I have observed much discussion among heterodox economists about what science comprises, whether one could do "scientific" economics, and what ontology, epistemology, etc., etc., might be involved. If, for example, economies are historically contingent, how could one hope to do a rigorous analysis. I have also observed much concern about the complications of people and societies and the resulting alleged need for elaborate statistical analyses to extract an object of interest, followed by the construction of an elaborate mathematical model that includes many nuances of human behaviour.

I think the challenge is not nearly so daunting. An economic analysis does not have to emulate the precision of (some) laboratory physics to be useful. It does not have to yield a literal prediction. If one steps out of the equilibrium mindset of the neoclassical mainstream one can find obvious phenomena crying out for explanation, a financial market crash for example.

It is not a great mystery how one might try to do some scientific economic analysis. Many kinds of scientist do science all the time, mostly without worrying about the philosophical nuances of precisely what kind of process they are engaged in.

The process I illustrate here is drawn from my experience studying Earth's interior (Davies, 1999). It is a historical science. Earth's processes are historically contingent and often very complicated. Observations of the interior are difficult, indirect and always incomplete. Yet we have developed considerable understanding of how the interior works to move continents and tectonic plates around the surface. Sometimes a very rough estimate can yield considerable insight.

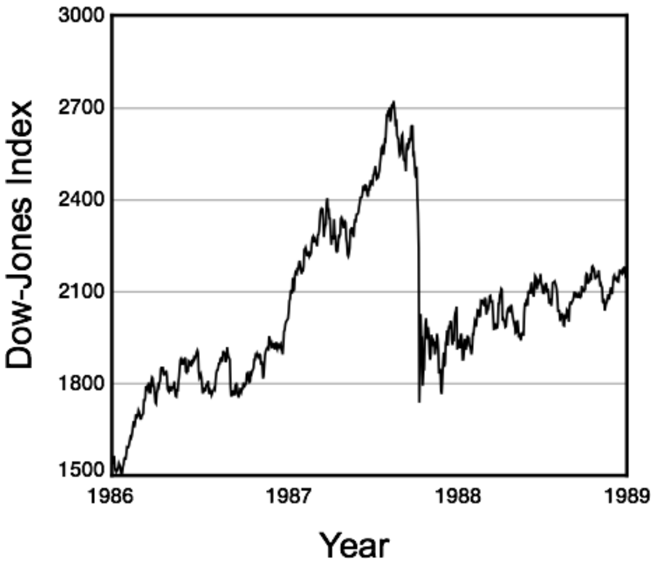
What follows is expressed in terms that I think apply to many other kinds of science. Worrying about whether this process encompasses all kinds of science is precisely the sort of distraction I want to avoid. In avoiding the philosophy I do not mean to imply there is none involved, I simply want to get on with something that I know to work.

The process, in outline, is to seek some regularity or pattern or striking feature of an observable economy, and to propose a hypothesis that might account for the observed feature. The relationship of the hypothesis to the observation(s) ought to be explained. This might involve mathematics or it might not, and any mathematics used might be simple or sophisticated. Ideally some additional observations would be noted that are consistent with the implications of the hypothesis. One might then conclude by discussing whether the hypothesis appears to provide a useful description of the noted phenomenon and, if it does, how its usefulness might be further tested or enhanced.

The currency of such enquiries is thus observations, hypotheses and useful resemblances. Nothing more obscure or contentious.

As an example of an observed phenomenon I offer the record of the US financial markets in the late 1980s (Figure 1).

Figure 1. The Dow-Jones industrial average, 1986-1989



One can interpret this as a broad rising trend upon which is super-imposed a more rapid rise followed by a sudden drop. One might make other interpretations of a rather irregular plot, but that seems to be a useful description.

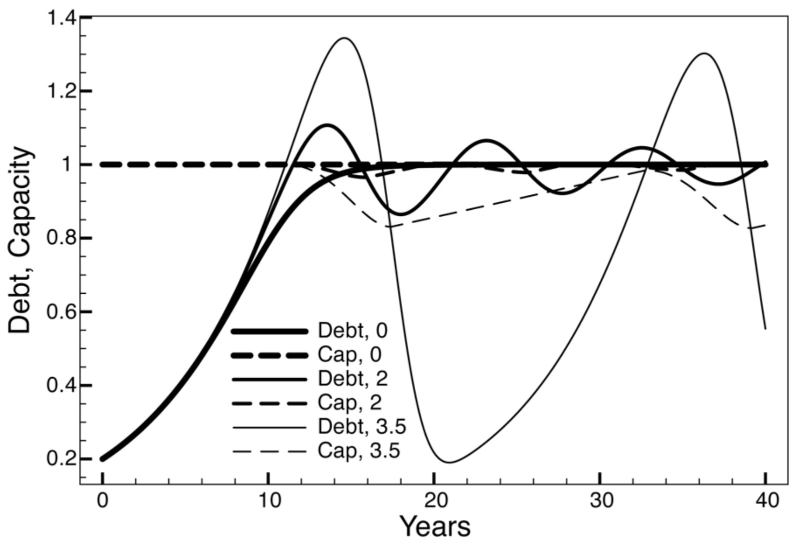
This interpretation raises the question of what might cause the financial markets to rise unusually rapidly and then suddenly drop, i.e. the implied change of behaviour signals something that might be usefully investigated. An analogy can be made with population dynamics in ecosystems. A species, say rabbits, might find itself in a very favourable season, with a lot of food and few predators, and breed rapidly. If, however the rabbits eat the food faster than it can regenerate then they might find, rather suddenly, that there are lots of rabbits and hardly any food. Starvation might then ensue, with a sudden crash in rabbit numbers. Worse, they might have over-grazed the land and damaged its productive capacity.

This is known as an overshoot-and-crash phenomenon. It occurs because the feedback from food supply to breeding restraint is delayed. If there had been a wise old rabbit who persuaded the rabbits to slow their breeding as the carrying capacity of the land was approached then the population might have stabilised around a steady number. However rabbits are not so wise, and they keep breeding past the carrying capacity until the issue is forced by lack of food. By then it is too late to stabilise, and a disastrous crash is inevitable.

So by analogy one might suppose that something triggers a burst of optimism among financial market traders and they borrow lots of money to “invest” (though really to bet on the market continuing to rise). This may continue until the amount of debt becomes more than can be reasonably repaid. There might then be a cascade of defaults that drive the market rapidly down.

One can make a mathematical description of this process, in which the rate of growth of debt approaches zero as the "carrying capacity" of the economy is approached, but with a delay, so the amount of debt may overshoot the carrying capacity. How much overshoot will depend on the delay between the debt reaching the carrying capacity and the traders slowing their borrowing. It is assumed that during overshoot debt is extinguished, with a delay, by defaults at a rate that rises rapidly as the overshoot increases. Three solutions are shown in Figure 2, corresponding to delays of zero, 2 years and 3.5 years. The details of this model and further discussion of it are developed in my books *Sack the Economists* (Davies, 2013) and *Economy, Society, Nature* (Davies, 2019).

Figure 2. Modelling debt as an overshoot and crash phenomenon



With no delay of feedback, the debt rises, exponentially at first, then smoothly levels off at the presumed carrying capacity. With a 2-year delay there is some overshoot, then quasi-periodic oscillating. With a 3.5-year delay there is a larger overshoot followed by a crash to very low levels of debt. The crash in the model is because debt is still being rapidly extinguished even after the level of debt has fallen back. It then takes a long time for the debt (and the economy that depends on it) to recover.

This simple model seems to capture some of the essence of the market behaviour observed in Figure 1. It suggests that the core of the problem might be excessive optimism of traders and their resistance to warnings, combined with debt being too readily available. Clearly one could make more sophisticated models of such a process, but this simple model encourages further exploration of the main idea.

A further encouragement is the solution with the 2-year delay, which yields behaviour reminiscent of the "business cycle", too much money (and debt) alternating with not enough. The three kinds of behaviour illustrated in Figure 2 are obtained merely by changing one parameter, the delay. Thus in this sense the model has a generality extending beyond the immediate question addressed.

This model is kept very simple in order to focus on the process of developing and using it, but you might think it is just too crude. It involves a single non-linear ordinary differential equation and a few plausible but debatable assumptions about parameters. The equation can readily be solved numerically.

Yet consider a model of the Global Financial Crisis of 2007-8 by Eggertsson and Krugman (2012), the latter a pseudo-Nobel prize winner. They made two models, one for before and one for after a crash, with the difference between the models being effectively that the amount of available credit was presumed to be less in the second. Nothing in the model determined the amount of credit, it was imposed from the outside. Their equations of optimisation did require sophisticated, though old-fashioned, analytical methods to solve, but that says nothing about the usefulness of the models.

Both models are equilibrium models. But if the "before" state of the market, with high prices, was an equilibrium state there would be no crash. Therefore the model must be missing the imbalance that drove the crash. It is therefore incapable of telling us why such a crash occurred. It cannot tell us anything about the dynamic process of boom and crash, the inflation and bursting of a debt bubble. It is not a useful model, it is a useless model, a dead end as far as understanding an observable economy is concerned.

My simple model, on the other hand, can accommodate imbalances of the sort that must be involved in market crashes and the initial results are encouraging. It could be elaborated with more empirically-constrained input and, for example, a more explicit model of traders' behaviour. In other words it has the potential to yield useful insight into a financial market crash. Steve Keen's rather more elaborate models of finance are of the same general kind, so we have taken a small step in the direction of his instructive models (Keen, 2012). It may also turn out that this approach has limitations, when compared with more observations, and that other factors are important. That would still be a useful insight.

Another virtue of my model is that it addresses a major and recurrent dysfunction of modern economies, their propensity for financial market crashes. The neoclassical tradition has been completely unable to address this rather fundamental issue, to the point that it was claimed no-one could have anticipated the Global Financial Crisis of 2007-8, though of course many outside the mainstream did.

Let us look at what went into the models of Figure 2. First was a subjective interpretation of the graph in Figure 1, that the rise and fall during 1987 was a distinct episode with potentially identifiable causes. Then there was a model of one aspect of human behaviour: that financial traders tend to be over-optimistic and tend to ignore warning signs until they are very strong. This behaviour was then rendered into a rather simplified mathematical description with some plausible choices of parameters. These are all assumptions on which the model is based. Then deductive logic was invoked to deduce the implications of these assumptions - in other words the equation was solved, numerically. Then the results (Figure 2) were compared with observations - those of Figure 1 and also, qualitatively, with knowledge of "the business cycle".

This is a scientific process in operation: non-rational perceptions or interpretations of events or patterns in observations, the formulation of a hypothesis, deduction of implications of the hypothesis and further comparison with observations.

Notice also that taking this small step in understanding did not require a comprehensive model of human behaviour and the many ways we interact. We do not have to be paralysed by the immense complication of human societies.

Nor does one episode need to be identical to another for potentially useful insight to be found. An economy is a historically-contingent system, but we can still gain some understanding. The field of history would not exist if resemblances did not exist. You do not lie in bed despairing that today will not be just like yesterday, nor trying to model the coming day in detail. Rather, you get up and muddle through the new day as best your considerable understanding allows.

My analysis did not yield a prediction of the future of the stock market. The event analysed is in the past, immutable, as the processes that formed a rock are in the past, yet we can draw insight from an analysis of how it might have come to pass. The solution of the equations expressing the assumed model allows us to deduce the implications of the model's assumptions. It is more general and more useful to talk about implications rather than predictions.

By dealing with observations we avoid worrying about what "reality", if any, might lie behind our perceptions. Observations will always have limited accuracy and will always be incomplete, and we have to contend with those limitations, but the existence of some observations is not in doubt.

The assumptions on which our model is built matter, contrary to the thoroughly muddled assertions of Milton Friedman (1953/1983). In fact assumptions are everything. Eggertsson and Krugman assumed equilibrium and thus emasculated their model at the beginning, making it incapable of addressing the issue. Scientifically it is a useless model, even though professionally it presumably further enhanced the reputations and power of its authors within their misguided profession.

The model behind Figure 2 would be called a macro-economic model, in conventional mainstream terms. It is legitimate to address aggregate properties in this way because a complex self-organising system, as a modern economy plausibly is, has emergent behaviour that is not inherent in the behaviour of the system's components (the traders and the objects of their trade). The behaviour emerges from the interactions among the traders and cannot be deduced, for example, from the behaviour of one representative trader. The well-developed science of fluid dynamics, for example, proceeds on the basis of the emergent macro behaviour of fluids, not by modelling all the atoms within the fluid.

It is possible to do useful micro-economic models, but they must involve modelling the interactions of large numbers of traders and extracting their collective effects. Yoshinori Shiozawa and his colleagues are developing such an approach (Shiozawa et al., 2019). Other agent-based models, some associated with the Santa Fe Institute, have been reviewed by Eric Beinhocker (2006).

This exercise did not involve statistics. It did not require elaborate massaging of data to extract the object of interest. That object is obvious enough in the raw data. Thus we need not be paralysed by the knowledge that there are many factors and variables at play in any given situation. There is a place for statistical analysis, but understanding of modern, disequilibrium economies is still so limited it is not hard to find rather obvious phenomena worth analysing.

There is much low-hanging fruit to be harvested by those willing to venture into the field of far-from-equilibrium systems.

That of course is a telling observation about a field that has been so misdirected it has failed to make substantial progress on basic questions (financial crashes, inequality, oligopoly, capture of markets and governments, destruction of our planetary life-support system, for example) after 150 years or more.

One might reflect on the wisdom of humans relative to rabbits. We understand that rabbits do not have the foresight we do, and so they proceed to eat out their food supplies. We, on the other hand, do have foresight, and we have wise elders who have been warning us for decades, yet we persist with exactly the same over-exploitation of our planet. I think the problem is that in large societies our collective communication, verbal and non-verbal, is too limited and distorted for our foresight to regulate our baser impulses. Traditional societies living in smaller groups with mutual eye contact fare better in this regard – otherwise we would not be here. Until we reclaim and wisely use our means of communication in large societies we will remain collectively greedy and stupid.

If at this point you feel the urge to further analyse the type of approach I used in the example presented above, please, resist. Do not tell us about the epistological, ontomagestic, negativist, empyreanist foundations of what I just did, nor even about the sadly disturbed state of my psyche. Instead, get out of bed, come outside into the messy world and join us in muddling along. Look for an interesting aspect of the observable behaviour of an economy and its society and either find or invent a possible explanation for it. Then tell us about it. We can then start to learn more about how modern economies and societies work.

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