

Comments on the manuscript **The Finance-Growth Nexus Revisited: From Origins to a Modern Theoretical Landscape**, by Mikhail Stolbov (published in *Economics: The Open-Access, Open-Assessment E-Journal*).

I found this a very interesting account of past and recent ideas about the interplay between economic growth and financial systems.

As I understand Stolbov's review, one interesting question – to which a variety of people have given a range of answers – is whether economic growth drives the advancing sophistication of financial systems, or whether the contrary is true. Looking at the variety of answers which Stolbov summarises, I am very much inclined to favour the view that there is no causal arrow facing one way or the other, but rather there simply has been and continues to be an evolutionary growth in the two-way interplay between economic growth and financial systems.

About half-way through his excellent review, Stolbov invokes Granger-Causality, which according to some recent studies suggests “a bi-directional causality between finance and growth”. Whilst I favour this answer, I have significant reservations about Granger-Causality's validity when it is applied in this particular context. As Granger himself emphasised, his methods apply to identifying cause and effect only in decomposable (essentially linear) systems. I do not believe that the interactions between economical growth and finance/banking satisfy this constraint. Very recently, however, Sugihara *et al.* (*Science*, **338**, 496-500; 2012) have introduced a method, based on nonlinear state-space reconstruction, that can distinguish causality from mere correlation in nonseparable dynamical systems (i.e., cases not covered by the usual Granger-Causality paradigm). It might be interesting to see what this method says when applied to the finance-growth nexus.

Figure 1

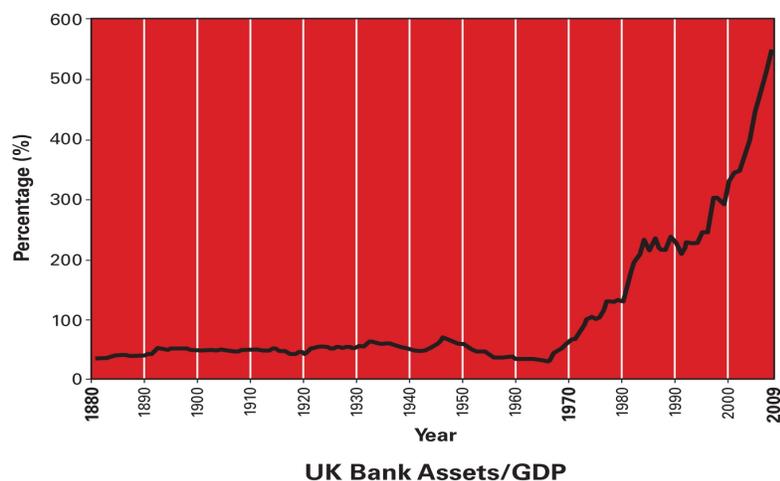


Figure 1 illustrates another aspect of the interesting questions posed by Stolbov, showing UK bank assets as a ratio to GDP from 1880 to 2008, just before the crash. In a very rough sense, this ratio could be seen as a measure of financial activity (bank assets) in relation to economic growth (GDP). What is truly remarkable about the graph is that this ratio remained roughly

constant, at around 0.5, for a century, but then rose super-exponentially, paralleling the increase in computer power, which enabled increasingly complex financial instruments to be created and traded (up to around 8 just before things fell apart). The obvious question is: what happened to the interplay between bank assets and GDP to drive this extraordinary rise in the ratio? Surely **real** bank assets could not have increased sixteen-fold in relation to GDP over this 40 year span? I think it likely that these questions are not unrelated to those asked by Stolbov.

More generally, there are other important and interesting questions to be asked about economic growth – its creation and sustainability – which lie outside the scope of Stolbov’s essay. For one thing, unbounded growth simply cannot continue on a finite planet. Since Darwin illuminated human origins, some 150 years ago, both human numbers and average energy use per person have increased seven-fold, for an overall fifty-fold increase in the ecological footprint stamped by humanity upon our planet. Although the exact time-scales are debatable, there is no doubt but that we are approaching the limits to growth. Viewed from this perspective, continuing economic growth is a strange way to characterise progress. For another thing, a good deal of recent technological progress has had the effect of reducing employment, as advances in computer power and information technology – which conventionally make positive contributions to GDP – abolished swathes of jobs. Thirdly, there is growing advocacy for characterising economic health by some form of “human happiness” index, rather than GDP.

These interlinked issues of limits to growth, jobs, and happiness may at first glance seem to have little, if any, contact with Stolbov’s review of ideas about finance and growth. Ultimately, however, I believe all these big questions are woven together. And there is increasingly urgent need to perceive the connections, and to address the consequent problems.

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