The Godley–Tobin memorial lecture*

Animal spirits and viral popular narratives

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John Maynard Keynes's (1936) concept of 'animal spirits' or 'spontaneous optimism' as a major driving force in business fluctuations was motivated in part by his and his contemporaries' observations of human reactions to ambiguous situations where probabilities couldn't be quantified. We can add that in such ambiguous situations there is evidence that people let contagious popular narratives and the emotions they generate influence their economic decisions. These popular narratives are typically remote from factual bases, just contagious. Macroeconomic dynamic models must have a theory that is related to models of the transmission of disease in epidemiology. We need to take the contagion of narratives seriously in economic modeling if we are to improve our understanding of animal spirits and their impact on the economy.

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1 INTRODUCTION

In a famous passage from John Maynard Keynes's *The General Theory of Employment, Interest and Money* (1936), the founding volume of modern Keynesian economics, Keynes gives the concept of *animal spirits* a central place in his theory. After commenting on the obstacles people face in making economic decisions because of the difficulty of predicting very far into the future, and of even trying to ascertain all the possible long-term implications of any economic decision, he wrote:

Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the result of animal spirits – a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities. (Keynes 1936, p. 161)

Variations through time in public inclination to make 'decisions to do something positive' must be central to economic fluctuations. The idea that important economic decisions 'can only be taken as the result of animal spirits' was revolutionary when he wrote. But while the passage is often quoted, it still hasn't made its full way into

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macroeconomic theory. There remains little semblance of measurement of animal spirits. I will argue here, expanding on ideas in my 2009 book *Animal Spirits* with George Akerlof, and my 2019 book *Narrative Economics* which was based on my American Economic Association presidential address (Shiller 2017), that an epidemic theory applied to economic narratives, using digitized searchable data on actual narratives, can provide such a foundation. The contagious narratives are the link between people that creates large movements, and words associated with them can be revealing of changing animal spirits.

Mathematical epidemiology has been studying disease phenomena for over a century, and its frameworks can provide an inspiration for improvement in our understanding of economic dynamics. People's states of mind change through time, because ideas can be contagious, so that they spread from person to person just as diseases do. The ideas that informed human behavior spread in the form of narratives, story- and human-interest-based, because of a natural human fascination with such stories.

The concept of Keynes's animal spirits was brewing for more than a decade in his mind. Keynes, it is worth noting, did not believe that most uses of the word 'probability' had an objective basis. In his 1921 book *A Treatise on Probability* Keynes invoked some words similar to those quoted above, suggesting that something like animal spirits must play a role in decisions:

If, therefore, the question of right action is under all circumstances a determinate problem, it must be in virtue of an intuitive judgment directed to the situation as a whole, and not in virtue of an arithmetical deduction derived from a series of separate judgments direct to the individual alternatives each treated in isolation. (Keynes 1921, p. 312)

In the same year, 1921, Frank Knight wrote his *Risk, Uncertainty, and Profit*, which made a similar point: 'We act upon estimates rather than inferences, upon "judgment" or "intuition," not reasoning for the most part' (Knight 1921, p. III.VII.36).

But the beginning of an economic theory of animal spirits was not laid out well until Keynes's 1936 book, where he goes on to explain:

This means, unfortunately, not only that slumps and depressions are exaggerated in degree, but that economic prosperity is excessively dependent on a political and social atmosphere which is congenial to the average business man. If the fear of a Labour Government or a New Deal depresses enterprise, this need not be the result either of a reasonable calculation or of a plot with political intent;— it is the mere consequence of upsetting the delicate balance of spontaneous optimism. (Keynes 1936, p. 162)

This reference to 'atmosphere' is as close as Keynes comes to describing narratives (here from the Labour Party or Democratic Party and their influence on popular narratives) as a basis for economic fluctuations.

Keynes's discussion of animal spirits has led to a substantial literature, with keywords 'Knightian uncertainty,' 'ambiguity aversion,' and 'Keynesian utilities' (see for example Ellsberg 1961; Bewley 2002; Bracha and Brown 2013). There has been less progress in advancing our understanding of the genesis of changes through time in animal spirits, and of research that allows us to understand, and forecast, such changes.

The US economy has just had its longest expansion ever, according to the National Bureau of Economic Research (NBER), from June 2009 to February 2020: 128 months.¹ Then it was interrupted by the COVID-19 epidemic, and then mid-2020

1. See <https://www.nber.org/cycles.html>.

with the stock market setting new records, unpredicted. We need at least a beginning of a theory of animal spirits to make any sense of the situation.

The concept of animal spirits seems to be central to the whole concept of Keynesian economics, which takes growth of the economy as driven by aggregate demand which can be erratic, not driven exclusively by economic fundamentals. The excitement that Keynes's 1936 book generated soon after publication was related to its focusing on this reality, with something loosely called 'aggregate demand' driving economic activity. When I interviewed James Tobin (one of the namesakes for this lecture series) he recalled to me his excitement as a young student reading Keynes's book when it came out, excitement because it modeled the economy as a whole, not just an abstract discussion of microfoundations.

In his Godley–Tobin lecture before the Eastern Economic Association two years ago, James Galbraith said that if households are independent in their actions then 'the law of large numbers precludes fluctuations in aggregate GDP on the scale observed Animal spirits, herd behavior, are indispensable to understanding our world as it actually exists' (Galbraith 2019, p. 2).

The term 'animal spirits' was not original to Keynes. The term goes back to ancient times. The Latin phrase '*spiritus animalis*' can be dated (using the digitized database *Latin Library*) at least to Vitruvius, (c. 75–15 BCE). In recent centuries it used to be applied to describe dancers, singers, actors, and athletes who showed real spirit in their performances. But Keynes gave the phrase a new context, that of inspired consumers or businesspeople acting on intuitive judgments in a situation that was complex and ill-defined.

I could not find use of the term animal spirits in this context before Keynes. The first hit for 'animal spirits' and 'Keynes' in Proquest News & Newspapers was not until 1958, over 20 years after he wrote his *General Theory*. Use of the term grew very slowly from there (Figure 1). (Only 10 percent of the count of articles with the term 'animal spirits' in the two most recent decades refers to our 2009 book with that title, so it is clear that George and I did not make this happen.)

Figure 1 Attention to Keynesian animal spirits as revealed by a search in English for 'animal spirits' AND 'Keynes' or 'Keynesian' in Proquest News & Newspapers 1900–2020, case insensitive, no smoothing

2 LEARNING ABOUT ANIMAL SPIRITS

But what are the ultimate determinants of animal spirits? I wish to argue here that to fulfill Keynes's mission, animal spirits should not be described in terms of a primitive urge, though primitive urges are likely to be involved. It is instead better described in terms of the telling in an inspiring way of a story that is of such a nature as to be conveyed from person to person, a story that somehow leads, in our intuitive judgment, to certain actions. We call such tellings of stories narratives.

Why do people buy cars in one year more than another? Of course, many may do so or not do so strictly in response to the palpable current economic situation. Someone who just lost their job is not likely to buy a new car just then. But we need to consider what started the current economic situation, what its perceived nature is, and all the ramifications of their actions. We live in a world of stories, sentimental stories, funny stories, sad stories. In an economic depression, the decline in auto sales is typically much larger than the increase in the unemployment rate. It has more than a little to do with the power of an inspiring story.

Late in the recent expansion 2009–2020, automobile sales did not collapse as they usually have done late in other expansions. Sales remained high for the four years 2016–2019, which is unusual so late in an expansion. The powerful narrative of the Trump administration, with its disparagement of 'losers,' may be part of the reason (along with objective fundamental reasons, like low unemployment and cuts in interest rates from the Federal Reserve) why the sales have held up.

How can a large population acquire animal spirits at one time and lose them at another? Keynes describes animal spirits as an 'urge,' a term which reminds us of primitive psychology. His book does not turn into a book about crowd psychology. As interpreted by generations of Keynesian theorists, the animal spirits become reduced to the 'error terms' in the various structural equations.

The rational expectations revolution came in with animal spirits in the 1970s, in an attempt to say SOMETHING concrete about expectations. The word 'expectations,' chosen to quantify animal spirits then, suggested also something not so emotional or story-driven.

3 LESSONS FROM EPIDEMIOLOGY ON VIRAL DYNAMICS

A core idea in mathematical epidemiology is that each disease in a given environment has its own contagion rate and its own recovery (or death) rate. The consequence is typically a hump-shaped pattern through time for epidemic outbreaks. Figure 2 shows an example, an epidemic curve for COVID-19 in New York City from 29 February to 13 September 2020. The weekly choppiness in the series is primarily due to weekend effects. The overall pattern is hump-shaped. There are often also deviations from this path, including the possibility of subsequent waves or aftershocks in the future, as typically caused by changes in the contagion rate, as through mutations or seasonal factors, not seen yet as of this writing for New York City. Mitigation efforts, such as were prominent in New York City, can also heavily influence the epidemic curve.

The Kermack–McKendrick SIR model is an extreme special case of an epidemic model (1927), with constant contagion and recovery parameters. There are many variations of this model, each with its own hump-shaped, or sometimes wave-like or even chaotic, outcomes. A recent summary of 51 forecasting models for COVID-19 by the

Source: <https://www1.nyc.gov/site/doh/covid/covid-19-data.page>.

Figure 2 Daily cases COVID-19 in New York City

US Centers for Disease Control and Prevention explicitly described 23 of them as based on a variant of the original SIR model.²

When we apply such models to narratives, the recovery rate is just the forgetting rate, or loss-of-interest rate, which stops people from spreading the narrative further. In SIR-like models an epidemic cannot get started unless the contagion rate scaled by the fraction of the population that is susceptible exceeds the recovery rate. More people have to be getting the disease anew than are recovering from it, a situation known as ‘herd immunity.’ High contagion rates imply faster epidemics, but not necessarily bigger ones. In simple models, the ultimate size of an epidemic depends positively on the contagion parameter and negatively on the recovery parameter.

The Kermack–McKendrick (1927) model is called an SIR model or compartmental model since it divides the population into three compartments: percent susceptible, S, percent infected and contagious, I, and percent recovered, R. The original model refers to a non-fatal disease: so, there is no compartment for deaths. New infections come from encounters between people in the S group and the I group, and hence the number of new cases in any week depends on the product of S and I. It is assumed in their original model that, after recovery, no one becomes susceptible again.

The original SIR model allows for large and fast epidemics as well as large and slow epidemics, as well as small and fast epidemics and small and slow epidemics. Which of these cases we observe depends on the contagion and recovery parameters.

We humans live our lives in a sea of epidemics all at different stages, including epidemics of diseases and epidemics of narratives, some of them growing at the moment, some peaking at the moment, others declining. New mutations of both the diseases and the narratives are constantly appearing and altering behavior. It is no wonder that changes in business conditions are so often surprising, for there is no one who is carefully monitoring the epidemic curves of all these drivers of the economy.

2. See https://github.com/cdcepi/COVID-19-Forecasts/blob/master/COVID-19_Forecast_Model_Descriptions.md.

Since the advent of the internet age, the contagion rate of many narratives has increased, with the dominance of social media and with online news and chats. But the basic nature of epidemics has not changed. Even pure person-to-person word-of-mouth spread of epidemics was fast enough to spread important ideas, just as person-to-person contagion was fast enough to spread diseases into wide swaths of population millennia ago.

4 AN EXAMPLE OF A CONSTELLATION OF ECONOMIC NARRATIVE: SUPPLY-SIDE ECONOMICS

The term ‘supply-side economics’ apparently began outside the academic economics profession and was spread far beyond the economics profession beginning in the late 1970s. It refers to a theory that tax cuts, including tax cuts on high incomes, and regulatory easing, will have incentivizing effects that will invigorate the economy without incurring onerous government expenditure deficits. It is not known who first invented the term supply-side economics. Wikipedia claims the term was used first in 1976 by Herbert Stein, a *Wall Street Journal* columnist and Chair of the Council of Economic Advisers under Presidents Nixon and Ford. It was apparently not in one of his columns then that could be checked to verify the claim. The term was first popularized by Jude Wanniski, a writer for *The Wall Street Journal* in the late 1970s. We see, in Figure 3, that frequency of appearance of the phrase in the news media has had a roughly hump-shaped curve, like the epidemic curve seen in Figure 2. Other narratives are shown in the figure too, marking a constellation of narratives. Clearly, supply-side economics was growing by contagion far beyond the economics profession. The Proquest data show a pick-up in contagion in the latest decade, perhaps reflecting a mutation in the narrative as it was later restated by people including our current president Donald Trump. The results for the US

Figure 3 Google Ngrams counts by year for the terms ‘supply-side economics,’ ‘welfare dependency,’ ‘welfare fraud,’ and ‘hard-working American’: 1900–2019, case insensitive, no smoothing

economy were profound: a free-market revolution, a set of major tax cuts, and fundamental regulatory changes.

The popularity of supply-side economics in the 1970s and 1980s in the United States had something to do with narratives about the indigent poor who, supported by a growing welfare system, were paid to sit around at home or go out and foment mischief. For example, one description of a single welfare mother in 1989 described her in these terms:

Her oldest daughter is herself a welfare mother, and two of Mrs. Santana's sons who live at home with her are drug addicts constantly in trouble with the law. Mrs. Santana by her own admission 'cheats on the welfare' in various ways ... (Coughlin 1989, p. 84)

The frequency of stories like this led a large segment of the population to think constantly of such images when contemplating that their taxes support such people, motivated by many individual stories rather than statistics. The stories became central to their sense of individual identity as providers, suppliers of all the goods and services to the public, as increasingly to think frequently about the injustice to patriotic 'hard-working Americans' of having to support the indigence of a growing segment of the population who are welfare-dependent.

The popularity of supply-side economics also had something to do with the extraordinary popularity of its loudest US proponent, Ronald Reagan himself, who was President of the United States from 1981 to 1989. His popularity led him in his 1984 re-election to win 49 states of the 50 states in the Union, 525 electoral votes out of the total of 538. His opponent, Walter Mondale, won only his home state. Why was Reagan, and supply-side economics, so popular? Before his career in politics Reagan was an actor who became popular from the late 1930s, starring in a number of B movies like *Bedtime for Bonzo* (1951), about a cute chimpanzee. Reagan continued to be host of the popular television show *General Electric Theater* from 1954 through 1961. He was already a celebrity well before he launched his California governor and then presidential campaign, and, in the presidential election of 1980, he became even more familiar to Americans. In that campaign, he stressed supply-side economics and as president he continued to refer to it. He illustrated his arguments with highly quotable simple quips, jokes, and human-interest stories, known as 'Reaganisms,' such as:

You can't be for big government, big taxes, and big bureaucracy and still be for the little guy.

Republicans believe every day is the 4th of July [the annual independence celebration, but the democrats believe every day is 15 April (the due date for income taxes)].³

These were as quotable as any Trump tweets and helped make his economic narrative contagious. These circumstances must surely account for big economic changes.

The effect was to create a public swell of support for free-market economics, large tax cuts, and deregulation, changes that were certainly economically significant. The appeal appears to have been partly the flattering sense of moral superiority over the poor, and partly a new hope for a better future in a more free-market society. These were changes that could not be forecasted on economic fundamentals.

Both Google Ngrams counts (giving the number of times a name or phrase was used in books for the year divided by the number of word groups of the same length in books for that year) and Proquest News & Newspapers hits (giving the percentage of articles that mention the name or phrase at least once) show a hump-shaped pattern resembling the epidemic curve. All of these indicators of narratives show the classic

3. See <https://www.pinterest.com/pin/267823509066091577/>.

Kermack–McKendrick hump shape, as seen in Figure 2, though the narratives are very much alive, still, and still play a role in our thinking and politics today.

This constellation of narratives, and others as well, must have played a role in the events such as the ‘Great Recession’ of 1981–1982 or the ‘Great Recession’ of 2007–2009 as well as the incipient recession that started in February 2020, through their interaction with other narratives and events. The popularity of these narratives may encourage mistrust and resignedness that may in the context of other events deter spending and investing, but may in other contexts have the opposite effect, of increasing spending so as to separate oneself as far as possible in public appearance from the welfare class.

5 NARRATIVES MATTER EVEN IF STIMULATED BY EXOGENOUS EVENTS

There are occasions, of course, when ‘decisions to do something positive’ will change because of direct observations of readily exogenous shocks to the economy. Natural disasters, like epidemics or earthquakes, provide examples. Also, acts of the government or monetary authorities might in some cases be considered exogenous events.

For an extreme example, disease epidemics, like the ongoing COVID-19 epidemic, communicate their impact directly to the broad mass of people. Between the fourth quarter of 2019 and the second quarter of 2020, real per-capita GDP in the US fell by 10.8 percent. They are often thought of as events exogenous to the economy, though in fact their time path is also affected by the economy.

The extreme influenza epidemic of January 1918 to December 1920 was certainly a major cause of the August 1918 to March 1919 recession, and quite plausibly was also among the precipitating factors of the January 1920 to July 1921 recession as well. The disruption due to the demobilization that began after World War I ended in November 1918 was also a cause. But even in the case of these recessions, the meaning of these precipitating events appears to have been changing through time in response to rising narratives.

My work with William Goetzmann and Dasol Kim shows that there has been a small but significant negative reaction to garden-variety earthquakes in public expectations for the stock market in parts of the US that are nearby (Goetzmann et al. 2017). The local news media after any substantial local earthquake tend to dramatize the local stories of people during the quake. Reactions can thus be much larger, more national or international and more long-lived, if the earthquake is a major one, and reactions are embellished by contagious narratives.

After a major tremor, people may immediately decide that the stock market will fall dramatically, and this may lead to narratives so contagious as to be a self-fulfilling prophecy. For example, after the great San Francisco earthquake of 18 April 1906, the US stock market fell by 12.5 percent within a week of the earthquake (Odell and Weidenmier 2004, p. 1011). This earthquake brought out criticisms of the preparation for such events and the inadequacy of public response to the event. The earthquake ‘was followed by an unparalleled period of racial, political, and social strife’ (Fradkin 2006, p. 195). People decided that this wasn’t a good time to launch a new business, in San Francisco especially but perhaps more generally. Immigration to the city halted. The financial panic of 1907 followed.

But even in this case, extreme in the obviousness of the ultimate source of the problem, inside the Earth, the evidence began to be reinterpreted and manipulated by

narratives that could change the impact of the event, an impact felt in San Francisco and also nationwide. Angry reactions to the event occurred when owners of real estate discovered that their policies excluded damage from fire started by earthquakes (O'Dell and Weidenmier 2004, p. 1012). The words were right there in their insurance contracts, but of course, many had not read the contracts. Now the attention of the public was turned toward the perfidy of the insurance companies and was a source of disillusion with business in general.

The same kind of presentation variations in stories about historical events or imagined events, whether the variety of stories about Donald Trump or Donald Trump's stories about us, whether about global warming or about COVID-19, or the next viral narrative, need careful study if we are to improve our understanding of macroeconomic events.

6 CONCLUSION

Scientific advances are often stirred by new data sources. We have increasingly today new data that are relevant to animal spirits and narratives. Consider how the growth of information technology from the start of printed newspapers in the early 1600s to the recent development of the internet and the availability of digitized text. There are now all manner of digitized documents, from newspapers and magazines and books to legal briefs and legislation, to transcripts of talk shows, to social media and church sermons, even diaries. They can, under the powerful lens of modern search engines, be as important a revolution as the data revolution that preceded Keynes's *General Theory*, with its new measurements of statistics on the aggregate economy, such as gross domestic product and unemployment.

Over the years since 1936 when Keynes first made an emphasis on animal spirits, we have gradually developed new data sources that inform us about them. The first business confidence questionnaire surveys of public opinion were done by George Gallup in 1937 (see Gallup 1938). More recently, we have seen indices that reflect confidence in particular institutions and practices, such as the Economic Policy Uncertainty Index of Baker et al. (2016).

As this research continues, there should come a time when there is enough definite knowledge of the waxing and waning of popular narratives that we will begin to see the effects on the aggregate economy more clearly. It will not be a simple matter to do this. It is not just a matter of recording confidence along some preset dimensions, such as business confidence and consumer confidence or policy uncertainty. Continuing our example, the effects of the 1906 earthquake on business confidence can't be understood by just collecting keywords; we have also to note the psychological and sociological color that the new story has taken on, and the nature of the morals of the stories. We need to learn how to appreciate the substance of many complex stories. It will be a matter of quantifying the stories about the economy and our lives that have at their birth a creative element, that sometimes look utterly unlike the stories in other times. There will be an ever-expanding list of stories, some mostly dormant, though capable of blooming again as circumstances change, some currently competing for dominance against other stories.

There has recently been some criticism of this work on animal spirits and narratives on the basis of direction of causality. How do we know that the causality can run from narratives to the economy, and not exclusively the other way around? But these causality inference problems are no more difficult than causality direction inference in much of

econometrics today. Once we have a better quantification of narratives, we will be better able to use methods of inferring causality that are already off the shelf.

The digitized and searchable data relative to narratives are not perfect. For example, we do not have assurance that the sample to be digitized is really a random sample of the universe. ‘Animal spirits’ as a driver of the economy has been a compelling idea for the better part of a century, but evidence for this has until recently been too indirectly observed and slippery to attract scholarly attention. The research should improve as narratives, data, and their processing develop even further.

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