Forecasting, Prediction and Precision: A Commentary

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Abstract

Forecasting involves an underlying conceptualization of probability. It is this that gives sense to the notion of precision in number that makes us think of economic forecasting as more than simply complicated guesswork. We think of it as well-founded statement, a science and not an art of numbers. However, this understanding is at odds with the nature of social reality and the attributes of the forecaster. We should think differently about how we both anticipate and make the future and what this means. Foresight is perhaps a more appropriate term.

This paper addresses two issues that rarely receive attention in the field of economics. First, why is there a continued high demand for economic forecasts despite their lack of success in anticipating significant turning points in any given system? Second, what are forecasts actually assuming about the nature of a system and the future state of the world? In the paper I approach these issues indirectly. My intention is to highlight their significance by setting out a series of arguments that encapsulate the characteristics of a forecaster required to match a common understanding of what forecasting is intended to do.

The structure of this paper is unusual for a contribution in the field of economics. It follows a format more commonly used in analytical philosophy when the author wants to focus on a problem and where the intention is to provoke further questioning, rather than supply ready answers. As such, it should not be read as a comprehensive account of all possible approaches to methods or philosophies of forecasting and attendant issues of probability. Three points are worth stating at the outset as a guide to what follows:

1. Forecasting tends to forget that it is conjecture and what that really means. Its scientism overburdens how it is articulated and how it is perceived.
2. We tend to think of forecasting as degrees of precision in prediction and of successful prediction as successful description of phenomena at some future point.
3. There is, as the following discussion demonstrates, something basically inconsistent within the implications of this minimalism.

Since the greater part of the credibility of, and authority of, economics resides in its claims to effective forecasting these points are highly relevant to the state of the discipline.

1 Inhuman Characteristics: Sherlock or Sheer Luck?

In the latest BBC Sherlock Holmes television series Holmes would seem to have the following attributes:

1. In situ eidetic memory – he remembers for recollection the whole picture of his immediate experience as a real time movie.
2. Hyper observation – he is able to focus in on specific details as points of relevance in minute detail within the whole (hems, spots, stains, calendars in the background)

3. He has instant recall of all aspects of further information; his immediate experience at some point has included the absorption of street maps, timetables, texts, newsfeeds etc.
4. He is able to integrate 1, 2 and 3 based on some undefined but additional synthesis of relevance to the case.
5. Predicate perfection – he immediately reconstructs the whole as a deductive model that flows from True predicates to True conclusions [there are no lemmas, but there can sometimes be mistakes – because predicate perfection is not the guarantor of the correct predicates – there can be external shocks].

Sherlock's interior world is not our own. It is recognizable yet alien. But not as alien to economists as it would be to most people. To economists, Sherlock's interior world immediately evokes that of the Walrasian auctioneer, the implicit conditions of Arrow & Debreu's complete contracts, and the similarly weird world of many ideal models.

But is the set of characteristics 1-5 also implicit in any form of probability calculations about the future? Do they bear on the background issues for forecasting and the conditions of successful description?

2 When Naming is not Numbers but Numbers are Named?

We are accustomed to thinking of statements of likelihood being equivalent to numerical statements of the same thing. But are they simply that?

If we think about the future, to state 'it is likely that' is to indicate some proposition concerning that future. In terms of events/outcomes it can indicate:
'The occurrence of outcome A is more likely than the absence of A'
'The occurrence of outcome A is more likely than B'

At a minimum this can be translated into:
'There is a greater than 50% likelihood of A'

This, of course, can be adjusted by the conditions of the initial statements. If there is some other possibility than A or B then it does not necessarily follow that there is a greater than 50% likelihood of A in fact. The possibility of C or D complicates the transition from 'more likely than' to a 'likelihood of'. For example:
'The occurrence of outcome A is more likely than B, but neither A nor B is the norm or dominant situation.'

Here one might state:
'There is a greater than 50% likelihood of A occurring rather than B, but not of A in fact.'

But the point remains that the translation gives the impression that not only can the meaning of likelihood be translated into number, but that the attribution of number *adds something additional to the statement*. Yet in this case the number is simply a translation of the statement of likelihood. It has not become more precise by the restatement.

The equivalence here is not between a statement of likelihood and the precision of number but the statement of likelihood and the imprecision of number. The semantic equivalence between the two is not about precision. However, we look to number to give us precision – even if that precision is specified

as a range. This is an important point in regard of probability, social reality and the expectations of forecasting.

A probability is a statement (typically today founded in calculation) of likelihood of some future phenomena. It is not itself a statement of the event. [1]

- One can state that GDP for 2012 will be 3%.
- One can state that one is predicting or forecasting this outcome; one can then state the terms on which the prediction is made – statistical inputs x, y and z were of particular levels, the relations of x, y and z over time have led us to expect an outcome of GDP 3% based on previous occurrences and some stated assumptions, and this has held on, say, 90% of previous occasions.
- One might then state that there is a 90% likelihood of a 3% outcome (though one might then hedge this).
- One might adjust the claim by the likelihood of error in the initial statistics for x, y and z, and thus of error in the modeled outcomes of the presumed relations.
- One might adjust for likely deviation in the precision of the presumed relations of x, y and z as they pertain to GDP, and thus of deviation in the modeled outcomes of the presumed relations.
- One might then state a range of possible outcomes for GDP for 2012 – a forecast range of 2.5% to 3.5%.
- One might then state a further probability of the range based on the previous relations of x, y, and z coinciding with that range of outcomes.
- One might then run a series of further 'scenarios' allowing for additional changes in x, y, and z over the period in which they are deemed to impact on GDP for 2012.
- One might then also adjust one's forecast during the period up to the completion of the forecast as and when data could be used to replace the anticipated/interpolated numbers.

Several features are worth noting here:

1. The statement of the future outcome or event is linked to a statement of probability but the probability of the event is rarely what we focus on in public discourse.
2. Both the probability of the outcome or event and the series of statements regarding the outcome or event that are the forecast are a curious mix of precision and imprecision.
3. The received understanding, however, is that there is something in the underlying calculation that is being done in a precise way and that this gives credibility to the forecasting process.

In the end, however, what one has is a series of outcomes or events, which either did or did not coincide with the forecasts.

In a truistic sense these common features of forecasting render it no more or less than successful *description* of some future phenomena. This does not account, however, for the full range of intentions that may motivate forecasting:

- A forecast may be knowingly of an impossible outcome as a cautionary statement – often used when trends are extrapolated ad absurdum to indicate the need for current change.
- A forecast may be intentionally an act of construction in a variety of other senses of shaping the future (see later).

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[1] The following is not a claim that this separated series is what actually occurs in any programmatic sense in any given instance of modeling for forecasting. The list is just that – a list of what can be stated.

More immediately for our purposes, one can state a number of possibilities regarding the circumstances under which successful description is occurring in the forecasting process:

1. Successful description can be simply coincidence.
2. Successful description can be approximately successful and the approximation may be highly conditional – creating a great deal of leeway in claims of successful description.
3. Successful description can actually be a basic illusion, trading on the perpetual adjustment to the modeled process of forecasting as and when new data emerges that confounds the initial basis of the initial forecast.[2]
4. Successful description may actually also be because the forecasting process had (in sum or parts and to different degrees based on power, position, and institutional location and remit) inadvertent constituting influences on the outcomes or events.
5. Successful description may be no more or less than a special case of coincidence – the conditions that allowed for outcomes to be of a particular kind were captured for some brief period *because they were stable* – it is the stability that is being captured and not the complexity of relations that are sometimes stable; the forecasting, therefore, is descriptively successful in an approximating way for some period; in so far as it is successful it is 'right' for the wrong reasons and thus forecasting works reasonably well right up to the point where you actually really need it to work – when things fundamentally change. *Then it doesn't work*. At such points one might then get more of 2 and 3.

Elements of 3, 4 and 5 are most recognizable in modern forecasting. They are, for example, fundamental issues for the methodology and philosophy of dynamic stochastic equilibrium (DSGE) models and for econometrics. Both have become more sophisticated, but within limits. The driving question remains whether the mathematical complexity matches the complexity of the world - *not* whether the mathematics *is* complex but whether its complexity captures the complexity of the world (e.g. Hendry 2000; Pratten, 2005).

The possibilities 1-5 ought to make us consider carefully the way we think about the link between the success or failure of forecasting as description. They also raise issues in regard of the role of precision and of our understanding of probability in forecasting for social reality. All forecasting involves an underlying conceptualization of probability. There is a formal division between a cardinal statement of probability with its precise statements of likelihood, and ordinal or relative probability with its more explicitly comparative statements of likelihood. But this formal division is blurred by the actual practice of forecasting (what is specified in quantity) and by the way forecasting is expressed and received.[3] It is the notion of precision in number that makes us think of economic forecasting as more than simply complicated guesswork.[4] We think of it as well-founded statement, a science and not an art of numbers –

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[2] This has been a particular feature of IMF forecasting over the last 4 years. Each new significant publication (World Economic Outlook etc.) updates prior forecasts for growth; the use of the term 'update' masks the basic fact that the models have been consistently wildly inaccurate. All too often the curious defense has been that the unexpected occurred! 'Illusion' also has a different register; a given country may issue headline data that is simply unreliable (China's GDP bears little resemblance to the disaggregated components of the economy) but forecasters apply the same methods and models as the government in order to be able to accurately forecast that essentially spurious indicator.

[3] A forecaster's claim may well be intended to be weaker as a statement of probability than it is subsequently taken to be by others. But it is important to note that much of this weakness can be strategic rather than a direct output of any given method – 'weak' can be more an expression of lack of confidence that the claims will be realized than it is a product of the approaches relied upon to do the forecasting. For example, the forecasters may be aware that radical changes are occurring that undermine the assumptions that went into the calculations; or they may be aware that they ran a variety of simulations producing many different outcomes and are unsure how to choose between them… They can then choose to provide an intuitive probability or likelihood of an outcome; but this is different than the probability built into something like the Gaussian basis of a model… see above

[4] For the early development of concepts of probability and their implications see Hacking (1984).

we are encouraged to think of it as something like Sherlock's predicate perfection, subject to shocks. The issues are most easily illustrated using pattern recognition.

What are the Grounds of Precision in Probability: Probability and Pattern Recognition

Ultimately, probability is a particularized numeric statement linking conditions to outcomes, trading on, and thus expressing, a determinate statement of a relation. It is determinant by range, since to state a probability of 35% is to also state the range – that other occurrences fall within the other 65%. There is, at minimum, a tacit completeness, even if the statement of some portion of the rest is a statement of the range of ignorance (the indeterminacy is itself a determinate range within the whole).

> But:
> It is an error to conflate a probability with a pattern.
> 1. One can identify a pattern and state the pattern, as is, so far.
> 2. One can quantify elements of some kinds of patterns.
> 3. One can state that the pattern under some description of that 'pattern' that is quantified has shown no deviation, specific deviation, repeated deviations of specific forms…
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> Yet:
> 1. It is the *grounds* of the pattern that account for the fact that elements of the pattern can be quantified and that it may show no deviation, specific deviation, repeated deviations of some form…
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> Therefore:
> 2. It is *the nature of the grounds of the pattern that are significant* to the pattern's form and continuation.
> 3. It is the grounds of the pattern that provide the basis for any possibility of probability statement and for such probability statements to be precise.
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> Further:
> 1. Though social/economic reality has elements that can be 'patterned' the further identification of any pattern is, truistically, a human construct about human constructs. The expression of patterns is a provisional representation. For example, one can look at a housing market and observe for circumscribed statement:
>   a. A house has been sold, a house has been sold, a house has been sold…
>   b. Some houses have been sold. Houses are being sold.
>   c. Three houses have been sold – imposing a break in time and a quantifier.
>   d. Again, a house has been sold, a house has been sold, a house has been sold, 3 houses have been sold, and a total of 6 houses have been sold since a given point in time.

Here, a frequency is being formulated. The numbers are real object references but also interventions in flows based on categories that are used to state patterns. What has been observed is not an irrelevance but nor is *the act* of observing i.e. the nature of the intervention. The patterns are constructs and they are not the grounds of the real referents that the constructs are constructed about. Since the grounds are significant to the pattern and the observer is significant to the act of observing (its forms of construction) then the possibility of probability statement requires further characteristics of the

identifier of the pattern in order for s/he to formulate a probability in a descriptively real sense. They must be able to orient on and gather the relevant information as an act of construction and to do so in a way that addresses grounds.

One can now ask:
2. What grounds are conducive to the production of a probability statement?
3. What attributes must the probability stater exhibit in order to make probability statements?

For probability statement to be possible one might expect:
1. Given patterns of outcomes to be stable
2. Given patterns of stability to be observable
3. Given patterns of observable stability to be translatable into quantifiable forms.

But, any sophisticated approach recognizes that stability is a relative term. As such, probability would seem also to require that the relative stability conform to the expectation that:
1. Possible patterns of outcomes form a totality – the range; where that range is complete
2. Possible patterns of outcomes – the range – will be stable
3. Possible patterns of outcomes – the range – will be inferable-observable-deducible
4. Possible patterns of outcomes – the range – will be translatable into quantifiable forms.

The implication would seem to be:
1. A fixed, complete, social/economic reality, exhibiting in its parts and its whole a system that is a stasis of some form expressed variously in regular outcomes, in a range of possible outcomes, and/or in the grounds that gives rise to its outcomes and possible outcomes.
2. The stasis is temporal, extending from the manifest outcomes to the possibilities of outcomes that have not been but can be – to the determining relations or grounds.
3. For the *probability range* of any acknowledged complexity to be consistently descriptively true that description must be of a complete pre-conditioned possible patterning of complexity.
4. As such, the grounds necessary for the precision of probability are both closed and complete.
5. This closure and completeness would appear to extend from the actual pattern manifest to the range that might be.

Two things follow. First, the more complexity one affords to this stasis the more the problem of probability is generalized beyond simple pattern recognition. *Any* approach to probability must address the problem of grounds. *Any* approach must acknowledge the problem that the precision of number blurs the problem of what it means to state a cardinal likelihood, and what it means to state an ordinal 'more likely than'. Second, the more challenging an investigation becomes, whilst presuming that a probability can be stated, then the more the forecaster must take on the guise of Sherlock.

Forecasting, in so far as it gains its credibility from an underlying probability, therefore, runs up against a problem of the real world. Social/economic reality is, in its entirety, simply not complete in the necessary sense and we, as economists exhibit few and at best transient Sherlock characteristics (often tending more towards Frank Spencer).

4 Forwards and Backwards

If there is a way forward here, then it involves a decision: is the problem a mathematical one to be solved by mathematical means – Steve Keen's approach – or is the problem a problem of mathematics to be solved by a turn to non-mathematical means – Tony Lawson's approach (Lawson, 2003). The answer hinges on how far one can make mathematics compatible with social reality. Keen (e.g. 2011) would have it that there is a way to make the internalities of models capture genuine change and contingency, as such, forecasting may still be useful when you need it most…

The major challenge for innovative approaches that take Keen's route is posed by what Morin terms their 'restricted complexity' (e.g. 2008). Many complex systems approaches are rooted in difference equation models. These typically borrow methods from physics to construct simulations. The system oscillates but has points of tendency – 'attractors', which emerge based on the behavior encoded in the initial difference equation. Some see a great deal of scope in this approach (e.g. Ormerod, 2001). It may be, however, that it provides no more than a more sophisticated approach to relative stability for some period; in this sense, the more information encoded into the model the better the scenario will be. This is particularly so if the information extends to the institutional means by which actors proceed. The rules are… But it is the existence of rules that raises a question mark against the adequacy of simulations for forecasting. There is a clear difference in what degrees of latitude in relations or interactions means when one considers a human system rather than any other non-sentient-based system. There is a great gulf between contingent rule following and a contingent physical relation.[5] As such a meteorological model and, say, a financial system model, are in some basic sense different.

This is not to suggest it would then be impossible to anticipate a financial typhoon (or epidemic). It may be that complex systems models will be able to highlight thresholds and breakpoints, which are indicative of phase shifts in human activity. The question would then become, whether in fact the model enabled a degree of insight that a focus on raw data and the application of common sense based on well-known principles (herd activity, feedback loops etc) could not provide – was it in some sense providing an early warning or a counter-intuitive red flag? One might also wonder how many simulations are run based on different scenarios and how does one rank the simulations prior to the events? There may be something analogous here in the scientistic mode to an econometrician running numerous applications but subsequently publishing only one.

It may also be germane that applications of complex system models are not new. Hedge funds and various other financial organizations have been employing physicists and mathematicians to construct such models for quite some time; there is no evidence that their use gave hedge funds in general any advantage in forecasting the global financial crisis or in generating consistent returns (though there are hedge funds that use undisclosed proprietary trading models in fabulously profitable ways, such as Renaissance Technologies' Medallion Fund). Those hedge funds that did profit from the crisis (such as Paulson & Co), did so based on simple scepticism regarding an ever-expanding housing market and a timely introduction to a new innovation in credit default swaps, which allowed them to short the market based on AIGs naivety as a counterparty (Morgan & Negru, 2012). Moreover, those economists who were most accurate in anticipating the crisis did not share a common mathematical model for forecasting

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[5] This is by no means to suggest that a quasi-Platonic reality in which numbers are real referents is automatically rejected (Benacerraf, 1965 & 1973, provides the two main contributions that have defined the problem in philosophy of mathematics). Material reality may well be written in the language of mathematics. But we also live in a world of emergent complexity. Causation may be central to social reality. However, determined does not imply determinism. The former acknowledges significant antecedents. The latter is usually associated with the inference that an outcome could not have been otherwise.

– they too shared an interest in the same raw data (the descriptive statistics) of rising debt levels and asset prices.

Conclusion

The conclusion I want to draw here is not that forecasting has failed to have some traction within social/economic reality. The implication is that the relative success or failure of forecasting cannot be based on:
1. A *consistent* isomorphism between probability calculation and reality as is in its complexity
2. The necessary attributes of a person calculating probabilities in regard of that reality, in a Sherlock sense.

The failures of forecasting flow from the lack of isomorphism and the impossibility of the necessary attributes. But, the lack of isomorphism does not mean that there cannot be brief points of tangency – stabilities in reality that seem to conform to the completeness and overall stasis that seems to be needed. The lack of the necessary attributes does not mean that our real attributes are not sometimes sufficient to express probabilities for some time in some place within social reality. The problem is that we may be right for the wrong reasons and come to place faith in methods that are not genuinely adequate. The faith itself is an unintended consequence of an underlying social demand for security and control.

Ultimately, we should think again about the nature of forecasting. We should think carefully about the nature of social reality that it is seeking to 'describe'.

This is not a new message. It is central to Keynes' work on probability. It is, for example, an important element in the distinction between probability as a numerical expression from relative frequency and the imprecise statement of likelihood based on an understanding of context (take an umbrella it might rain). It is at the heart of the problem of uncertainty and what we mean by that. The potential problems here are more than a matter of theoretical interest. The message is one that needs to be reinserted into how economists proceed on a practical level. Concepts of probability, forecasting models, and so forth are also resources for agency. As many have noted, the over-reliance on DSGE models that presumed relative stability to be the norm, and which were used by central banks in conjunction with a price stability policy focus, helped to render those central banks blind to the rise of financial instability (Morgan, 2009 & 2013). Similarly, the development of risk management mathematics by financial organizations encouraged them to think of the financial landscape of profit and loss as probabilistic, in a precise sense, enabling more not less risk to be taken.

Many points might be made here in regard of forecasting. One important one is that we should think again about its institutional role i.e. its ideological function and also its role in construction. We ought, for example, to be thinking far more in terms of the issue of foresight rather than an ideological precision in forecasting.

Foresight and forecasting are not the same things.

Forecasting is about stating the future that will be, foresight is about anticipating possible futures and shaping them – perhaps avoiding what may otherwise be, and where one considers a possible state of affairs to be adverse. Foresight involves the negative in the sense of what may now never be and also why one would not want the outcome that may now never be. Foresight recognizes that the issue of possible futures begins from alternative possible presents.[6] This is also what forecasting is about, though

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[6] The political economist Heikki Patomaki has many interesting things to say about the issue of possible futures and alternative presents (e.g. 2011 & 2012).

in the case of forecasting the relation is not emphasized. Forecasting is about possible presents in two senses:

1. In many institutional contexts forecasting is also an expectations shaping exercise. The highlighted future shapes a present behaviour. This is implicit in the expectations theorizations and practices of central bank policy. More broadly, a forecast can justify a present policy. There is a credibility compromise at play that is well understood. For example, forecasting in conjunction with predictive models played a key role in the stress tests of banks in the EU and the US over the last 4 years. The stress tests were positioned precisely as damage limitation exercises. Possible futures were constructed that minimized the degree of statement of the current undercapitalization (if any) of the banks. Possible futures were being constructed in order to stabilize the present i.e. in order to form a possible present that (hopefully) prevented some possible futures.[7]

2. Forecasting typically shares an imaginary world with general equilibrium and with the efficient market hypothesis (EMH). It shares a paradox of implicit understanding of the flow of time. Both the EMH and general equilibrium are essentially timeless as models in any real sense. However, the EMH, for example, assumes that all information is commonly available, commonly processed and well used. The present is in effect an assimilation of the relevant elements of the future. The present performs the future but the future dictates the present. Since the basis of doing so is descriptive completeness, then effectively every point of the present becomes fixed by an accurately anticipated future. One is effectively living backwards from the future to the present and living the future twice – both as a perfect simulacrum and as an actual event. Since each point in the past is an instance of this (in order for the model to be confirmed) then one is permanently living backwards from the future to the present as a series of moments that become future pasts. The problem here is the basis of description shared by forecasting; i.e. completeness and closure that then become the basis of the possibility of prediction as calculative precision for forecasting.

The future may be in the present and expressed through the tentative relation between possible presents and likely futures, but this is not a situation that can be encompassed by a simple notion of description. Forecasting, as currently practiced, has a disjoint between its actual significance and its manifold of justifications and expressions. It thus occurs within an ideological frame. It is partial description in three senses. It is partial in the sense of being incomplete because social reality is incomplete. It is partial in the sense that it is incomplete because no forecasting system and forecaster can fully capture what is not complete. And it is partial in the sense of partiality – it is part of the multiform manner in which social reality is shaped.[8]

I'll finish here with a quote from Geoffrey Dicks, chief economist at Novus Capital Markets:

"Forecasters tend to hunt in packs. At one time they are all downgrading; at others they will be revising their forecasts higher. It may sound a contradiction, but typically forecasts will lag rather than anticipate trends in the real economy. In the financial crisis

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[7] This is not to suggest the shaping exercise is necessarily realised as anticipated: the process may have unintended consequences or fail to produce its intended outcomes. For example, a stress test may be passed by a bank but the bank may suffer losses irrespective – undermining the credibility of the stress test. This may be considered an acceptable risk by the authority since it allows a problem to be at least temporarily mitigated

[8] These are issues addressed in various ways by Donald Mackenzie (e.g. 2008) in the sociology of finance, as well as by the CRESC group at Manchester University (Karel Williams, Julie Froud, Ismail Eerturk, Adam Leaver etc. e.g. 2006)

and the recession that followed in 2008-9 the forecasters were in perpetual catch-up mode." (Dicks, 2012)

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