The Dynamics of Expectations. A Look on Forecasting as a Sequence

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The Dynamics of Expectations

A Look on Forecasting as a Sequence

Abstract

The paper claims forecasting is a process during which forecasts are regularly updates and revised. Paying attention to the dynamics of expectations provides the opportunity to study changes in expectations formed by professionals, and thus give insights into how their labor unfolds. Drawing upon data from a purposely-built database of forecasts running from September 2006 to September 2017, linear and logistic regression models investigate the informational and organizational grounds of forecasts revisions. It it suggests that similar forecasts form a consistent sequence, so that revisions mostly consist in the adjustments of 'old' forecasts with respect to newly available information. By and large, forecasting means updating former forecasts. Besides, data shows the core activity of forecasting organizations, and in turn their audience, matter to understand the extent to which they revise their forecasts: despite what forecasters claim in interviews, public institutions, among which the IMF or the OECD, tend to revise their forecasts on a wider scale than private banks or insurance companies. Eventually, scrutinizing how forecasts revisions distribute according to the years during which they are produced, stress that during major economic crises, such as the Great Recession, forecasters not only revise their former expectations downward but also upward. This hints at a Durkheim-inspired interpretation of economic crises as re-opening the future.

Keywords: macroeconomic forecast; economic sociology; organizations; economic futures; expectations; forecast revision.

Introduction

While neoclassical economic theories often assume certainty to be a key feature of economies, social sciences, along with some subfields of economics, has long emphasized the importance of uncertainty in the 'real', or 'empirical', economic world. Uncertainty has been scrutinized from at least three points of view, respectively referring to the properties of commodities, to individual behaviors, and to the ontology of economies. First, uncertainty arises from unobservable qualities of goods and products. (Akerlof 1970) famously shows that asymmetric information, on a theoretical level, implies releasing the hypotheses of perfect information and homogeneous products and, empirically, may lead to sub-optimal equilibrium and, eventually, to the collapse of entire markets. A sociological perspective on the same issue highlights uncertainty over quality requires shifting from a logic of price-based choices to a different one, which involves judgment (Karpik 2010). Secondly, 'boundedly rational' actors face difficulties to analyze complex situations and, as a consequence, to discern 'optimal' solutions – all the more so as the ultimate consequences of action remain unknown (Simon 1959). Uncertainty here arises from actors' limited computational abilities: Unable to reach the 'best' solution, economic actors pursue 'satisficing', rather than 'optimizing', solutions. Thirdly, uncertainty is a common property of 'real world' situations: The classic distinction between risk and uncertainty (Keynes 1921; Knight 1921) sheds light on the ontological differences between situations with outcomes can be associated to a defined set of probabilities, and those where "there is no scientific basis on which to form any calculable probability whatever. We simply do not know." (Keynes 1937, 214) Whatever its sources however, uncertainty prevents from attaining the conditions of general equilibrium (especially, homo oeconomicus and perfect competition) and therefore makes it impossible to reach optimality, or efficiency (Beckert 2002).

In a functionalist perspective, forecasting aims at providing economic actors with depictions of economic futures. When uncertainty prevails, actors' decisions are necessarily anchored in 'fictions', requiring actors a priori to 'suspend disbelief' and adopt an 'as if' convention. When the future has yet to be created and cannot be known at present (Shackle 1972), economic actors can base their action only on 'fictional expectations' – that is, "pretended representations of a future state of affairs" (Beckert 2013, 226). In this perspective, 'instruments of imagination', among which forecasts, support fictional expectations. Forecasts fuel actors' imagination – they eventually build the fictional expectations upon which economic action and coordination is based (Beckert 2016).

Shifting the focus from outcomes to processes

Most literature on macroeconomic forecasting deals with 'errors', through the comparison between forecasts and actual economic performance. Indeed, assessing such errors mostly relies on an ex post comparison between 'what actually happened' and 'what had been predicted' – a reality test that forecasters often discard as 'irrelevant' or 'ineffective' (Pilmis 2018). Explanations of collective forecasting mistakes often focus on econometric models: in particular, economists advocate for new forms of macroeconometric modelling that include financial cycles (Borio 2014) or reduce the discrepancies between the "real" world and the one models create (Caballero 2010; Taleb 2007). Other hypotheses stress the importance of cognition and beliefs in the economic world. Behavioral economists emphasize the importance of 'animal spirits' in finance and in the economy (Akerlof and Shiller 2009) – a notion one could apply to forecasters as well as to 'ordinary' economic actors. Combining Durkheimian and Bourdieusian traditions, sociologists underline that the adherence to a dominant vision of the economic order formed the ground upon which interpretations of crises were built (Lebaron 2010).

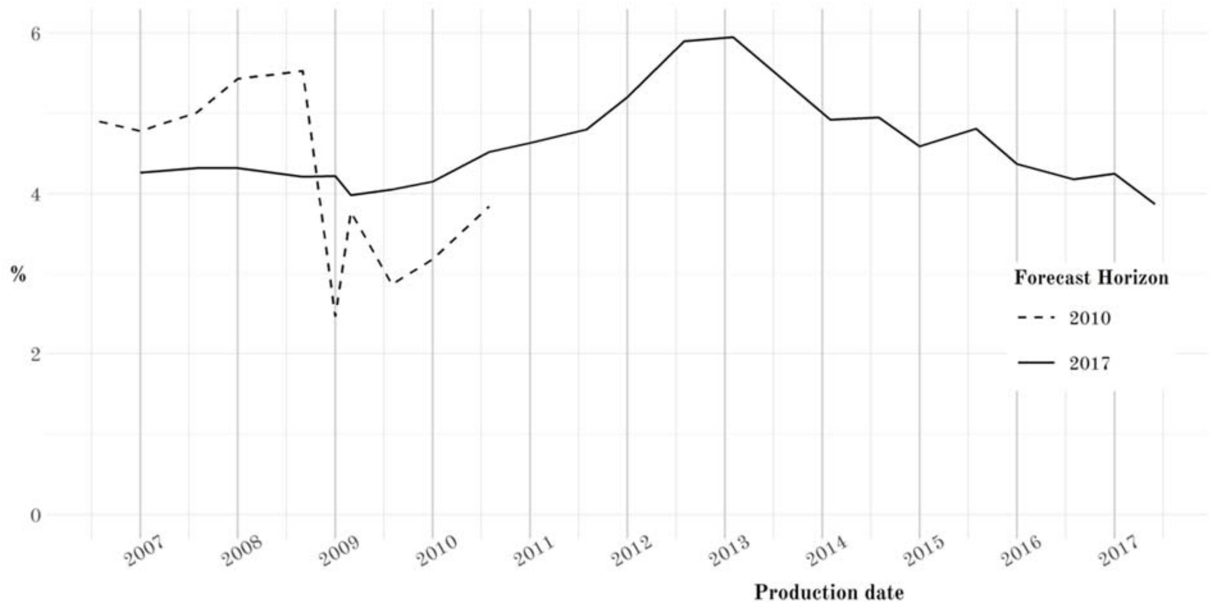
Although inspiring, these sets of explanations remain partly unsatisfactory. Approaches dealing with econometric models often share an optimistic, and somehow positivist, belief that future improved models will be robust enough to provide an accurate approximation of economic mechanisms. Collective forecasting 'error' is thus regarded as a mere technical issue, without reference to the dynamics within the forecasting world. It claims a continuous 'march towards progress' would eventually put an end to most forecasting mistakes. Besides, it offers little insight into the actual process of forecasting. Whether they originate from economics or sociology, a major drawback of 'cognitive' explanations lie in their almost tautological nature. One may provocatively summarize it as follows: 'Forecasters make the same predictions because they agree on how the economy works', or even 'They see the same things because they think the same way.' Consensus then becomes self-explanatory, resulting from either socio-historical configurations of the profession of economist (Fourcade 2010), the interwoven theoretical, political and ideological grounds of economic thinking (Lebaron 2000), or an unquestioned human nature that would lead to herd behavior. As Keynes's 'beauty contest' famously pointed out (Keynes 1936), herding can be a relevant strategy when actors face uncertainty. A game-theoretical perspective on 'rational herds' (Chamley 2003) emphasizes the importance of social learning through mutual observation, since individual behaviors are motivated by private information. Forecasters are no exception: consensus partly emerges from the observation of peers. However, in addition to reducing social processes to the sole exchange of information, the analysis of rational herds often leaves the production of information in the shade and rather focuses on how it spreads. Once again, the process of forecasting remains unquestioned.

Indeed, focusing on 'errors' rules out whole areas of the activity of forecasting. It pays attention to the opus operatum but provides little information about the modus operandi. Shedding light on forecasting as an on-going process rather than on its outcomes departs from the way forecasting are usually understood. Moving backstage, sociologists emphasized the collective dimension of forecasting and stressed the importance of social networks in its making (Evans 2007) or the 'epistemic participation' of the object of forecasters' inquiry, the economy, to the very process of forecasting (Reichmann 2013). The collective dimensions of forecasting have therefore been studied primarily in the case of individual forecasting organizations (academic research centers or central banks mostly) and of singular moments of production. The scholarly works implicitly assume forecasts are independent from each other.

This paper advocates for a different approach to the forecasting process, which emphasizes forecasting sequences made of successive forecasts of a similar object. Indeed, forecasters issue several forecasts for a same horizon, a same country, and a same variable – usually at the end of each quarter. To take an extreme example, the United States Congressional Budget Office (CBO) produced more than twenty different projections of the US GDP growth at the end of year 2017 – forecasts being produced twice a year (usually in January and August) up to ten years in advance. For the same variable, country, and horizon, the IMF produced ten different projections – at the end of the first and third quarters of year y-5 (here, 2012), and at the end of each quarter of both years y-1 (2016) and y (2017). Each new forecast revises the preceding one to reflect the incorporation of newly available economic information – the implied changes being sometimes dramatic (see Figure 1 for an illustration).

Figure 1

CBO Forecasts of US real GDP growth at the end of 2010 and 2017



Source: Congressional Budget Office, Budget and Economic Outlook (https://www.cbo.gov/about/products/major-recurring-reports).

Understanding the process and nature of forecasting requires paying attention to forecasts revisions. From a theoretical perspective, revisions provide the opportunity to study changes in expectations formed by professionals, and thus give insights into how their labor unfolds. It allows investigating the weight of various factors, whether they are related to the properties of the forecasted object, to the identity of forecasters, or to the historical and institutional environment of forecasting. This approach differs from Nordhaus's (1987) which, through the analogy with financial markets (Fama 1970), concentrates on forecasts efficiency and thus makes little, if any, difference between revisions and 'errors'. It obviously conveys normative statements as to the process it evaluates and, because it focuses on the use of available information rather than on the availability of information, misses one of the key dynamics of forecasting. For example, the deepening of economic crises, which the successive releases from statistical bureaus allows tracing, prevents forecast revision at date t to be independent from that at date t-1 – contrary to what the efficiency hypothesis implies. A processual approach seemingly reduces forecasting to mere calculations. Forecasts however encapsulate not only figures but also scenarios. Forecasters claim their merits and achievements should be judged according to the scenarios they outline rather than to the figures they end up with (Pilmis 2018) The present paper exposes that forecasts simultaneously hold narrative and numerical dimensions. Both are interdependent: Figures both express numerically and challenge scenarios.

Data and material

The text exposes early results from ongoing research on macroeconomic governance. It draws upon data from a purposely-built database of forecasts running from September 2006 to September 2017 (designated below as 'Forecasts Database'). Data was first drawn from 'Consensus Forecasts'[1], a series of monthly economic forecasts from professional forecasters. In order to match the quarterly pace of actual forecasting, collected data was produced at the end of each quarter (March, June, September and December[2]) – in other words, the database contains a sample of all 'Consensus Forecasts' issues over an eleven-year period (size=⅓). It nevertheless almost exhaustively represents all the end-of-quarter releases. Secondly, institutional forecasters usually grant access to their publications online, providing the opportunity to retrieve the IMF World Economic Outlook, the OECD Economic Outlook, the European Commission Economic Outlook or the CBO Budget and Economic Outlook.[3] The 'Forecasts database' eventually gathers more than 32,000 forecasts about two macroeconomic variables (GDP growth and inflation, using 'consumer prices' as a proxy in the latter case) and eight countries or group of countries (China, France, Germany, Greece, Japan, United Kingdom, United States, and the Eurozone). Each forecasts is further characterized by its point value, its date t, its (more or less distant) horizon and, when appropriate, the date and magnitude of its revision between t-1 and t.

This paper more specifically relies on a subset of the 'Forecasts database'. In order to keep a balanced panel, analyses exclude forecasts about China and Greece, as well as to those whose horizon exceeds 24 months[4]. Furthermore, forecast organizations are distinguished according to their main activity:

- *Public institutions* gather institutional forecasters, that is organizations such as the International Monetary Fund (IMF), the Organization for Economic Co-operation and Development (OECD), the European Commission (EC), and the Congressional Budget Office (CBO). They produce figures and scenarios about an often large number of countries, which all forecasters closely scrutinize.
- *Major banks* are multinational banks whose subsidiaries or national offices produce macroeconomic forecasts for various countries. Such banks are Bank of

[1] Consensus Forecasts™ are publications from Consensus Economics™, a London-based organization established in 1989 which claims to be "the world's leading macroeconomic survey firm" (Consensus Economics website, http://www.consensuseconomics.com, accessed June 25th, 2019).
[2] This rule suffered only one exception: "Consensus Forecasts" for December 2011 were missing and thus replaced by data from January 2012.
[3] Appendix A displays the sources of the database more precisely.
[4] Appendix B provides a more detailed account of the panel structure.

America (including Merrill Lynch), Citigroup, Crédit Suisse, Goldman Sachs, HSBC, JP Morgan, Morgan Stanley, UBS and Unicredit.
- *Other banks* designates the remaining organizations of the banking sector.
- *Other organizations* mostly regroup insurance companies (e.g. AIG, Allianz, Axa, Dai-Ichi Life, etc.), business firms with a department devoted to macroeconomic forecasting (among others, DuPont, FedEx, Ford, General Motors, Total or Toyota), research centers, consulting firms, rating companies, and some public institutions.

Are predictions predictable? Forecasting as a sequence

Forecasts rely on the computation of economic information, the largest part of which is made available to the community of macroeconomic forecasters by data providers and statistical bureaus. Scheduled press releases and embargos enable a simultaneous access to recent data for all forecasters and economists.

> We forecast continuously: We are equipped with databases to feed Excel spreadsheets. Supply comes straight from databases once the GDP is out – a quarter an hour later, and even sometimes at the same minute. When the US figures are released, they are under embargo but they are already delivered to the press and data providers and, say, the embargo is lifted at 8 or 8:30 NY time, hop!, all the data becomes public at once through press agencies and data providers, and I get them on Excel, like, five or ten minutes later… that depends on the data provider, sometimes it needs maybe an hour. Then, they pour out… I don't know, about one country, you get 20 or 30 entries. I don't use them all but I do get them that way, automatically.
>
> Chief economist, Insurance company, French citizen, born early 1960's, December 2015.[5]

In this regard, the world of macroeconomic forecasting displays some features of quasi-perfect information. Most, if not all, macroeconomic information is available and, what is more, devices are designed to implement symmetry between all economists and forecasters and ensure they all get the same information at the same time. Since forecasting often consists in extrapolating recent data to spot economic trends, the nature, amount and accuracy of information is critical to produce forecasts. Besides, forecasters sometimes compare forecasting to some kind of 'art', which would require experience-based intuition to 'feel' the coming tendencies and spot key data in the larger dataset. One may hypothesize that the forecasts' point value depends on its basic properties (or its 'nature', e.g. the forecasted variable or country, as well as its year of production) as well as on the amount of information

available. In other words, using the forementioned dataset, linear regression models accurately describes the relationship between forecast value at time ^{t} vt and a set of independent variable, including the autoregressive model $v_t = \alpha_0 + \alpha_1 v_{t-1} + \varepsilon$ (model 1). The test implies four different linear models, all with the same dependent variable (v^t) and method (OLS) but with varying sets of independent variables. Dummies enable to include qualitative variables in the models, such as forecasters'activity (public institutions, major banks, other banks, or other

[5] All excerpts are part of a larger qualitative study, made of 48 in-depth interviews. The author has conducted them since June 2014 (average duration: 80 minutes) with economists and forecasters from public (either national or international) and private (banks, insurance companies, and so on) institutions.

organizations), the forecasted country or variable (GDP or inflation). When continuous variables proved significant, using dummies also allows scrutinizing the impact of some particular modalities: e.g. as the comparison between Model 3 and 4 shows, it enables paying attention to economic conjuncture, rather than considering 'time' as a mere duration.

Table 1

Linear Regression Modelling of Forecast Values

			Model 1	Model 2	Model 3	Model 4
Forecasts	Country	Eurozone		0.036**	-0.734***	-0.741***
		France		n.s.	-0.861***	-0.853***
		Germany		0.062***	-0.581***	-0.582***
		Japan		n.s.	-1.247***	-1.241***
		United Kingdom		0.062***	-0.186***	-0.191***
		United States		*ref*	*ref*	*ref*
	Variable	GDP		*ref*	*ref*	*ref*
		Inflation		0.088***	0.113***	0.114***
	Distance to horizon				0.023***	-0.004***
Forecasters	Bank	Major bank			n.s.	n.s.
		Other bank			*ref*	*ref*
	Public institution				n.s.	n.s.
	Other organiza-tion				n.s.	n.s.
Context	Year	2006				0.573***
		2007				0.368***
		2008				0.060*
		2009				-2.050***
		2010				n.s.
		2011		0.005***	-0.014***	0.279***
		2012				-0.291***
		2013				-0.245***
		2014				n.s.
		2015				-0.299***
		2016				-0.379***
		2017				*ref*
	Previous forecast value		0.999***	0.999***		
Intercept			-0.073***	-9.438***	29.594***	1.938***
Adjusted R-squared			0.8199	0.8217	0.1286	0.3794
df			24,737	24,729	29,701	29,691
N			27,739	24,739	29,713	29,713

Source: Forecasts Database subset.
Method: OLS.
Signif. codes : ***: Pr. < 0.001**: Pr. < 0.01*: Pr. < 0.05

Table 1 exhibits that simple linear regression modelling, including a limited set of independent variables, accurately 'predicts' macroeconomic forecasts. It is noticeable that the identity of forecasting organizations holds little, if any, crucial role: there is no significant difference between banks, public institutions and other organizations. In contrast, what forecasts are about matters. Regarding countries, it is no surprise that the modelled coefficients reflect the hierarchy of macroeconomic performances, since forecasts are often continuation of past trends into the future. Although not always in a strictly linear manner, the horizon weighs in forecasts value: Indeed, all other things kept equal, and the impact of conjuncture being controlled for, longer-term forecasts look more optimistic than short-term. In addition, the forecasts are sensitive to their context of production. Here again, the outburst of the Great Recession (especially year 2009) is easy to spot. This supports the claim according to which data providers are decisive actors who disseminate the economic and statistical raw information necessary to produce forecasts. All organizations being granted access to the same information at the same time, their precise nature, singularities and peculiarities make little difference, all the more so as cooperation is a key feature of the social world of forecasting (Evans 2007; Reichmann 2013). Shared economic information lead to similar forecasts. To say it more provocatively, forecasters seemingly lack 'imagination', and forecasting appears data-driven.

Yet, as mentioned above, the most noticeable result lies in the decisive role of previous values to understand newly-produced ones. The removal of the previous forecast in regression models dramatically diminishes their goodness of fit, as shown by the R^2 dropping from around 0.82 (model 2) to 0.13 (model 3). This finding stresses that forecasting shall not be understood as 'one-shot' operations, but rather as a process along which forecasts continuously incorporate new economic information. Forecasts extrapolate from recent economic trends. In turn, they widely draw upon preceding forecasts. That forecasts are actually self-referential is well-known in economics. "Forecasters, Nordhaus (1987, 668) writes, tend to have a certain consistency (stickiness?) on their views of the world, so that recent forecasts will go far in explaining current forecasts". A broader explanation to this self-referential feature argues previous forecasts encapsulate, not only forecasters' own views about the future[6] , but also the amount of economic information available at time t-1 – the persistence of some information from one period to the next then contributes to the stickiness of forecasts. Indeed, revising forecasts by definition implies forecasting exercises seldom start from scratch. The importance of 'post-mortem' in the world of macroeconomic forecasting – that is, the examination of former forecasts at the beginning of a new exercise – demonstrates the connection between past and present forecasts: Spotting preceding flaws is an assumed requirement to achieve better forecasting. In line with the near-perfect correlation between one forecast and the preceding one[7], it suggests that similar forecasts form a consistent sequence, so that revisions mostly consist in the adjustments of 'old' forecasts with respect to newly available information. By and large, forecasting means updating former forecasts.

[6] Besides, Nordhaus (1987) often regards forecasters' views in a behavioral perspective, drawing from Kahneman and Tversky's depiction of the 'anchoring effect' (Tversky and Kahneman 1981). As most works in psychology-inspired behavioral economics, such under-socialized perspective cannot truly account for social phenomena (Bergeron et al. 2018): forecasters' views are not just their own personal views, they are also grounded in the epistemology of economics as a whole, in the econometric tools they use, in the categories according to which the economy is described…

[7] Autogression Model properties (adjusted R^2=0.8199, coefficient close to 1 – 0.999) stress the almost perfect correlation between v_t and v_{t-1}. Autocorrelation coefficient for v_t (all t) is 0.91.

What is updating? The informational grounds of forecasts revisions

Studying updates gives insight on the practice of forecasting as well as on economic expertise as a whole. Indeed, interviewees sometimes relate forecast revisions to the properties of organizations, such as their main activity or the contours of their audience.

> - There is a major difference as to how work is done here [a major French bank] and in the public sector – especially the OECD but the Planning Bureau [Dutch *Centraal Planbureau*] too. People in those places are very cautious. When the figures are bad… well, next ones may be good. You don't know if this is the beginning of a new trend. You keep very cautious. And if you look at the forecasts from the Planning Bureau, there is little difference between one forecast and the other. Things are very different here because, here, it is of great importance to get the new trends – and yet, like the others, we missed the [2008] crisis in the US. […]
> - *When you said "you keep very cautious", what does it mean? When the figures are bad, does it mean saying that they might not be "that bad" and, likewise, when the figures are good, saying they might not be "that good"? Or does…*
> - [Interrupting] Yes. Well, most importantly, in the case of the OECD and the Planning Bureau, because these institutions are carefully watched. And, when they release something about the US, they fear it will trigger a stock market crash. They want to avoid that. Their goal is not to spread panic. Things are different here because we are not a public institution – we don't bear responsibility to the general public. We assume liability to our investors. And we are under an obligation to warn them that things may turn very bad. Well, if that's our impression, we don't want to spread panic either. But we state "the risks are high". […] And our forecasts can change far more dramatically. Also, one reason for this is that our clients do not really look backwards. I do. I take a look at what I had forecasted three months earlier. But our clients don't give a damn: they get our forecasts once every three months and that's it. At the OECD, people are far more cautious when it comes to changing forecasts dramatically.
>
> Forecaster, French Bank, Dutch Citizen, born mid-1950s.

Beyond providing research with a testable hypothesis, the interviewee highlights the role of revisions for forecasters' work. As a practical category, forecast 'revisions' encompass a variety of situations, so that several proxies may capture their intensity. As numerical re-assessments of coming economic evolutions, their measure is three-fold:

1) They can equate to their *deviation*, i.e. to their arithmetic difference between the value *v* of forecast at time *t* and that at time *t-1*: $(v_t - v_{t-1})$ – called below 'revisions' without any other specification.
2) Another estimate relies on their *squared deviation*, in order to study the magnitude of revisions, whatever their sign: $(v_t - v_{t-1})^2$ – designated below as 'squared revisions'.
3) Finally, *squared relative deviation* provide a same scale for all revisions and, accordingly, allows comparing them despite widely different face values: $\left(v_t - v_{t-1}/v_{t-1}\right)^2$. However, as forecasters often anticipate unchanged macroeconomic situations (meaning $v_{t-1}=0$), using such an index poses difficulties.

Table 2

Distribution of Forecasts Revisions (Overview)

	Mean	Median	Std Dev	Skewness	Kurtosis
Deviation	-0.08	0.00	0.55	-2.29	20.84
Squared Deviation	0.30	0.04	1.38	16.52	410.49

Source: Forecasts Database subset

Table 3

Forecast Revisions by Type and Magnitude

Type / Magnitude	Negative		Positive		Null		Total	
	N	%	N	%	N	%	N	%
[0-0.5[	8,449	*34.15*	7,454	*30.13*	3,552	*14.36*	19,455	*78.64*
[0.5-1[	2,065	*8.35*	1,685	*6.81*			3,750	*15.16*
[1-max]	1,100	*4.44*	434	*1.75*			1,534	*6.20*
Total	11,614	*46.95*	9,573	*38.70*	3,552	*14.36*	24,739	*100*

Source: Forecasts Database subset
With null revisions excluded, χ^2=195.11, df=2, p<2.2e-16.

Table 2 and 3 expose the properties of the statistical distribution of forecasts revisions and squared revisions. It actually shows that, whatever the measure considered, forecasts revisions are not normally distributed. Indeed, forecasters more often revise downward than upward (mean and skewness are both negative) and forecasts revisions widely concentrate around the mean (kurtosis is over 20 in the case of revisions, and over 400 in the case of squared revisions). The distribution of squared deviations is here especially spectacular, whose median (0.04) almost equates the minimal value (0 per definition) – meaning half deviations belong to the interval [-0.2; 0.2]. However, more than one fifth of all revisions exceed 0.5 point in absolute value, and more than 1 in 15 exceed 1.0 point. The implementation of linear regression models provides some insights to understand the impact of forecasts properties on their revisions. Table 2 exposes the results of three models, which share the same dependent variable (forecasts revisions, as defined earlier). Their specifications are the same as models 1-4: the method used is ordinary least square and the dummies intervene in the same way. Table 3 displays the results from another series of identical linear regressions, except for the dependent variable –which is now squared revisions.

Table 4

Linear Regression Modelling of Forecast Revisions

			Model 5	Model 6	Model 7
Forecasts	Country	Eurozone			0.030*
		France			n.s.
		Germany			0.052***
		Japan			n.s.
		United Kingdom			0.045***
		United States			*ref*
	Distance to horizon	0 to 5 months		-0.008***	*ref*
		6 to 12 months			-0.097***
		13 to 18 months			-0.079***
		19 to 24 months			n.s.
Forecasters	Bank	Major Bank			n.s.
		Other bank			*ref*
	Public institution				-0.071***
	Other organization				n.s.
Context	Year	2007		0.005***	-0.044*
		2008			-0.326***
		2009			-0.242***
		2010			n.s.
		2011			-0.101***
		2012			-0.131***
		2013			-0.073***
		2014			-0.195***
		2015			-0.173***
		2016			-0.156***
		2017			*ref*
	Previous forecast value	Q1		-0.039***	*ref*
		Q2			-0.166***
		Q3			-0.272***
		Q4			-0.455***
	Previous forecast revision		0.178***	0.217***	0.183***
Intercept			-0.069***	-0.105***	0.314***
Adjusted R-squared			0.0329	0.0467	0.1524
df			19,659	19,656	16,635
N			19,661	19,661	19,661

Source: Forecasts Database subset.
Method: OLS.
Signif. codes : ***: Pr. < 0.001**: Pr. < 0.01*: Pr. < 0.05

Note : The inclusion of the previous revision requires taking into account three successive forecasts, therefore excluding forecasts produced during Year 2006.

Table 5

Linear Regression Modelling of Squared Forecast Revisions

			Model 6	Model 7	Model 8
Forecasts	Country	Eurozone			-0.131***
		France			-0.163***
		Germany			n.s.
		Japan			0.156***
		United Kingdom			n.s.
		United States			*ref*
	Distance to horizon	0 to 5 months		0.021***	*ref*
		6 to 12 months			0.379***
		13 to 18 months			0.085**
		19 to 24 months			n.s.
Forecasters	Bank	Major Bank			n.s.
		Other bank			*ref*
	Public institution				0.263***
	Other organization				n.s.
Context	Year	2007		-0.057***	n.s.
		2008			0.720***
		2009			1.156***
		2010			0.155**
		2011			0.370***
		2012			0.129**
		2013			n.s.
		2014			n.s.
		2015			n.s.
		2016			n.s.
		2017			*ref*
	Previous forecast value	Q1		-0.085***	*ref*
		Q2			n.s.
		Q3			n.s.
		Q4			0.181***
	Squared previous forecast revision		0.139***	0.101***	0.061***

	Model 6	Model 7	Model 8
Intercept	0.284***	115.01***	-0.150**
Adjusted R-squared	0.0205	0.0422	0.0926
df	19,659	19,656	19,635
N	19,661	19,661	19,661

Source: Forecasts Database subset.
Method: OLS.
Signif. codes : ***: Pr. < 0.001**: Pr. < 0.01*: Pr. < 0.05

Note : The inclusion of the previous revision requires taking into account three successive forecasts, therefore excluding forecasts produced during Year 2006 (see Appendix A).

In a seemingly unsurprising manner, Tables 4 and 5 also show that the higher the value of preceding forecasts, the larger their downward revisions. As to the distance to horizon, dummies hint at a partly non-linear effect, suggesting lower revisions on shorter- and longer-term than on 'average' term (between 6 and 18 months ahead). It also confirms the impact of macroeconomic conjuncture, with both years 2008 and 2009 being characterized by increased downward revisions (Table 4) and increased squared revisions (Table 5). Last but not least, all these models also show a close positive association between (either squared or not) revisions at time t and at time t-1. As mentioned earlier, one may interpret it as a (more or less) deliberate forecast smoothing, but it may also relate to the informational structure of forecasting and the difficulties to assess economic turns, especially in times of economic crisis and recovery, during which actors encounter difficulties to reach diagnosis. In this perspective, the relationship between revisions in t and t-1 may reflect the release of further economic information gradually confirming what previously appeared only as a possibility: in the end, data corroborates what previously was mostly judgmental.

More interestingly, Tables 4 and 5 provide little support to the aforementioned claim that 'public organizations' would be especially cautious as compared to the private banking system. Considering either revisions or squared revisions, public institutions differ from the other forecasting organizations by their tendency to revise forecasts more strongly. Conversely, professional forecasters more easily smooth their forecasts than institutional forecasters. This obviously contradicts the above-quoted forecaster. On the other hand, it reminds of what some other forecasters state: "One forecaster told me that he smoothed his forecasts because a more accurate but jumpy forecast would 'drive his customers crazy.' President Carter indeed complained about the 'inconsistency' of his economic advisers, stating he was tempted to prefer the fortune teller at the Georgia State Fair. Another reader commented that too-quick forecast revisions would entail reversing decisions about investment plans too often." (Nordhaus 1987, 673) Besides supporting this claim, such results raise two additional issues. It first requires explaining the discrepancies between forecasters' discourses: How come professionals from a same field hold so widely contrasting views of its functioning? Secondly, both discourses stress the importance of audiences to understand the process of forecasting. It thus challenges the usually admitted idea that forecasting is solely data-driven, and instead suggests studying forecasts and forecasters in their broader social environment.

Besides their proxy measures, descriptions of revisions as 'events' can take into account their sign (revisions are 'negative' or 'positive'), their magnitude ('more than 0.5' or '1.0 point'), or both (see Table 3). Some of these events are frequent enough to be modelled using logistic regression modelling. Each model studies a specific binary dependent variable (coded 0/1): negative revisions (model 9), positive revisions (model 10), and revisions over 0.5 point (model 11). All models rely on Maximum Likelihood Estimation (MLE) and propose the same set of independent variables:

- Country (6 modalities: Eurozone, France, Germany, Japan, UK and US)
- Forecasted Variable (2 modalities: GDP and Inflation)
- Distance to horizon (4 modalities: 0-5, 6-12, 13-18, and 19-24 months)

- Forecasting Organization (4 modalities: major banks, other banks, public institutions, other organizations)
- Production year (12 modalities: 2006 to 2017)
- Forecast value in *t-1* (4 modalities: quartiles by year).

Table 6

Logistic Regression Modelling of Forecast Revisions (odds ratio)

			Model 9 Dependent variable: Negative Revision	**Model 10** Dependent variable: Positive Revision	**Model 11** Dependent variable: Abs. Revision ≥ 0.5 pt
Forecasts	Country	Eurozone	0.745***	n.s.	0.531***
		France	0.851***	0.722***	0.544***
		Germany	0.599***	0.902*	0.784***
		Japan	0.823***	n.s.	n.s.
		United Kingdom	0.670***	n.s.	n.s.
		United States	*ref*	*ref*	*ref*
	Variable	GDP	*ref*	*ref*	*ref*
		Inflation	0.895***	n.s.	0.689***
	Distance to horizon	0 to 5 months	*ref*	*ref*	*ref*
		6 to 12 months	1.115**	1.086*	2.992***
		13 to 18 months	n.s.	0.847***	1.276***
		19 to 24 months	n.s.	0.739**	n.s.
Forecasters	Bank	Major Bank	n.s.	1.149***	n.s.
		Other bank	*ref*	*ref*	*ref*
	Public institution		1.523***	0.778***	2.051***
	Other organization		n.s.	n.s.	n.s.
Context	Year	2006	1.685***	0.560***	0.575***
		2007	0.619***	1.394***	0.606***
		2008	1.573***	n.s.	3.945***
		2009	n.s.	1.200**	3.367***
		2010	0.490***	2.021***	n.s.
		2011	0.781***	1.791***	2.696***
		2012	*ref*	*ref*	*ref*
		2013	n.s.	n.s.	0.601***
		2014	1.738***	0.639***	0.618***
		2015	1.541***	0.684***	0.664***
		2016	1.351***	0.720***	0.730***
		2017	0.563***	1.834***	0.264***
	Previous forecast value	Q1	*ref*	*ref*	*ref*
		Q2	1.815***	0.529***	0.668***
		Q3	2.764***	0.346***	0.665***
		Q4	5.686***	0.169***	1.194***
Intercept			0.272***	2.449***	0.214***
Pseudo R^2 (MacFadden/ Nagelkerke)			0.0927/ 0.1605	0.0889/ 0.1518	0.1445/ 0.2156
Confusion Matrix Accuracy			64.84%	66.70%	79.87%
df			24,712	24,712	24,712
N			24,739	24,739	24,739

Source: Forecasts Database subset.
Method: MLE
Signif. codes : ***: Pr. < 0.001**: Pr. < 0.01*: Pr. < 0.05

Table 6 exposes results that are consistent with those of linear regression models of forecasts revisions. They do not support the hypothesis that banks would more likely overreact to new information in order to warn their clients of coming downturns, while public institutions would be more cautious to avoid spreading panic. Indeed, public institutions are more prone to revise their forecasts downward (model 9) and to revise them strongly (model 11) than any other organization in the panel. The argument according to which major banks would commit to warn their client of coming economic bursts further weakens once one takes into account their tendency to rise their forecasts from time t-1 to time t (model 10). Distance to horizon as well as production year also bear salient outcomes. First, considering odds ratio, 2008 and 2009 appear as years during which forecasts underwent massive revisions. Yet, while many negative revisions occur in 2008, the following year 2009 is associated to positive revisions. More interestingly, regression odds-ratio for years 2008 and 2009 are non significant for respectively positive and negative revisions. This contrasts with all other years in the panel, for which a negative association (odds-ratio <1) with one particular type of revisions (either positive or negative) comes along a positive association (odds ratio >1) with the other. In plain words, that far more upward (respectively, downward) forecast revisions than expected occur in 2009 (respectively, 2008) does not mean that, the same year, fewer downward (respectively, upward) revisions are observed. Moments of economic crises jeopardize former conventions and habits, thus opening the field of possibilities: Both deep recession and dazzling recovery seem possible, if not likely. Secondly, once again the distance to horizon hints at a non-linear temporality in forecasting. Actually, the 6 to 12-month-ahead period is the most closely associated with forecast revision, whatever its sign, as well as, by far, with stronger revisions.

Discussion and conclusion

These early and exploratory results shall be considered with caution. They require consolidation through further analyses. In particular, testing hypotheses on smaller subsets would provide more robust results, as it allows restraining the analysis to one country at a time, excluding some years (especially those in which the crisis was most acute), and therefore avoiding the overdetermination of statistical results by some singular socio-historical, i.e. cyclical, configuration. Besides, factor analyses will enable studying forecast revisions with a different stance, emphasizing a 'mutatis mutandis' rather than a 'ceteris paribus' perspective and shedding light on the congruence and correlation between variables.

The inquiry however displays a few features of forecasters' work. It first shows to what extent is forecasting data-driven. Indeed, forecasting organizations do not hold an instrumental role per se. The homogeneity of models and methods amongst organizations demonstrates the similarities of economic reasoning across the world of forecasting. Economic information is treated in such similar ways that little differences arise between forecasting organizations. Forecast revisions trace shifts in expectations and representations of the future, whether major or minor. Mostly are they nothing but adjustments, which marks the incorporation of newly, though sometimes significant, available data. Studying the kind of data leading to such changes is a promising lead for further research, as it may provide insights into the categories of thought according to which forecasters apprehend the economy. Forecasters have to choose what seems relevant among such a plethoric and continuous economic information, so that not all data can serve as input to econometric models. The analysis of selection principles and their possible changes across time would then provide the opportunity to understand macroeconomic thinking in the making and, eventually, to hold more closely the two dimensions of forecasting – narratives and calculations. Altogether, the paper shows that the dynamics of forecasting matter for the ways in which expectations form and change. These

dynamics arise from forecasters' working practices, which involve the tasks of selecting, questioning, interpreting and incorporating newly available economic information to produce forecasts for a certain type of clientele or audience. In the end, expecting means revising, adjusting, updating former expectations.

Paying attention to forecast revisions also emphasizes a two-fold non-linearity of economic forecasting. Obviously, it first reflects the non-linearity of economic evolutions, especially in the case of crises and downturns, by definition disruptive. The Lehman Brothers collapse and its aftermath led to huge forecast revisions, especially during years 2008 and 2009. Secondly, it has to do with the very nature of forecasting. One would expect the distance to horizon to be inversely related to economic information, so that most forecast revisions would happen in the final months, when it accumulates and grows more precise. The collected data highlights on the contrary that forecasts revisions are more likely to occur earlier during the sequence of forecasting. Everything goes as if the main features of macroeconomic forecasts were fixed between six and twelve months prior to the horizon, leaving just some details to set. In line with an informational perspective on forecasting, it raises questions as to the nature of economic data available at that precise moment. Altogether, these results remind that the time is not a continuous but a discreet variable, whether in the economy or within economics.

A Durkheimian perspective on economic evolutions provides a theoretical frame to understand how fictions about the economy change. "Crises, Durkheim writes in his seminal study on Suicide, [are] disturbances of the collective order." (Durkheim 2005, 206). Such "anomy", as he names it, has widespread consequences.

> The [social] scale is upset; but a new scale cannot be immediately improvised. Time is required for the public conscience to reclassify men and things. So long as the social forces thus freed have not regained equilibrium, their respective values are unknown and so all regulation is lacking for a time. The limits are unknown between the possible and the impossible, what is just and what is unjust, legitimate claims and hopes and those which are immoderate. Consequently, there is no restraint upon aspirations.
>
> (Durkheim 2005, 213)

That forecast revisions, in times of crisis, go both upwards and downwards seem to confirm the Durkheimian intuition of a widening range of possibilities. Major crises then would contribute to (re-)open the future, by making possible or thinkable what was not. Fictions, i.e. representations of the future, change. Again, switching narratives eventually alter point forecasts. Yet, another, and complimentary, way to draw on such an argument instead considers the raising of some previous forecasts as a way to keep the future unchanged. Forecasters distribute and categorize a continuous time into discreet temporalities (short-, medium- and long-term), and assign each of them to differing explanatory models. Investigating forecasters' practices shows that short-, medium- and long-term forecasting does not rely on the same concepts and information. The analysis of economic conditions in the last few months of an on-going year makes use of economic data about the first quarter or semester of the same year, which have then been made public by national statistical bureaus. Conversely, economic conjuncture cannot take part in longer-term forecasting, which provides statements about economic structures – NAIRU, potential GDP, potential growth, and so on are here crucial notions. Revising forecasts then means re-investigating how economic structures translate into numbers. Provided that, in times of crisis, downward revisions are more closely associated to short-term forecasts and upward revisions to medium-term forecasts, their combination brings about a same depiction of the long-term economic future as prior to the crisis. In this perspective, crises are only momentary. In Durkheimian words, medium term would then matches the "required time to regain equilibrium". In times of crisis, fictions about the economic future, for the shaping of which forecasting is instrumental, vary widely. One fiction however remains that most forecasters share, respective of their theoretical anchoring in mainstream economics: More accurately, in the long run, the equilibrium will prevail, and the actual output will equate the potential output. In the end, economic theories would operate less as "instruments of imagination" fueling actors' imagination (Beckert 2016, 245–68) than as constraints restraining forecasters'.

Appendix A: Forecasts Publication Date

	Consensus Forecasts	CBO Budget and Economic Outlook	EC Economic Forecasts	IMF World Economic Outlook	OECD Economic Outlook
2006	Sept./ Dec.	Aug.	Nov.	Sept.	Jun./ Dec.
2007	Mar./ Jun./ Sept./ Dec.	Jan./ Aug.	Feb./ May/ Sept./ Nov.	Mar./ Sept.	Jun./ Dec.
2008	Mar./ Jun./ Sept./ Dec.	Jan./ Sept.	Feb./ May/ Sept./ Nov.	Mar./ Sept.	Jun./ Sept./ Dec.
2009	Mar./ Jun./ Sept./ Dec.	Jan./ Mar./ Aug.	May/ Sept./ Nov.	Mar./ Sept.	Mar./ Jun./ Sept./ Nov.
2010	Mar./ Jun./ Sept./ Dec.	Jan./ Aug.	Feb./ May/ Sept./ Nov.	Mar./ Sept.	May/ Nov.
2011	Mar./ Jun/ Sept.	Jan./ Aug.	Feb./ May/ Nov.	Mar./ Sept.	May/ Nov.
2012	Jan./ Mar./ Jun/ Sept./ Dec.	Jan./ Aug.	May/ Nov.	Mar./ Sept.	May/ Sept./ Nov.
2013	Mar./ Jun./ Sept./ Dec.	Feb.	Feb./ May/ Nov.	Mar./ Sept.	May/ Sept./ Nov.
2014	Mar./ Jun./ Sept./ Dec.	Feb./ Aug.	Feb./ May/ Nov.	Mar./ Sept.	Sept./ Nov.
2015	Mar./ Jun./ Sept./ Dec.	Jan./ Aug.	Feb./ May/ Nov.	Mar./ Sept.	Mar./ Jun./ Sept./ Nov.
2016	Mar./ Jun./ Sept./ Dec.	Jan./ Aug.	Feb./ May/ Nov.	Mar./ Sept.	Feb./ Jun./ Sept./ Nov.
2017	Mar./ Jun./ Sept./ Dec.	Jan./ Jun.	Feb./ May/ Nov.	Mar./ Sept.	Mar./ Jun./ Sept.

Source: ‘Forecasts Database’

Appendix B: Panel Overview

Variable and Modalities	N	%
Country	**29,713**	**100**
Eurozone	5,538	18.6
France	4,109	13.8
Germany	5,570	18.7
Japan	4,153	14.0
United Kingdom	4,876	16.4
United States	5,467	18.4
Macroeconomic Aggregate	**29,713**	**100**
GDP	14,988	50.4
Inflation	14,725	49.6
Distance to Horizon	**29,713**	**100**
0 to 5 months	7,313	24.6
6 to 12 months	10,692	36.0
13 to 18 months	7,621	25.6
19 to 24 months	4,.087	13.8
Forecasters	**29,713**	**100**
Major Banks	7,137	24.0
Bank of America – Merrill Lynch	1,026	3.5
Citigroup	910	3.1
Crédit Suisse	530	1.8
Goldman Sachs	1,004	3.4
HSBC	899	3.0
JP Morgan	726	2.4
Morgan Stanley	654	2.2
UBS	868	2.9
Unicredit	520	1.8
Other banks	8,997	30.3
Public institutions	2,096	7.1
Congressional Budget Office	92	0.3
European Commission	736	2.5
IMF	550	1.9
OECD	718	2.4
Other organizations	11,483	38.6
Production year	**29,713**	**100**
2006	1,342	4.5
2007	2,647	8.9
2008	2,643	8.9
2009	2,514	8.5
2010	2,506	8.4
2011	1,896	6.4
2012	3,107	10.5
2013	2,658	8.9
2014	2,684	9.0
2015	2,779	9.4
2016	2,792	9.4
2017	2,145	7.2

Source: 'Forecasts Database' Subset

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