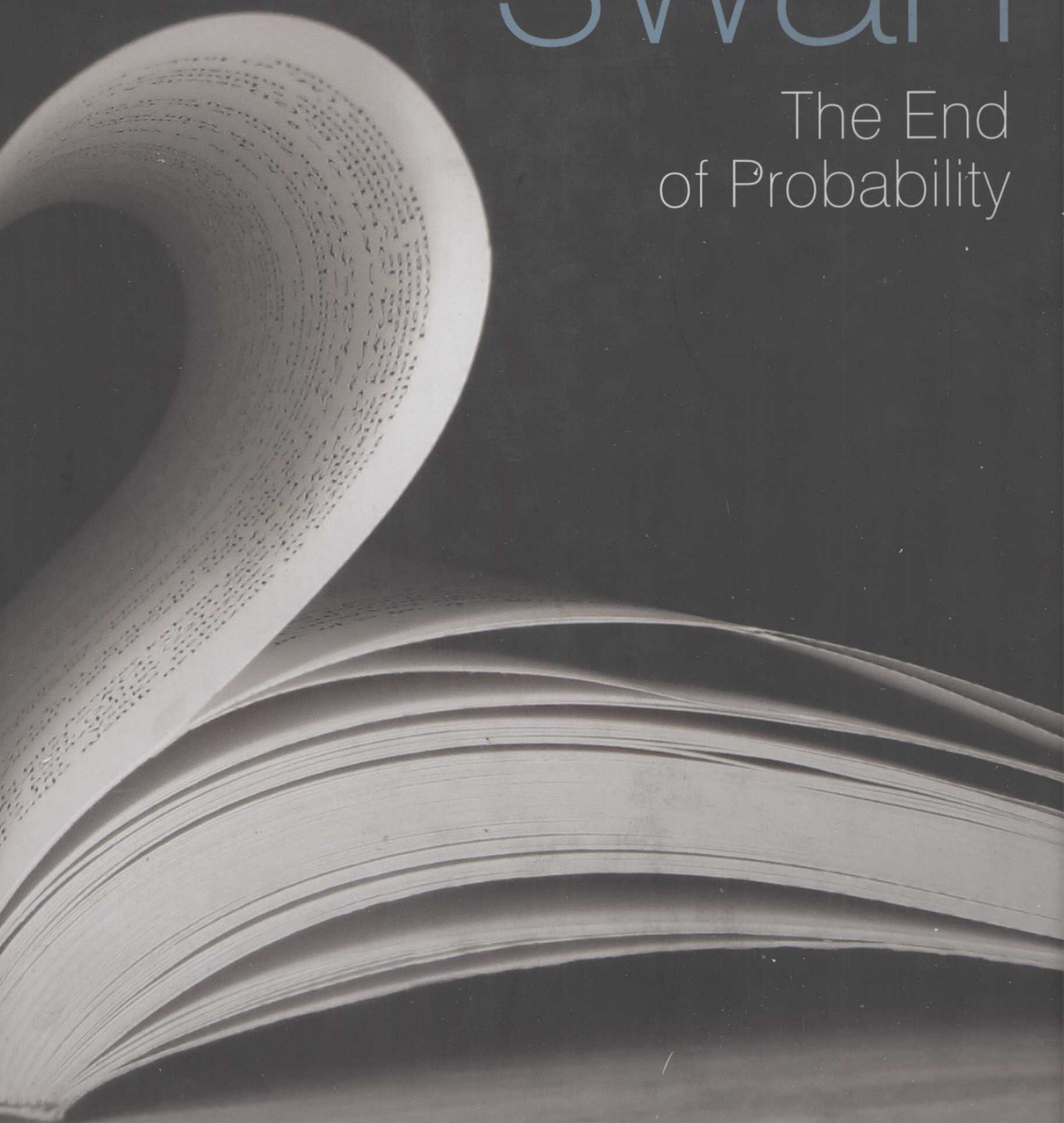


Elie Ayache

# the blank swan

The End  
of Probability



# The BLANK Swan

*The End of Probability*

**Elie Ayache**



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## Introduction

This is a book about writing, pricing and contingent claims. I hold that the writing process and the pricing process are two special kinds of processes that do not take place in possibility or in probability, like the traditional stochastic processes. They fall completely outside prediction. As processes, they keep re-creating themselves and differentiating themselves, yet they do not unfold in chronological time. For this reason, their Swan bird, or the event that gives them wings, is BLANK. It is neither Black nor White; it is neither loaded with improbability nor with probability. It can only be filled with writing, as when we say 'to fill in the blanks'.

Likewise, the medium of contingent claims – that which transmits them and translates them into prices – is something I call the *market*. This cannot be covered by probability theory or derivative valuation theory. The medium is of the nature of writing, and the trader of contingent claims is a writer and a creator. He doesn't predict the market (or its generalization, which is history) or try to anticipate it. The market is his *work*, as when we say that the book is the work of the writer or the poem is the work of the poet.

It was during the period in which I was an option market-maker on the floors of LIFFE (London International Financial Futures Exchange), in 1990–95, and MATIF (Marché à Terme International de France), in 1987–90, that I learnt what it really meant to be a market-maker, or a 'local' (as we say), and how far the open outcry market (which is the only true form of market to my eyes and the only place where contingency, as a meta-probability, can truly strike) can be from the masquerade and total degeneration of probability to which we were recently led by the Collateralized Debt Obligation (CDO) blunder and the subsequent rout, and will be led by any other form of complex derivative that we cannot calibrate to the market. I believe this whole branch is going to drop off the tree, and the only way to reconstruct a market and return to the market is to go back to the place (and probably the times) where individuals (locals) *make* the market, as opposed to big institutional players who never understood how to make money in the market in the first place.

Probability theory is bad for the market as it eventually leads to the metaphysical extremity of the CDO and to the blanket rejection of all probability models by someone like Nassim Taleb, author of *The Black Swan*. I think the real intellectual scandal that the whole 'culture' of the market is facing today is that traditional financial theory can only understand profit in the market through an imperfection of some kind or other: either by an arbitrage opportunity, or asymmetric information, or monopoly, or Knightian essential uncertainty, etc. (not to mention

sheer luck). What is lacking is an account of how to make money in the market as a *perfect medium of contingency*, not as an imperfect case of probability theory.

Apart from rebuilding a market that may emerge as a true vehicle of speculation (in the good, almost philosophical sense of the world), i.e. as *technology of the future*, I believe that a critique like the one I undertake in this book can revolutionize the philosophy of probability. Indeed, it is not in probability (or worse, by luck) that money shall be made in the market, but *outside* probability, in a medium and continuum that I can find no better way to describe than to compare it with the medium of the creation of literary work.

The reason why my book is called *The BLANK Swan* is that *it is not* the opposite of *The Black Swan* as a hasty critic of Taleb's book would tend to think. *The White Swan* would be the opposite of *The Black Swan* and Nassim himself, in a characteristically witty passage of his own book, considers the possibility that somebody some day would write a diatribe against him with the title *The White Swan*.

My book is not a direct criticism of Nassim's; therefore it is not opposed to it in colour. Rather, it criticizes the whole background or framework of thought in which one would assume that Black Swan and White Swan are opposed to each other.

The Black Swan is the perfectly unexpected event; the White Swan is the perfectly expected event. Underlying both is the category of prediction and prevision, which is the real object of my criticism. The Black Swan refers to something we cannot see or foresee (it is black) and the White Swan to something evident and clear. Although opposed, the two are predicated on the idea of *content* of vision, or *content* of mind, or *content* of expectation.

My observation is that Black Swans are said to be *unpredictable* only insofar as the framework and whole register of prediction is maintained. For instance, Nassim's book is crammed with the framework of prevision, only he argues that there is something – the Black Swan – that typically evades that framework. My criticism consists in suggesting that if Black Swans constantly evade prevision, as Nassim warns us, then we should be able to define them and deal with them *completely independently of prevision*. Why even keep the framework of prevision when we keep talking of something that constantly evades it?

Like I said, Nassim has to maintain this framework (of prevision) because this is the stuff his book is made of, or the stuffing his bird is filled with, only negatively so. In other words, they are full of prevision, only Nassim constantly argues against it. What would become of Nassim's book and the whole concept if prevision was eliminated altogether? What if we completely eliminated the content of vision, i.e. both the colours White and Black? What if we eliminated the whole context of colour and of content? Hence the BLANK Swan.

It is not with prevision (either of Black or White) or prediction that we should deal with the Black Swan or define it, but with something else, which, in the course of my book, turns out to be *writing* and whose quantitative avatar is the market. Writing is something we produce without previous knowledge or prevision or prediction. Writing is quicker than thought and vision. It is a material process, when vision and prevision are only conceptual. Writing transpierces the page it is marked on. It is real. It is a process that eventually transports us to the future, making us attain and fulfil our promises (think of the derivative payoff as a promise that the seller of the derivative has *written* to the buyer), yet at no point is it based on prediction or forecast.

The market, whose other name is the 'pricing process', is such a process. Hence my idea is that the market (or writing) should be the way we deal with Black Swans, not the place where we complain helplessly against them (as Taleb does).

Taleb famously declares that he now belongs to the exclusive ‘club of single-idea people’.<sup>1</sup> These are people who realize one day that they have been carrying a single idea all along in their heads, and this is when they start writing books about it. Taleb’s single idea is that our idealization of the world, what he calls the ‘Platonic’ (theoretical representations, models, schemas, classified patterns, or more generally well-organized knowledge that we see with the eye of our mind), keeps rising to the surface, systematically hiding from our sight the underlying intractable and nonrepresentable reality. ‘It is why we do not see Black Swans,’ he writes, ‘we worry about those that happened, not those that may happen but did not.’<sup>2</sup> The consequence for the reality known as the ‘market’ is that no Platonic form, no formalization of the unpredictable, or, technically, no probability theory or model, shall ever apply to it.

Single and simple as this idea may be, I say it is still composed of two parts: probability and the market. One can further simplify the idea by eliminating one of the parts. The idea I defend in this book is that the market should *replace* probability. Thus I end up with the market as the only part and only idea.

The reason why probability or prediction doesn’t apply to the market isn’t that the market is too complex or too human or too chaotic. The reason is simply that the market should be the *alternative* to prediction in matters relating to the future. It remains to say, of course, how we can relate to the future outside prediction. Trying to answer this question is the stuff my own swan is made of.

Part of the difficulty is that if the market remains single, with only itself to apply to itself, then the apparent tautology will dazzle the thinker and will prevent him from discerning the difference and the differential meaning of the market. Saying that the market is the only way to predict the market, or that immersion in the market is the only way to relate to the future of the market, hardly seems informational. By contrast, my argument would have been more compelling and much riskier if I had contended that the market is the technology, not only of its own future but of the future at large, and that the mathematics of price – which I hold should replace the mathematics of chance and probability – consequently apply to all kinds of historical events, those belonging to the future of the market as well as to the future of humanity. After all, Taleb has written about the role of chance in the market *and* in life, as the subtitle of his pre-*Black Swan* book indicates.

I will not be nearly as ambitious in the present book. I will limit myself to the market and to the analysis of contingency as it takes place there (the contingency of market prices – what else? – which, fittingly enough, are the prices of contingent claims). When I take up topics of seemingly broader scope than the market (such as philosophical speculation in Part II and literary creation in Part III), I will always refer them back to the market or to my personal experience as a market-maker or market technologist.

I will stick with the uniqueness and the singularity of the market (which constitutes the singularity of my subject), but will extract my differential meaning from sharp distinctions I will have to make within the strict field of contingent claims and of their pricing technology – distinctions not necessarily visible to the naked eye, such as between possibility and contingency, prediction and writing, derivatives and contingent claims, virtual and possible, etc.

Contrary to history or life, the market possesses a single metric: the up or down movements of market prices. This can be a source of confusion and oversimplification, and is probably the

<sup>1</sup> Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House, 2007), p. 132.

<sup>2</sup> *Ibid.*, p. 131.

reason why we import numbers from a foreign field, probability theory, in order to account for the numbers in the market. However, this coincidence in numbers can also be a blessing, as it eventually allows us to frame our criticism of probability and prediction with all the greater precision, provided the distinctions I listed above are made.

It is those distinctions, rather than the singular occasion that made me realize them (the market), that will stand ready for generalization to fields that may be strictly superior to the market, either in scope or importance or degree of human concern. In this way, it will truly appear from inside, from the *internal difference* that the market is in itself quite independently of the things of different scope and different order to which it may later be externally compared, that the market is indeed a general *category of thought* that surpasses the strict acceptance of the financial market. It is no wonder, from this perspective, that I should draw heavily on the work of philosophers of event and difference such as Bergson, Deleuze and Badiou.

Perhaps the main distinction on which the whole book hinges is the one between possibility and contingency, or, correlatively, between the (theoretical) value of a derivative and the (market) price of a contingent claim. This distinction becomes clearest in the last part of the book, thanks to the *conversion*, and the three preceding parts can be read (or listened to) as different voices or different variations on the same theme, leading to the final movement, like in a symphony.

In a sense, the three parts say the same thing; they are three voices of the market that do not equivocate on its notion. On the contrary, they say the market in the same sense. *Univocity* of the market and of contingency is indeed the main theme of this book.

The three preparatory parts are different approaches and travel towards the culmination of the book which appears, in the final part, to be the *genesis* of the market. Think of the three parts as occurring in the context of discovery and of the concluding part as taking place in the context of justification.

In Part I, the totality of themes is introduced. In Part II, contingency is given a firm philosophical basis (even an absolute status), which will secure the way to think of it independently of possibility, even independently of thought itself.

Part III is literally a travel to the 'land of the market'. It traverses at once all the relevant spaces: geographical, literary and the space of the book itself. In fact, it is a narrative adventure or a kind of reverie, which the strictly mathematically or philosophically inclined reader may wish to skip at a first reading. Nonetheless, it is the part I personally prefer and in which I have travelled the farthest I could. There are outer reaches in this exploration that even I do not yet quite understand.

Part IV is the promised land, or the new world finally reached. It illuminates the whole book like a beacon. If the reader isn't afraid of travelling at infinite speed, as Deleuze would say, and of discarding, right at the entrance, any prejudice or preconceived idea he may have about the pricing of contingent claims and their market, he or she is welcome to engage in Part IV directly and to read it independently of the rest. From a talk I have recently given, I have discovered that the reader (or listener) may be all the more prepared to assimilate a given idea that the idea is truly revolutionary and radically new and that it has not the slightest resemblance or even the remotest relation with anything he or she may be familiar with. Of course, the idea has nevertheless to be consistent.

Perhaps I can introduce this idea along the following lines. I will start with a question. Imagine you are writing a foundational book on options (or on derivatives generally – let us not yet call them 'contingent claims'), a script that begins from scratch, literally from genesis,

as if you were writing the history of that world. Can you say what options are, what meaning they have, that is to say *what difference they make*, or what they are meant for, without using the notion of possibility or probability?

Imagine you are a speculative philosopher, and by this I mean that you wish to build your system of philosophy and your ontology from scratch, and that the notion of possibility is not available to you. Possibility and possible worlds are metaphysical constructs. As such, they don't exist. Perhaps we will make them exist. Perhaps it will turn out we cannot talk of markets or of options without talking of possibility. Still, my question is for the moment: 'Can we conceive of options, of their meaning and of their destination, without thinking of possibility?'

Options are contingent claims. The vanilla call option pays  $(S - K)$  if the stock price  $S$  is above the strike price  $K$  at the expiry of the option, and 0 otherwise. The formula 'If ... then, else if ... then' is the formula of contingency. It points to a dissymmetry in the otherwise indifferent space; it points to a difference. It also points to an event: something that can be, but that can be otherwise. This 'making a difference', or contingency, is the essence of options. This is the creative act of options, the productive difference they are made of.

Possibility has nothing to do with this. Contingency is of this world; possibility is of another world. There are even philosophers of the modern speculative brand (e.g. Quentin Meillassoux) who abhor metaphysics and the language of possibility and necessity as the totalization of possibilities, yet who believe that the world is only made of contingency and that the only necessity there is in the material world is the necessity of contingency. (I examine Meillassoux's work at length in Part II.)

Possibility is only the metaphysical channel that we have invented in order to guide us to contingency. While contingency is all difference and shift and dislocation, possibility is but the (very understandable) move to fold that difference back on identity and on presence. The proposition of possibility is the following: Why don't we imagine a process, a sequence of possibilities, that takes us to that contingency?

Possibility is a representation and, as such, it re-presents, it pins back on the presence of mind, the pure difference that contingency is supposed to make. Therefore, before I have even started talking about market completeness and the threat of redundancy of derivatives, you can tell that possibility, as a metaphysical notion, in itself already contains the germs of completeness or the death of the market. Possibility is already an attempt to bring back within the confines of representation, and to domesticate, the utter otherness of contingency.

In a world that is only made of contingency, it is only natural that we should invent options or derivative contracts. It is only natural that we should circulate, today, things that we know will *make a difference in the future*. This is why I have always thought of derivatives and derivatives markets as the *technology of the future*. Thus we write those derivatives contracts, and in their writing (the 'If ... then, else if ... then' formula) there is nothing even remotely related to possibility. It is the pure, material writing of contingency. It is pure difference. Writing is difference, as Derrida would say.

However, writing, as we all know and as Roland Barthes suggests, is only the prelude to an *exchange*.<sup>3</sup> Typically, we write contracts when we are about to exchange something for fear that, when we no longer hold what we used to possess, in the interval of the exchange, but

<sup>3</sup> 'Writing, therefore, is the exchange. When I face the dangerous interval in which I let go on one side and seize on the other, writing constitutes the way of preserving myself against the risk of a lethal gap: if writing didn't exist, I would find myself *without anything*: having already let go, not having seized yet: in a state of infinite fall' (Roland Barthes, *Œuvres Complètes*, vol. IV (Paris: Éditions du Seuil, 2002), p. 292; my translation).



have let go of it in order that the counterparty may receive it, the counterparty might disappear, thus alienating us of our property.

Therefore, my next statement, as I am sure one can guess already, is that we write derivatives, those pure formulas of contingency, *only insofar as we wish that the difference they will make in the future may make a difference today*. Instead of wondering at their present value, we immediately go and see what difference they make in front of somebody *else*. This is the most direct statement that I could think of, to the effect that we write derivatives for the sole purpose that they may be exchanged and admit of a price. Price is a differential, not a splendid present value as general equilibrium theory holds. To price something is to trade something in order to *earn a difference*. It is to make a difference.

In the very essence of derivative writing, in its very meaning, the fact is embedded that they should admit of a price. The link is immanent and material. *We don't need possibility or metaphysics to travel from the derivative payoff to its present price*. To be a derivative is to admit of a price. That is to say, *to add a price*, a new state of the market-world, to the existing prices.

Possibility and probability and stochastic processes, all these constructs, are themselves derivative concepts, that is to say secondary. They came later. Contingency and price (or market) came first. Market (both of the underlying asset and of any stratum of overlying derivative you care to write on it) is the original entity (note that 'underlying' will henceforth be used as a noun). Absent possibility and stochastic process, there is no way to talk of replication other than as static or intrinsic or model-independent. Creating a new derivative payoff – and by 'new' I mean that this payoff is not statically replicable with the existing ones – is only meaningful to the extent that it will bring to the table, i.e. to the market, a new price: that is to say a new 'making a difference today' by something that 'will make a difference in the future in a new way' (say an innovative, path-dependent or knock-out payoff).

It is fine that we should devise algorithms, as a matter of fact devise the whole metaphysical notion of possibility and probability, in order to compute present values of derivatives. I even think that tools that allow us to value and dynamically replicate derivatives are a constitutive part of the creation and growth of derivative markets (see chapter 3). However, given how I have straightened up the genesis of markets, going directly from contingency to price without the mediation of possibility, it should be clear that derivatives can have as their only meaning and destination that they may trade in a market and never end up perfectly replicable and redundant.

Therefore, when the Black–Scholes–Merton framework of option valuation – to only cite this paradigmatic case – shows that the option value is perfectly reducible to a number called volatility and to a deterministic replication strategy, this doesn't mean the end of the game. On the contrary, this is just one way of slicing the price, and if this designates anything and puts pressure on anything, it designates that the thing called 'volatility' as the thing that you should expect, by virtue of the first principle that options must trade, to become stochastic.

Does this mean that the underlying process has changed and that you must now assume a process with stochastic volatility? No! Nothing has changed. The market is the eternally contingent and eternally self-differentiating thing it has always been; it is the *single dice throw* that you will never fit in a fully settled and developed representation of states of the world. It is your valuation tool that needs to change and evolve and differentiate<sup>4</sup> – unless you combined your valuation tool with your trading skills and finally came up with the *universal pricing tool* that, hopefully, would never need changing, namely you the trader.

<sup>4</sup> In all that follows, I will use the verb 'to differentiate' in the intransitive sense. To differentiate, for an organism, is to undergo the process whereby it grows and develops differentiated features and organs. It is a process of becoming.

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