

# Quantum Finance. A new methodology for economics

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[I wrote this in around 1996 in bar in Prague (as you do), but I think that this group might enjoy it :-)]

Quantum Finance is a new field that seeks to resolve problems that are experienced with the Standard Model, (i.e. money is real, and takes the form of cash and assets).

Interestingly the whole endeavour arose as a result of a discussion between a CERN experimental physicist and his private banker in Geneva. This led to a collaboration between CERN and a select group of Swiss bankers, who between them created the discrete GW (Gnomes and Wizards) Forum, the papers of which this summary is based on.

The motives of the CERN researchers was a combination of simple pure pursuit of knowledge, and the hope that a successfully predictive theory would solve their perennial funding problems. The Bankers were suffering from their twin emotions of fear and greed. Fear that they stood to lose if Quantum Finance worked, and they were ignorant of it, and greed in that they hoped for an edge.

In this overview I shall explore the following concepts and thought experiments. (Many areas are of course incomplete and in need of much more research, but I present results and ideas to date in the hope of stimulating further discussion).

- 1) Quantum Cash and the non existence of “real” money, and monetary duality.
- 2) Estate Agents Uncertainty Principle.
- 3) Schrodingers Bank Account.

- 4) Black Scholes.
- 5) Relativistic effects and Financial Mass, (inc Hype Drives, current technology).
- 6) The Law of Cash/Energy Conservation, (and Feynman cashflow diagrams).
- 7) Virtual Economic Particles and the Inflationary Universe.

However first of all a History of Classical Financial Mechanics. Cash was originally believed to have been invented by the Ancient Greeks, on the grounds that Aristotle is quoted as saying “all investment advisers are sophists”. More recent studies have concluded that the Greeks got their ideas from the Ancient Egyptians, who, until then, had only been given credit for inventing Pyramid selling.

For years cash was used in ignorance of its true nature and economic activity was slow, with take-over technique being limited to your basic rape and pillage, and rampant protectionism that was little more than a protection racket (Danegeld).

This period ended with the development of Banks, who managed to identify some fundamental monetary laws, and develop some sophisticated tools for financial analysis comparable with the development of Logs in the field of mathematics. Indeed armed with profit/loss/cashflows and interest the foundations of classical monetary theory were laid down and codified (or exploited) by Adam Smith, Venice, and the Lombards, eventually leading to the creation of the Gold Standard. Another group, for the first time noting the relationship between maths and money, invented actuarial studies and then insurance.

This edifice lasted until the 1970's when its growing complexity (analogous to building bigger particle accelerators) started to make clear the holes in the classical theory, though at the time no one noticed.

The key areas were the OPEC price hikes and subsequent recycling of petrodollars into the third world in the belief that no country could go bust. This proved to be an illusion that only be dealt with by applying a quantum approach to money. The other feature of this period is the appearance of derivatives (swaps, futures, options) which seemed to obey rules all of their own and had even less relationship to actual cash than was normal.

Finally people realised that the worlds assets were a lot less than the worlds money supply and that most money did not relate to property, gold, goods, services or any other clear source, but to an intangible called “confidence”, which, it is considered, may be a relative of the Higgs Boson.

Once this had been grasped it was clear that only a Quantum and Relativistic Theory could explain the reality as probed by modern financial markets.

### **1) Quantum Cash and the non existence of “real” money and duality**

Although everyday concepts like Cash, Profit and Loss apply in the ordinary world, they break down at the extremes, (which is why apparently healthy institutions like Barings or Orange County can suffer such sudden collapse). In reality the true elements of money can never be seen, but only traced by their effects or symbols.

Duality. Coin op machines demonstrate the particle nature of money, but any financial institution will tell you that cash flows in waves of profit and loss.

### **2) Estate Agents (Realtors) Uncertainty Principle**

You can never know both the ownership of an asset and its value. (If you know who owns it then you do not know its value. You only know its value at the time of sale, i.e. when it is between owners).

### **3) Schrodingers Bank Account**

Schrodinger, as well as having a cat, (either dead or alive), also had a bank account, about which he was equally uncertain. The reason is that a Bank is nothing more than a financial probability wave, and he could only know that his money was safe when he asked for it back. At this point the wave collapses into “solvent”, or “insolvent” and he can withdraw his money, or not. (Of course once he held cash he was scarcely any happier as the value of cash was a function of the countries probability waveform.)

Bill, Schrodingers brother, is believed to have gone bust after borrowing money on the basis that the waveform had to collapse as “insolvent” eventually, leaving him with no creditor. He was of course right in his fundamental understanding, but wrong in his probability computations.

### **4) Black Scholes**

Black Scholes are very complex areas of the financial continuum. They twist it around themselves and the largest ones form singularities surrounded by a

Bankruptcy Event Horizon, and anything that falls in vanishes for ever.

They used to be hidden from view but in the last couple of decades a number of more adventurous financial engineers have been exploring them, (sometimes getting too close). The reason for this interest is simple, dropping small amounts of loose change into a Black Schole can release vast amounts of profitable energy.

People often ask what happens when something falls into a Black Schole, and the answer depends on the relative position of the observer.

To the outside observer all is going well, and then suddenly the object, (normally a financially massive institution), falls in, going ever faster until it crosses the BEH and disappears from view.

To the person closest to the BS everything is fine, and stays that way. It's the rest of the Universe that goes haywire, and "it's not my fault".

Fortunately Black Scholes tend to be either clearly signposted if large, and rapidly evaporate if small.

## **5) Relativistic effects and Financial Mass, (inc Hype Drives, current technology)**

Most of the time we inhabit a classical financial universe of profit, loss, and cash.

Cashflow = Money times acceleration

but

Cashflow = Money times speed of light squared and also = Money times velocity squared / 2

Without going into detail this means that there are two ways to build up a financially massive institution or company; the slow organic growth and take-over route, or by moving at a relativistic speed and hoping to hold onto the extra mass when you slow down.

In attempting to get rich quick it is therefore almost always worth trying to attain a relativistic speed in order thereby to increase your financial mass relative to the rest of the (classical) universe.

This is commonly done by means of Hype Drives, and although none have yet

been shown to be reliable, many types have been tried over the years.

The earliest Hype Drives had a tendency to crash and burn, (see the 2nd Crusade, South Sea Bubble and Tulip Fever for details), while the next generation (based on the concept of New Territory) tended to turn on their creators and stop producing income, (see American War of Independence).

In more recent time a typical Hype Drive has involved the incessant talking up of vapourware, backed by spin doctoring, until enough hype is built up to really go places. The early Biotech floatations were of this type, and while promising, they have not managed, on the whole, to deliver. Apologists always say that they need just a little more speed to create just a little more cash.

After a lull we have seen a whole new approach tried for the first time by Netscape, who have used the rocket theory. Simple and effective it has pushed them from \$100M to \$3000M in three days, or 0 to \$3000M in 16 months, depending upon your choice of starting point.

The rocket theory is based on the simple note that since  $F=ma$  and  $Ke=mv^2/2$  if you throw enough stuff out of the back at high enough speed, you go forwards and accelerate. By chucking out over 6,000,000 copies of their program they built up a highly relativistic speed, and time will tell if they can maintain their mass while coming back to earth.

UPDATE 2001 - the market of 2000-2001 showed that rocket theory was no more effective than any other form of Hype Drive.

## **6) The Law of Cash/Energy Conservation, (and Feynman cashflow diagrams)**

It has been postulated that there is a law of Cash/Energy conservation. If true then the Green argument that we are simply borrowing from the future will be proven and a huge bill will absorb net profits to date.

In support of their position the greens draw upon Feynman diagrams that show time as neutral. (It is rumoured that Feynman developed these diagrams as a way of demonstrating to his bank manager that positive and negative credits were interchangeable, as were current spending and future lump sums. While his bank manager could not see the importance of this Nobel prize winning work, and was indeed needlessly rude at the time, these diagrams have become a valuable tool in cash flow analysis).

## 7) Virtual Economic Particles and the Inflationary Universe

The continued expansion of the economic universe is forever creating Virtual Economic Particles, which take the form of quantum collapses that exist as thoughts of the “now there’s an idea” type, (See R. Penrose, *The Emperors New Mind*). A few such particles are energetic enough to actually become real businesses.

The other side of this coin is of course Inflation, and the question as to whether inflation will continue for ever, be halted in a steady state, or collapse. The jury is out simply because at this macro economic scale the data is missing, (the so called “missing cash” question). Until much better measurements are made the Inflation outlook will always be guesswork, and controlling it even more so.

Arguments that Inflation is the supersymmetry for Entropy are also unresolved, but would, if true, disprove Cash/Energy Conservation and require Feynman Diagrams to be drawn in three dimensions.

Some people have used the recent UK Property market as a proxy for the Universe, (and then argued for the steady state), but others tend to argue that the system is too small, and that anyway the behaviour can be explained by either a massive Black Schole hidden from view by the blurring effect of MIG policies, or is the result of a market phase change brought on by movement relative to the markets strange attractor.

### Summary

As can be seen there remains a lot of work to be done in this area, but it may well be that physicists, mathematicians and, ahem, economists continue to probe the fundamentals of space and time both physics and finance will turn out to be nothing more than interchangeable explanations of mathematical reality, and money will indeed be shown to be that which makes the world go around.

### Postscript

Life is indeed stranger than fiction. Academics have demonstrated Gate Theory can be used to model financial markets and that Black Scholes is just a special case (ie simple) result.

[Ian Dickson used to be involved in Financial Services. He is now CEO of <http://www.commkit.com> - next generation social and community software]