Investment Commentary No. 197

October 28th, 1999

The Discreet Charm of the Derivative

1. Murano Glass and Silicon Chips

In its Research Section, the *Neue Zürcher Zeitung* recently published an article written in masterly manner addressing the question of which basic tendencies govern the processing of materials. It is quite surprising for the layman to find that there are a great number of analogies between the progress in the manufacturing of glass and in the development of silicon chips. Essentially every technological advance leads to a refinement of materials, which on the one hand is expressed in the purity of molecular structure, and on the other the improvement of processing technique. This is nothing other than "back to the zero-dimensionality of the point," being the basic tendency of successful technological change. The enormous economic advancement of Venice, Italy, at the end of the Middle Ages as well as the virtually astounding development of the Californian Silicon Valley towards the end of the Twentieth Century were both based on the ability to get close to this zero-dimensionality.

Such a basic pattern of commercial success obviously fascinates a priori those interested in economics, because an analog reasoning can be unconditionally applied to completely different branches of industrial processing. Indeed, in pharmaceutical production, for example, nothing other than the possibility to develop the most strongly effective drug with the highest purity is involved. He who manages to increase effectiveness while decreasing side-effects achieves success; or said another way: he succeeds whoever has put the most distance behind in the direction of "zero-dimensionality." The same goes for the gourmet chef whose creations stand out against such everyday "greasy spoon" menus like "schnitzel with fries." The word "raffinesse" expresses this very precisely, that any masterly technical performance "brings things to the point," and a point is zero-dimensional.

Data Security at

have concluded a long-term construction phase at our Head Office in St. Gall. Under the eastern side of the bank building is an area equipped to meet all the criteria of safety and security engineering requirements for our computer systems. Together with fire, water and theft security, the possible threat of electromagnetic pollution has also been safeguarded. A generously laid out provision for emergency power and a system for interruption-free current supply increase data security, crucial to processing readiness. These new facilities and impavements should contribute to a smooth transition to the new millennium.

In this Investment Commentary we will attempt to draw such analogous comparisons concerning the processing of materials to the service sector and its (often virtual) products. It will be necessary to clarify to what extent fundamental statements of the modern financial theory agree with observations made in production sectors. Of very special interest is to what extent the obvious economic success of physical refining techniques can be transferred to virtual areas.

But let us go back to the Island of Murano and to Silicon Valley. Glass, silicon dioxide, was already a widely used material in antiquity. Vessels and pottery fragments from Roman times verify an earlier inability to achieve today's obviously lustrous glass and the inability of reducing the dimension any further than an ungainly thickness. Silicon dioxide is recovered from sand, and is naturally polluted with iron, boron and other elements. The Venetians succeeded in eliminating the iron to an admirable degree considering the circumstances of those times. The green cast or, typical of old glass, the gray veil was made invisible in this way. Galileo could never have trained his telescope on the heavens and developed his theories of the solar system and modern times would certainly have dawned later had it not been for the pure glass from Venice. Moreover, the superb craftsmanship of the Venetians allowed for a reduction in its dimensions down to the thinnest glass thread. This has created a direct developmental path from the artistic and expensive millefiori glass up to the modern glass fibre. It is interesting that only by reducing a substance to its elementary dimension of the fine line and a point is it possible to produce highly complex devices, especially concave objects. Without this essential ability of refinement the construction of complex structures would not be conceivable. We must make note of this.

The production of semiconductors is fundamentally a question of the purity of the material, the silicon. Achieved in a makeshift laboratory in Silicon Valley, converted out of an old shack, it was possible to make use of high-level research from the surrounding universities. Pureness of material and employing the finest technical knowledge at the level of the atom to precisely "shoot" doping atoms have laid the foundation for semiconductor technology, which today can no longer be ignored. We have this to thank for everything, really everything, that has occurred in the last 40 years in technological and economic developments. And it is also valid to state here that without the ability to refine materials to the highest purity and without the possibility of reduction to the most basic dimension, even the highly-complex calculators which are today taken for granted, would be completely unthinkable.

2. Complex Financial Instruments

As a banking institution which has for some years placed emphasis on the development and the marketing of (derivative) structured financial instruments, we have often been confronted with the quiet criticism that with this activity we are contributing to the obscurity of financial markets. One longs to return to the good old times of the simple share and the simple bond. Then one knew what one held in one's hands. Today the instruments have become more complex, and within this lies a fundamental risk. Due to derivatives the financial markets have completely cut themselves off from reality; the price swings have become more extreme.

As will be demonstrated, standing behind this criticism is the question: What is more complex, the thick-walled clay pot or the delicate, transparent Murano glass? In the disagreement as to how actually to define "complexity" lies the basis for much misunderstanding. A survey as to the degree of complexity of an ordinary share on the one hand and a derivative interest rate instrument on the other would result to the disadvantage of the derivative even among financial experts. The simple share: one knows what one has. The interest rate derivative: difficult, incomprehensible, complex.

When one understands "complex" as "non-transparent," "obscure" or "unpredictable," then actually the share must befit the attribute, because, with reference to its inherent risks, it has such a complicated composition that even with the best of intentions one can not know "what one has." What is the Dollar risk hidden in a Nestlé share? How much profit is generated in Euros? How much Dollar, Euro and Swiss Franc interest rate risk is concealed in the Nestlé balance sheet? Where are the enterprise-specific business risks? To what extent is Nestlé tied to general market developments? There is a variety of influential factors of which their degree of effectiveness is not known, which on their own part are not even constant, and which determine the fluctuation of share prices.

And the interest rate derivative? Admittedly it is to a certain extent also complex, because its structure does not appear to be transparent at first glance. It is, however, *rather simple* in a relationship. Depending on interest rate development in the clearly defined currency, it is worth more or worth less. Completely predictable. The influential factor (the interest rate level) and its efficiency are clearly defined. There is no lame comparison between the clay pot and the Murano glass. The earthen vessel, formed out of undefined loam, with lots of impurities and contamination, is by far much more complex than the derivative with its definite characteristics. It will still be shown that due to this clarity, the combination of characteristics and value of derivatives can lead to an astonishing simplicity in the resulting structure, which nevertheless are often applied to clay-pot-complexities underlying such as shares.

However, as with a multitude of transparent things, one can also construct highly complex objects anew, analogous to the thousandfold decorated millefiori glass and billionfold silicon chip-equipped computers. There are, therefore, two kinds of complexity: the primitive, unrefined complexity of the clay-pot formed of dirt on the one hand, and the cultivated, differentiated complexity of the finest of glass molded from the purest of materials on the other. When we speak of the "Discreet Charm of the Derivative" in our title, then we imagine this charm originating in the refined simplicity of its characteristics. Such a picture stands out from the naively-hurdled denouncements that all newer instruments are the cause of all evils, a criticism the financial markets throw back at us.

3. On the Way to Clarity

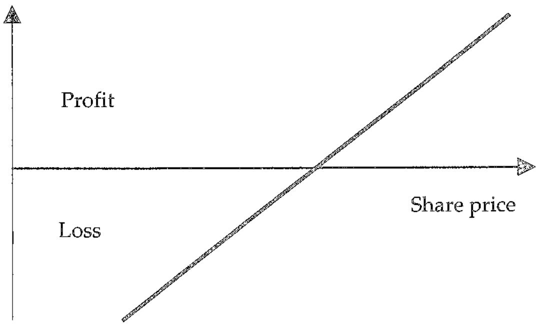
The specification of the characteristics of financial instruments can absolutely be compared to the efforts in the service sectors to refine materials and techniques. With the introduction of electronic data processing in the financial sector beginning in the 1970's, it became possible to apply theories which were developed ten, twenty years before. Especially the application of options theory requires complex computations; the boost achieved by computers was a prerequisite for the innovative thrust of financial instruments in financial markets.

Traditional instruments such as shares and bonds are always more or less of a primitive nature, being multi-dimensional risk conglomerations. There is hardly a share that is not connected to one or more exchange rate risks. There is hardly a company whose credit standing does not depend on a long list of diverse, mostly unknown factors. There is no bond which is not confronted with problems involving the joining of interest rate and other party risk.

In contrast to this, derivative instruments because they primarily deal with freely definable rights and obligations, relate to individual aspects such as a specific exchange rate risk, or a specific interest rate risk, or a specific opposition risk. This demands a deeper look. Therefore, in order to refresh one's memory, a short summary follows outlining the principles in the world of derivatives.

There are two basic forms of derivative instruments, the simple futures contract and the option. A *futures contract* is an agreement fixed at an earlier date to trade future performances. Both parties have the same rights

Payoff of a Long Futures at Expiration



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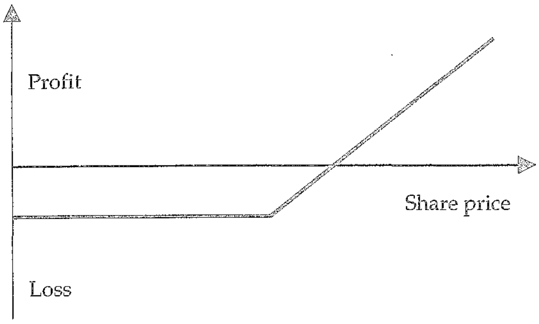
A "dangerous" futures contract looks like this. Its risk characteristics are based closely on the underlying futures contract which it covers. Unlimited profit potential on the upside, practically unlimited loss possibilities on the downside. Basically, one knows "what one has." That one can manage this with an extremely small amount of money is where the actual danger lies in futures contracts, not in the instrument itself.

and obligations. In a futures contract, the seller has to deliver (at a predetermined price), and the buyer must accept delivery and pay (at a predetermined price). Futures, as standardized contracts, are traded on exchanges and therefore have a market price. The risk characteristic of a futures contract is simple to understand: its market price moves roughly with the changes in the market price of the underlying goods.

The other, much more interesting basic derivative instrument form is the option. This is a legal transaction with a conditional exchange method; the option contract is an "if, then" situation. In contrast to simpler futures contract, the performance obligation and the delivery right are not equally distributed to both parties, but rather they stand opposed. An option gives the buyer the *right* to buy a share at a specified price (predetermined), but does not obligate him to do so; in contrast the other party (seller) must fulfill his *obligation* to deliver should the buyer exercise his right. This one-sidedness of right/obligation illustrates the asymmetrical, unilateral characteristic of the option contract. Here, it is at the price where the right to buy gains in value (and the obligation to deliver becomes a burden); the value of the option begins to move dependent upon the underlying goods.

Payoff of a Long Call Option at Expiration



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4. Working with the Time Dimension

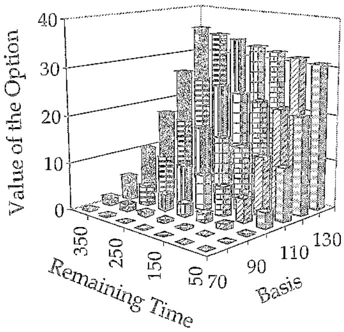
Financial instruments, whether "primitive" (shares and bonds) or "new" (futures or options), always have something to do with time. Each financial instrument is worth as much as it is expected to "bring in" in the future. "Expected" is a term to express that time and uncertainty are causally connected. Every payment flow which lies in the future is, at the most, always probable, but there is never security in connection with future time. Even the most safe of public bonds can hide a small risk of loss, not to mention interest rate risk, to which all bonds are exposed.

The main efforts of financial theory and financial markets lie in working with this uncertainty regarding future performance. A share as such has an indefinitely long future. The price of a share mirrors all possibilities which this indefinite future may bring along. By means of options, one is able to clearly define the dimension of time and more or less limit such a payment flow being exposed to probabilities.

The localization of the dimension "time," and its connected *temporal limitation of probability*, is the only real and decisive performance which the derivative world has brought to us and is still innovative. It is comparable to the technological achievement of forming glass millimetre thin or defining chips in microns. The trend to reduction of dimensions and to refinement is unmistakable.

Options theory has delivered essential knowledge to the working with future probabilities. The relationship between time and probability of an event occurring has proved to be inconstant. The longer the period of time, the more likely that something will occur. If, for example, today a Nestlé share is quoted at SFr. 3'000.-, then the probability that in future it will reach 3'500.- in a year or in a few months, is unequally likely as at the time this Commentary is delivered to our readers (the analogy also stands, with a grain of salt, also for a quote of SFr. 2'500.-.) The market price of options reflects this irregularity of probabilities: Towards the end of the term it becomes clearer whether the predetermined price will be reached or not. And with time it will become clearer whether the option will ultimately be worth something or not. Many options speculators have already paid dearly for this experience: an option behaves like a weight which is being pulled by an elastic band. At first its price hardly moves at all, but shortly before maturity it moves abruptly, because the event at which it is aiming is becoming all the more probable or improbable with time.

The Value of a Long Call Option Dependent upon Share Price and Time



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5. On the Way to Higher-Order Complexities

"So what?" the inclined reader will counter. This really sounds great and the comparison between Murano glass and silicon chips, and options makes sense – but how does it affect me?

We see two implications. Firstly the reduction of the complexity to the zero-dimensionality allows the subsequent reincarnation of higher-order complexities. The second implication refers to the possibility of considerably finer, specific risk control. Referring to the first implication, with the primitive clay pot technology, no highly-complex glass reactors could have been created for chemical production. Thanks to the innovative powers of the Venetians, who were able to reduce impurities and pollution in glass to the absolute minimum, we are able to profit from all further processing techniques connected with glass. Similarly, thanks to the tiny greatness of the modern silicon chip we can enjoy the immense developments taking place in the IT-sector today.

It is analogous to foresee that in future high-order complexity asset-portfolios are built similarly on foundations in which their characteristics are clearly defined with respect to the dimension "time." From undefined clay shards to highly complex glass reactors, we also see the development in financial affairs. A high-order glass reactor is worth nothing, and it can even be highly dangerous when its composition as a whole is not harmonious or when one knows too little of its single components. In the same way a high-quality complexity portfolio must be created with respect to transparency, which transparency has to work for the individual parts as well as the whole.

For some time our bank has been calculating for each client portfolio on a daily basis code numbers which describe, for the assets as a whole as well as for the individual parts of the portfolio, where the client stands economically. Such calculated *"actual exposure"* conveys information which a regular deposit statement cannot generate. For every financial instrument, even if it is only an ordinary, traditional convertible bond, its true economic worth is decoded. This process is called "Unbundling of Risks." It represents a first, decisive step on the way to determining more accurately the multitude of influential factors and their efficiency in this highly complex structure "portfolio."

The second step lies in the representation of the real risk behavior. Every financial instrument has its own characteristics. One fluctuates with pronounced movement, the other hardly changes its value, even in extreme market situations. All instruments together, i.e. a portfolio, representing an integrated total of various individual positions, behave differently than every single instrument in an isolated view for itself. The glass production process as a whole shows different features from the individual test-tubes. Modern portfolio management makes use of the knowledge of financial theory and for the whole as well as the parts strives for the highest possible transparency.

The value-at-risk evaluation, which we daily observe, interprets how assets or their parts would behave if

- Share prices sank by 10 percent generally,
- Interest rates increased parallel in all currencies by 1 percent,
- Foreign currencies lost 10 percent against the major currency of the investment
- Commodity prices fell by 10 percent
- Volatility, (excitement on the stock markets) climbed 20%.

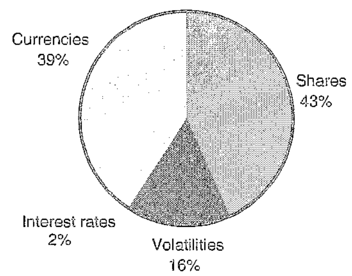
-Value-at-risk

Possible Loss per share (of approx SFr. 1'060.-):

Amount in SFr.:

Percentage:

Distributed by Risk:



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The representation above shows the value-at-risk calculation for our structured fund product W1. Should the above scenario occur, the loss suffered to the value of the share certificate, which at the moment is valued at approx. SFr. 1'060.-, would be in the range of about 100 Francs. The major part of the risk is found in currencies and the market risk for shares. Every portfolio can analogously be evaluated, no matter how "complex" it may be.

With the evaluation, the sensitivity of the portfolio or the individual parts can be defined in relation to each single risk factor. With it also, one comes closer to knowing "what one has." Similarly, scenarios supported by actual historical events (for example our worst-case-scenario with all its cumulative adverse financial market developments since 1987) or those which have been statistically derived, can convey valuable knowledge. This of course assumes that past risk behavior patterns will still correspond to those in the future.

We foresee that in the near future such details of characteristics of active investments will be demanded by clients, and will make up a minimal component of a more or less proper performance report. In the institutional area of retirement funds and insurance, these demands will acquire even additional weight by the corresponding conditions of the supervisory authorities. Last, but not least legal conflicts may accelerate the course of things. Shortly before the printing of this Investment Commentary, we learned that the retirement fund of Unilever was going to start proceedings against Merrill Lynch, because its investment management company, Mercury, had shown a "poor performance" in January 1997 and in March 1998. Bad performance was *not* defined as poor yield in absolute values, but as "too high a risk contrary to the contractual agreement!" We cannot imagine, how investments can be managed in future under such conditions without being supported by code numbers which interpret the partial risk of the exposures undertaken.

The development will continue. With options theory and through the additional data which has been obtained from the derivative markets, one is in a position to better determine the influential factors of the "primitive-complex," clay pot instruments in the implicit process. Today it is possible to access how much interest, how much currency risk, how much actual enterprise-specific risk a Nestlé share holds, and it is also possible to make a statement as to the constancy of the efficiency of these influential factors. The aggregation of this information, though seemingly blurred in its parts, is only a matter of time at the higher level of the total portfolio.

6. Strong Charm

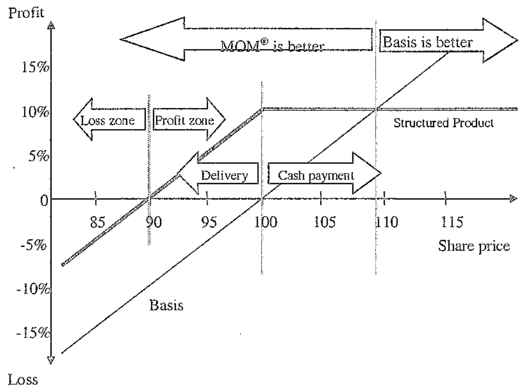
With the use of derivative instruments, the possibility to contain the dimension of time and with it to model probabilities to fit one's own needs should be examined more closely. We support the structured Capped-LEPO product (we call it "MOM®/Money Or Market") which was issued widely by our Bank. Here's how it works. At a specific point in time A, an (options) contract is made between two parties, by which one party obligates himself to takeover specific goods, i.e. share or currency, at a specific point in time B at a predetermined price. The one side enters into an obligation to accept delivery, and the other has the right to deliver. Because we are a risk-oriented Banking institution, we attempt to finance a possible takeover of goods in advance. At maturity of the products, the exchange of performances is made automatically. Should the price of the goods lie under the agreed price, then the right to deliver has value; the goods will be delivered and must be accepted. Should the price of the underlying at maturity be higher than the agreed exercise price, then money will be paid out.

Such an options contract would certainly never take place, if an economic performance was not tied to it. The obligated recipient wants to be compensated for his readiness to carry risk. The risks consists of having calculated that the price of the goods will fall below the predetermined level at maturity. For this he receives reimbursement.

Let's apply the example to investments. At the beginning of the contract, the share price for the share – say Nestlé – is quoted at SFr. 3'000.-. We agree to takeover the Nestlé share at 2'800.- on June 22, 2000. For this obligation to accept delivery, a compensation of 7 percent is paid. From the viewpoint of the obligated party, in an emergency the Nestlé share must be taken over at the today's price of the Structured Product of 2'620.-, in the better case the compensation (SFr. 2'800.- [Exercise Price] minus SFr. 2,620.- [Price of the Structured Product] = SFr. 180.- [Premium]) can be collected.

Because the temporally limited takeover of a (complete!) share risk does have its attraction, the derivative instruments which make this possible do have their charm. In comparison with direct equity holdings in which entire probabilities are based on unspecified time periods, the risk is clearly foreseeable; one can deduce the inherent risk which is hidden in a share by the quantifiable percentage of compensation. For a comparable life, a distinctly higher compensation is paid for a Credit Suisse share. Micro-economically defined, the investor can choose that risk/yield structure which meets his *individual use function*. A Nestlé-share at SFr. 2'620.-: why not? A CS-share at SFr. 250.-: Watch out! (The present market price for the CS-share hovers around SFr. 280.-; the compensation till June 2000 therefore is SFr. 30.- or slightly over 12 percent. Perhaps another investor would be pleased...)

The Structure of a MOM® -Product



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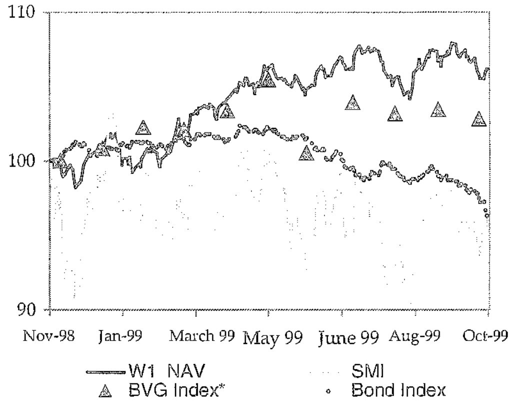
structured (derivative) products lies therefore in a much *finer play* between one's *own expectations* and the conditions which can be played on the financial markets. As the chart above shows, the MOM®-Product should be preferred above the direct investment in shares in two out of three cases. In falling markets, acquisition prices can drastically be reduced; should the markets remain stable, a considerable yield can be gained; only in strongly rising prices (that is above 7%, in the case of Nestlé, or 12% in the case of CS within the life of the contract till June 22, 2000) has the MOM®-Product proven itself to be inferior.

These attractive features can wholly be applied to an investment strategy. For example we strive at least to reach the level of the Swiss Bond Index, risk- and return-wise, with our investment fund "W1 – Structured Product." We consequently invest in structured products with the lowest possible risk in shares. Since the beginning of this year, bond yields have risen in general and the Index consequently experienced losses. The investment goal could happily be reached. More interesting though, despite the crab-walk of our stock exchange (the Swiss Market Index SMI since the beginning of 1999: ± 0 %!) a return of about 6% could be reached to date by way of consequent investing in structured products. A charming return!

Charming W1-Performance



* for the BVG Index: Values exist only as per Month-end

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7. An

In conclusion, much has been said and written in the past about the danger of derivative instruments to the investor as well as to the system as a whole. We also stood at the front when the Long Term Capital Management Fund (LTCM) was dissected and criticized in superior style by all the rules of the art. We also do not and will never cease to keep on raising a finger to warn against certain options deals, which represent the structures which promise to obtain extremely high profits within a very short period time; they, of course, obscure the correspondingly high risks. The probability that within a very briefly defined time limit a half or even a complete wonder will happen, proves itself more often than not as to be illusory. Most derivative losses are found in such long-call structures, based on a simple strategy with bought options. The most dangerous losses, however, arise from strategies which assume that within a defined time frame *no* wonder is going to happen, and then one actually does. They are the short-call structures, which should be entered into only with very close risk supervision.

So there is a definitely very uncharming side to derivatives. If this Investment Commentary has been able to contribute to the other, better but less well-known qualities of derivatives, then our goal has been reached. The world cannot get along without derivatives. The reduction of risks to their real content is crucial for the economy and the financial markets. As food for thought, what would it be like if in the European airspace - where a constant air-traffic jam exists contributing to huge economic losses - were managed by slot-options? (By a "slot" we mean a time window which an aircraft needs to safely takeoff or land at an airport.) An airline company, for whom delays mean a great risk to business, could cover itself at an early date with options. And others, who in this sense are a bit more flexible, could give up such slots. And what would it be like if such options could be traded on an exchange? No question about it! There would be no more delays on important flights; one would have to pay for this luxury. Inversely there would also be no problem for all passengers who experience one, two or more hours of delay would be able to enjoy discounts (reimbursements). Economically expressed, the tradability of rights to slots would lead to a better allocation of the scarce resources of time and space.

With this, we wish to point out that the derivative, indeed, has a lot to do with economic efficiency...

KH, October 28th, 1999