STOCK OPTIONS IN ARGENTINE CAPITAL MARKET
PRESENT END PROSPECT
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ABSTRACT

The aim of this paper is to indicate which are the main technical elements to take into account in order to evaluate the hedging and investments in Argentina through Stock Option in the Buenos Aires Stock Exchange.

Trading rules, statistical patterns, "yields" and volatilities and prospects are being presented in order to take a sound professional idea of the market.

Also this paper indicates which is the role of the actuary in this specific option market.

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1. ECONOMIC BACKGROUND

In 1991 The Argentine stock market had the best year by far among the world's stock markets. This was a consequence of the decision of the Government to control inflation, through a strong monetary policy, a privatization process of state-owned firms, deregulation of domestic and international trade, a new tax policy with a strict control of incomes, the negotiation of the external debt (with the final Brady Plan agreement to restructure its debt to commercial bank creditors) and encouraging
to repatriate flight capital through a law that allowed individuals and companies to repatriate capital paying only 1 to 3 percent tax and eliminating income taxes on stock market gains for foreign investors.

Since April 1991 Argentina is under a new monetary law ("Convertibility Law") which has established a conversion system based on the U.S. Dollar. Briefly the Government (via the Central Bank) would only issue local currency buying U.S. Dollars and it would sell U.S. Dollars at a fixed rate of exchange. Up to now the foreign exchange market maintains a quotation of $0.99 to $1.00 ("$", peso - local currency) per U.S. Dollar.

In October 1991 a deregulation decree reformed three areas: domestic industry, external trade and capital markets. This resulted in a reduction in local and international trading costs, also it eliminated most quota restriction on exports and imports. For capital markets, a very important subject is that the decree gave to forwards, futures and options the rank of a securities that can be traded on a public offering basis, and in consequence the National Securities Commission is encouraging derivative products and markets.

2. THE STOCK MARKET

During 1991 as a result of the general economic policy the local interest rate was strongly reduced and the domestic public placed part of their savings in the stock market together with repatriation and the activity of international investors this resulted in strong capital inflows which helped to increase volume and prices of the market.

After an explosive growth in one year the stock market began to come down reducing its volume to a 50% and with deep cuts in stock prices.

The Securities Market of Buenos Aires ("Mercado de Valores de Buenos Aires S.A.") produces an index based on the leading stocks, which represents the 80% of the traded volume, this is called "Merval Index". The index shows the price evolution of a basket of selected stocks weighted by their traded volume, with quarterly revisions.

3. RETROSPECTIVE STATISTICAL ANALYSIS OF THE STOCK MARKET

In this section we intend to give an idea of the patterns of the whole market and of some specific stocks which are most traded and
which represent some of the most important companies in the country.

The idea is to show what has happened during a period of one year, ending on last November 2nd. We take as examples the Merval Index considering quotations since the beginning of 1991, giving an idea of the whole market, "Celulosa" (from a series which starts on September 17th, 1991) which is important on account of the traded volume and "Telefonica de Argentina" (starting quotations at the exchange on last December 26th.) a privatized telephone company which represents approximately the 23% of the market capitalization included in the Merval Index.

Consequently charts are showing:

a) Price evolution, departing from a fixed investment of $100. All dividends are considered as reinvested in the same stock.

b) Daily relative price movements presented in a natural logarithmic version, according to the formula:

\[ r(t, t + 1) = \ln \left( \frac{S(t + 1)}{S(t)} \right) \]

where:
- \( r(t, t + 1) \): relative price movement
- \( \ln \): natural logarithm
- \( S(t) \): settlement price of day "t"

c) Retrospective annual volatility considering 3 different numbers of trading days (10, 20 and 30), in order to observe level, tendency, and stationary. Volatility is obtained by the following formulae:

\[ rm(t, t + n) = \frac{1}{n} \cdot \sum_s r(t + s - 1, t + s) \]

\[ \sigma^2(t, t + n) = \frac{1}{(n - 1)} \cdot \sum_s \left[ r(t + s - 1, t + s) - rm(t, t + n) \right]^2 \]

\[ vol(t, t + n) = \sigma(t, t + n) \cdot \sqrt{250} \]

where:
- \( rm(t, t + n) \): mean relative daily price movement
- \( n \): number of trading days.
- \( s \): varies from 1 to \( n \)
- \( \sigma^2(t, t + n) \): variance of the relative daily price movement
- \( vol(t, t + n) \): annual volatility
d) Beta coefficients relating the stock daily relative price movements with those of the Merval Index, considering “n” trading days.

4. STOCK OPTIONS RULES

Stock Markets are regulated by the National Securities Commission which authorizes the public offering of securities and supervises the entire system. The Buenos Aires Stock Exchange is a civil association with ample powers of self regulation, establishing listing requirements, authorize, suspend and cancel listing, and issues rules and takes steps to ensure that accurate financial statements and precise information are provided about listed corporations. The Securities Market of Buenos Aires is the private corporation of individual brokers and brokerage firms, and considers each stock and derivative instrument as a product, fixing its characteristics and being supervised by the previous institutions.

Any entity can buy or sell options. The most traded ones are the call options on a common stock and their main characteristics are as follows:

a) American style with protected dividends.
b) maturity the day 15th of each even month, usually up to 120 days.
c) unit of trading: a fixed number of shares according to a list.
d) underlying stock market: spot with 72 hs.
e) premiums: paid in 24hs.
f) series: opened upon requirement from a broker.
g) margin: to open a short position the writer must deposit the underlying stocks included in the unit of trading.
h) stock market expenses and brokerage fees: on premiums and on exercise, for writer and for holder.
i) quotations: in local currency, per each stock of the unit of trading, without minimum price movement.

In the case of Put options, the initial margin is determined as the double of the original premium or at least the 8% of the exercise price.

5. STOCK OPTION VALUATION

Options were introduced in 1986 and for many time call options were used as “short term fixed income investments”, considering low exercise prices and close maturity dates. Due to this idea the most important element shown was the “yield of the option”, assuming exercising at the
maturity date. This "yield" is not the same one for the writer and for the holder because of the effect of expenses. So the writer's yield is obtained considering the purchase of a stock (plus expenses) and the sale of a call option receiving the premium (less expenses), and this not invested capital is compared with the exercise price to be received on the maturity date (less expenses). For the holder it is supposed that he is coming short on the stock (obtaining the price less expenses) and long in the call option (paying premium plus expenses) closing his net short position at the maturity date exercising the option and consequently buying the stock at the exercise price (plus expenses).

Options began to be traded with an acceptable volume of around $30.000.090 premium per month during 1991, and due to the fact that during this year we had a bull market the "yield" was considered as reasonable indicator because call options were often exercised. But afterwards - as shown in the charts - prices came down and many writers who were happy on account of a high "yield" ex-ante were surprised when the options were not exercised and ex-post the value of the stock was lower that the initial purchasing quotation or without obtaining at least a yield equivalent to a free risk interest rate.

Since January 1992, a quote vendor (NOSIS S.A.) started to publish in a newspaper a complete analysis of call options using Black & Sholes's model, indicating theoretical values and implicit volatility according to actual quotations of each series, also the quote vendor introduced the model for theoretical values in his screen information system.

Elements which are now in use and available for all participants, according to Black & Scholes model, historical volatility (30 previous trading days) and actual closing quotations are:

a) Theoretical premiums of calls and puts, including minimum values for put premiums.
b) "Delta": as the first derivative of the call premium with respect to the underlying stock price.
c) "Omega": as the elasticity of the call premium with respect to the stock price.
d) "Vega": as the first derivative of the call premium with respect to the volatility of the underlying stock.
e) Probability of exercise of the call option.

It is important to say that market values have in general implicit volatilities higher than the historical ones. But sometimes the option market is not enough liquid and if a holder wants to close his position he may have only two possibilities: i) to exercise the option (buying
the stock) and to sell the stock, with all the related expenses, or ii) to sell the option at a price lower than the theoretical one, even lower to the theoretical minimum price - "Max(0, S - K \cdot (1 + i)^{-h})" - as usually indicated from non arbitrage principles - in this cases implicit volatility may be lower than historical one and even it may not exist.

6. THE ROLE OF THE ACTUARY

The actuarial profession is able to give its scientific opinion with a practical point of view in the development of the stock option markets - even for the stock market in general -.

The idea of this section is to express an opinion on which are important fields where the actuary may act as a consultant of a stock exchange:

1.- Methods of retrospective statistical analysis of time series of stocks, in order to produce inferences about maximum price fluctuation, volatility and correlation.

2.- Derivative Financial Products design, giving the financial and practical rules of those products.

3.- Market financial safeguard systems: integrating the risk management and the financial surveillance activities, according to the credit risks levels between clients and agents, agents and Market, and agents and the Clearing House and its guaranteeing performance (and/or Clearing House Members). In this area we include the definition and implementation of the Initial and Maintenance Margin Requirements, the Segregation of Customer Funds, Position Limits, Reportable Positions, Trading Limits, Price Fluctuation Limits, Capital Requirements for Agents and/or Clearing Members and Clearing House Capitalization.

4.- Training activities related to agents and staff members of the Market Organization and/or the Clearing House.

7. PROSPECTS

Stock Option Market in Argentina is in its very beginnings and new products and procedures are going to be put into practice.

A new index will be produced considering the same components of the Merval Index but with a market value weighting of each company, in order to give more relative participation in the index evolution to the
most important companies and on which many conservative investors want to deal with. Once put into practice the new index, futures and options will be available, for hedging, arbitrage, trading and speculating strategies.

The present Margining System is too conservative and does not allow to a broad development of the Option Market. The idea is to reduce the margining requirements and for this reason is necessary to consider:

A. - Basic Principles:

a) Each Agent (in Argentina is also a Clearing Member) must have a position limits on a gross and net basis according to its financial and capital strength.

b) Of each stock or group of stocks there must be considered specific parameters due to liquidity/traded volume, distribution of stockholders, market capitalization, and historical price fluctuation/volatility.

B. - A Primary System:

The first idea is to consider a simple way of computing margins based on simple rules.

The initial and maintenance margin ("M") requirements will be the result higher value of:

1. A percentage of the original premium ("Po"):
   \[ M = (1 + a).Po \]

2. A percentage of the last settlement ("Ps"):
   \[ M = (1 + b).Ps \]

3. A modified intrinsic value of the option short position according to price fluctuation and time value:
   \[ MC = \text{MAX}[0, S.(1 + c) - K.(1 + i)^{-n}] \]
   \[ MP = \text{MAX}[0, K - S.(1 - c)] \]

where:

MC, MP: margins for calls or puts
S: spot value of the underlying stock
K: exercise price
Parameters “a”, “b” and “c”, will be determined for each stock, and will be changed if market situation requires it.

4.- Specific rules will be applied for straddles and spreads.

5.- Deep out of the money options will have a special margin requirement (Ex. double of the original premium).

C.- A Modern System:

The final objective is to put into practice a valuation model based on Black & Sholes and related formulae considering conservative hypothesis on the stock price (coefficient “c”) and volatility (using the higher value of the historical and the implicit, with an increment). This model treat futures and options positions as a whole for each customer/agent, establishing and controlling the position limits.

There is no final decision yet and at a first glance the first systems seems to be the more likely to be implemented.

8. Final Remarks

We have considered the characteristics of Argentine Option Stock Market, indicated the statistical patterns of the stock prices, the market rules, the general concepts related to yields, and historical and implicit volatility, and an idea of the prospects of the markets from a technical point of view.

It is indicated which is the role of the Actuary in new markets on “derivative's” and it is hoped that our profession will continue giving his actuarial approach for financial risks in the way of economic and social on progress.
Stock options in Argentine capital market present end prospect

Graph. 1 Merval index 1991&1992 Daily values

Graph. 2 Merval index 1991&1992 Daily relative price fluctuation
Graph. 3 Merval index 1991 & 1992 Volatility

Graph. 4 Celulosa Daily index values
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Graph. 5 Celulosa Daily relative price fluctuation

Graph. 6 Celulosa volatility
Graph 7: Celulosa Beta/Merval index

Graph 8: Telefonica de Argentina Daily index values
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Graph 9: Telefonica de Argentina Daily relative price fluctuation

Graph 10: Telefonica de Argentina Volatility
Graph. 11 Telefonica de Argentina Beta/Merval index