# Derivatives and Structured Products: Project

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June 10, 2014

## 1 Product Description

"ConstructPro" are structured financial instruments with embedded derivative that provides protection for enterprises in the construction sector, in an event of a downside of the revenue in the construction sector. The aim of this product is to guarantee Swiss SME in the construction sector, to diversify their exposition to the risks relevant in that sector. In fact, many small enterprises usually suffer from the turmoil in the construction sector. Several Swiss SME have even faced bankruptcy due to inadequate diversification of assets.

Accordingly, this product could guarantee them a protected redemption at maturity of a loss of revenue due a decline in the construction contracts. Our potential clients target are within the construction sector and/or related to construction sector. For the Swiss SME that are interested in the product, the protected redemption at maturity is subject to the performance of the Index of large construction firms in the Swiss sector. There are three different categories of this product, with each having a protection level : **Gold**, **Premium**, and **Classic**.

The underlying is based on the replication of one Index, based on five large firms in the construction sector : **Allreal AG**, **Geberit AG**, **Holcim Ltd**, **Implenia AG**, and **Schindler AG**. The redemption at maturity is determined on the basis of the performance and the final fixing price of the underlying : If the underlying is under the barrier of 10% at any time and up to the end of lifetime of the product, the enterprise will receive of the value of the decrease for the enterprise who subscribe in the Gold protection. In order to reduce the cost of the derivative product, investors can choose the Premium or the Classic level of protection, the underlying must lie under the barrier of 10% for a certain number of time within two years span to enable the compensation of the eventual decrease in the value of the firm's revenue.

This product is destined to firms who are eager to protect themselves for long term span, like two years or even three years. This will allow firms to invest in a long term project with less uncertainty. It also enable Swiss SME in the construction sector to be in several projects or contracts. In fact, this product facilitate the conclusion of a project, because they could argue they are guarantee from an expected sluggish in the sector and that bankruptcy is not even an issue.

Knowing that the SME in the construction are guarantee from a downside in the construction sector by our product, this could signal their business partners that they are well diversified and that the projects will be achieved. Consequently, this product could promote new projects, new business partnership for the SME that are interested in this product.

## 2 Type of Financial Economic Problem

With the higher frequency of financial turmoil and given the level of uncertainty provoke by these events, firms in the construction sector that benefited from the boom of the economy, now suffer from large losses due to economic instability. In addition, construction contracts are relatively affected by seasonality, hence enterprises in the construction can thwart events where the demand for their services are conjecturally fewer. Thus, this product delivers a peace of mind for firms that face uncertainty and enable them to tie their hands for projects that require long term participation.

Consequently, our product is a solution for those who want to guarantee themselves from unexpected downturn in the construction sector. For example, if a SME has a revenue of 1 million and that firm wants to protect 20% of their revenue, then it has to buy 200 *Constructpro* put.

## 3 Type of clientele

Obviously, the target clientele are Swiss SME that are in the construction sector and enterprises related in the construction sector. There are a large number of SME within and related to construction sector, given that **6881 firms** (OFS 2008) are in the construction sector in Switzerland. Our objective is to deliver a product that will provide SME a protection in case of a crisis in the construction sector that is relatively costless.

The well-being of the Swiss SME in the construction section, that are in fact subcontractor, depends relatively on the health of some large enterprises. This product assures them protection against the risks of loss in their revenue, and eventually a bankruptcy. Given that the large part of these SME in the construction sector are subcontractors, they are directly exposed to risks of bankruptcy if they are not guarantee from our product. This product assures protection of 2 years for the SME that are interested. In general, SME have contracts that varies between 6 months to 2 years. This could help SME to cover themselves in an eventuality of a downside of the activity in the construction sector.

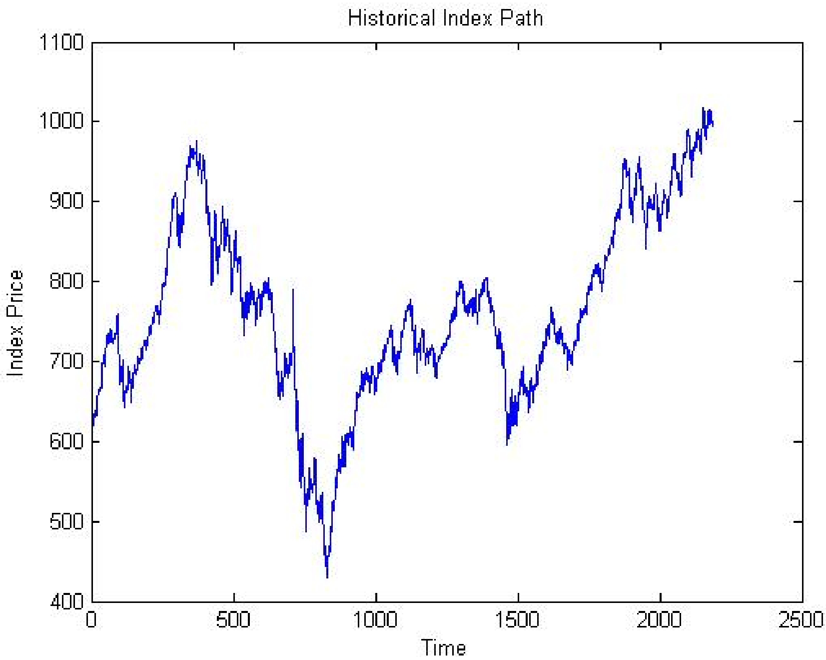


**Figure 1: The historical path of our Index**

# 4 Index

Our index is based on five large firms in the construction sector: Allreal AG, Geberit AG, Holcim Ltd, Implenia AG, and Schindler AG. We sum it up and weight them to obtain 1000. This Index is equal to 1000 and the strike is equal to 1000:

| ConstructPro | | |
|---|---|---|
| Underlyings | Weights | Value |
| Allreal AG | 16.7% | 122.8 |
| Geberit AG | 16.7% | 291.10 |
| Holcim Ltd. | 25% | 76.95 |
| Implenia AG | 25% | 63.5 |
| Schindler AG | 16.7% | 136.7 |

# 5 Payoff Relevance

The Swiss SME that purchases our product only guarantee them a protected redemption at maturity if the Index touches the barrier for the **Gold**. And for the Premium and the Classic, the Index have to be under the barrier for a certain number of times, N=48 and N=192, respectively. Whenever this possibility happens, the **Premium** and **Classic** level of protection assure a protected redemption at maturity.

We propose 3 structured products to our clientele:

| ConstructPro | | | |
|---|---|---|---|
| Term/Maturity | Gold | Premium | Classic |
| Term: 2 years | Put with Barrier | Parisian Put (N=48) | Parisian Put (N=192) |

# 6 Price Advantage

Given the preference of our clientele and how they want to protect themselves against the risks in the construction sector, we offer different level of protection. The difference between the level of protection of our product lies in which way the options activates. It also have the advantage to offer different prices that can attract every SME to insure themselves at a lower price.

The **Gold** level of protection guarantees the owner of the product a redemption at maturity whenever the barrier is touched. Consequently, for this level of protection, we require a higher price because we fully insure clientele of a direct risk of a downside in the construction sector.

For the **Premium** and the **Classic**, the activation of the option is determined by the number of time that the Index lies beneath the barrier. Since the coverage of these products come with additional condition, their price will then reflect a lower price.

| ConstructPro | | |
|---|---|---|
| Protection | 25000 Simulations | Confidence Interval at 5% |
| Gold | 100 chf. | [99.85 - 99.61] |
| Premium | 95 chf. | [94.78 - 94.79] |
| Classic | 77 chf. | [76.27 - 76.29] |

# 7 Pricing

For the pricing of the product, we did a Monte Carlo simulation, using the dynamic stock with historical values and and with the Euler discretization, where Z is a standard normal variable.

$$S_t = S_0 \exp\left((\mu - 0.5\sigma^2)dt + \sigma\sqrt{dt}Z\right) \quad (1)$$

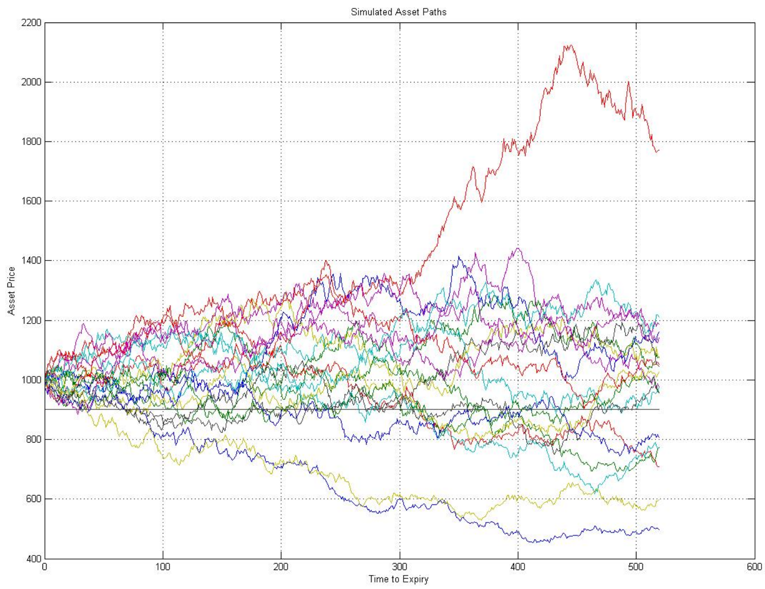


**Figure 2: The historical Monte Carlo simulation paths of our Index**

This simulation is made with 520 number of steps (number of day within 2 years) and 25000 number of simulations. Then, we calculate the mean of the value of the payoff of our 25000 simulations.

# 8 Hedging

## 8.1 Static replicating portfolio

Given some particular target option, we have constructed a portfolio of standard options, with varying maturities and fixed weighting that will not require further adjustment and will exactly replicate the value of the target option.

We have also decided to adjust in discrete intervals. This kind of method generate some errors. Thus, we have chosen to increase the frequency of the hedging which in result will higher the accuracy of the replication.

## 8.2 Hedging strategy

In this case, the sale of a down-and-in put is hedged by going long with put and with 8 puts with different maturities. There are two scenarios that determine the option's payoff:

1. The option price does not hit the barrier before expiration. In this case, the down-and-in put is extinguished and has zero value.

2. The stock price hit the barrier before expiration. Then the down-and-in put has the same value as an ordinary put.

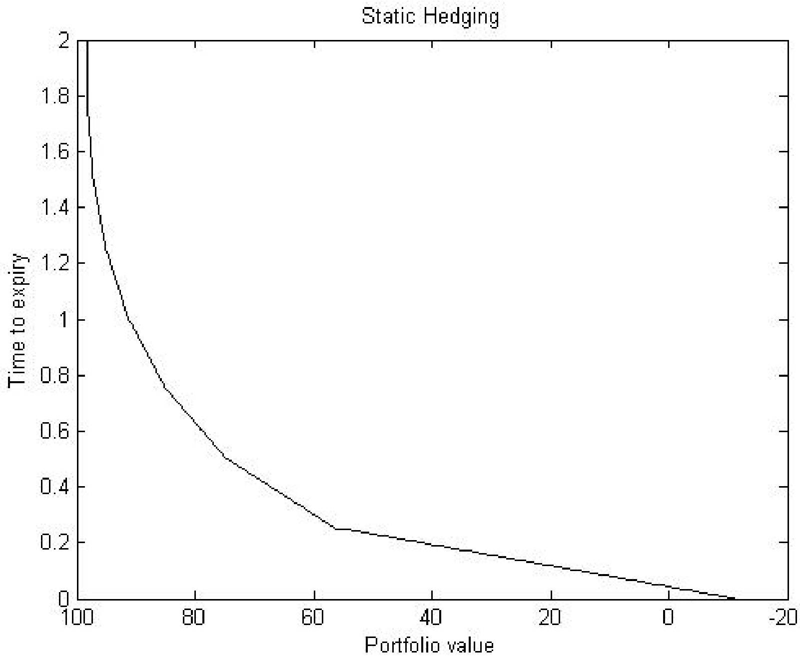


**Figure 3: The hedge of our *Constructpro* put**