Blockchain Project
Autocall Athena in Blockchain

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1. Financial Instrument Category

a. Precise name

1Y Autocall Athena on ETH in EUR
Quarterly observations, protection barrier 70%, coupons barrier and autocall level (early redemption) 100%, coupons level 10%, Nominal 1C000 EUR.

b. Description

Description du Produit

- **Maturity :** 1 year.
- **Observations :** Quarterly.
- **Underlying (UL)** : ETH
- **Conditional coupons** : At every observation date, if the UL performance is greater than the coupons barrier (100%), the product distributes a 10% coupon p.a. (2.5% quarterly).
- **Early redemption mechanism** : During the life of the product, if at an observation date, the level of the UL is greater than 100% of its initial level (Positive perf of the UL), 100% of the capital is automatically reimbursed (Autocall event).

- **Conditional capital protection at maturity**: At maturity, if there was no early redemption :
    - Favorable scenario : If the index performance is greater than the coupons barrier (100%), a coupon is paid and 100% of the nomina is reimbursed.
    - Intermediate scenario : if the index performance is lower than the coupon level (100%) but greater than the capital protection barrier (70%), 100% of the nominal is reimbursed.
    - Unfavorable scenario : if the index performance is lower than the capital protection barrier (70%), the product is reimbursed at its final level : ((P_final-P_initial)/P_initial) * Nominal -> Reimbursed impacted by the negative performance.

Advantages :

- Conditional coupon : 10% p.a. (2.5% quarterly)
- Early redemption mechanism : capital protection until barrier (70% barrier so 30% loss protection).

Drawbacks :

- The capital is not guaranteed at maturity, maturity is uncertain.
- No memory effects on coupons.

c. Legal structure and jurisdiction

EMTN : Euro Medium Term Note
Security token : it is a financial security.

2. Main legal and financial characteristics

a. Legal characteristics

Product terms explanations :

3. **Structured products :** A structured financial product is a product in which financial investments, such as e.g. bonds or shares, are combined with derivatives (most often options) and are securitized into an independent security. The redemption value of a structured product depends on the performance of one or more underlying assets.
4. **Barrier :** The barrier corresponds to the price of the underlying at which the payoff scenario is modified when it is hit. Violation of the barrier leads to a modification of the reimbursement conditions (“payoff”). If the underlying remains above the barrier the investor will obtain a minimum reimbursement (conditional capital protection).
5. **Nominal :** The nominal is the par (denomination) of a structured product. Product reimbursement refers to this value. Regularly the nominal value is equivalent to the issue price.
6. **Option :** An option gives the buyer the right (but not the obligation) to accept a contractual offer for a limited period of time. Underlying, duration and exercise price are stipulated in the contractual offer. We distinguish between Call options (purchase options) and Put options (sell options). By means of a Call option (purchase right),

the buyer counts on rising prices of the underlying. By means of a Put option (right to sell), the buyer bets on falling prices of the underlying. Options are a major component of structured products.

7. **Underlying :** The element at the base of a structured product is called the “Underlying” in English. Depending on the case, these could be stocks, indices, currencies, commodities, interest rates, etc.
8. **«Strike» (exercise price) :** The “Strike” of an option determines at what price an investor is authorized to buy (call option) or sell (put option) the underlying in question. In the case of participation or performance optimization products, the exercise price defines the reference price of the underlying underlying the structured product. Barriers, Bonus-levels or Cap-levels are then derived from the Strike/reference price.
9. **Client / seller** : We will need client data such as name, and in the best scenario, all compliant documents that banks require. It would be the same for banks.

a. Corresponding variables/data

- Barrier : The capital protection barrier (70%, if the UL is greater than 70% of its initial level, 100% of the nominal is reimbursed), coupon and autocall barrier (100%, during the life of the product, at a valuation date, if the UL is greater than 100% of its initial level, the product is reimbursed and coupons paid).
- Option : The Down and In Put, capital protection barrier 70%, put option activated when UL reaches a level below 70% of its initial level.
- Underlying : ETH.
- Client / Bank : Name.

b. Functions chosen to represent the instrument

We wrote a class with several functions so it would be ERC compliant :

- init : where we define the seller and name, associated with a product.
- Mint : Where we define the client, the ID, all the technical characteristics associated with the product life cycle. This function will really create the product and transfer the nominal from the client to the seller. the last_mint date will be the initial date. The function also creates a collection of autocall ids, to which the id is appended.
- hash_name : in order to hash client and seller name.
- get_current_date : in order to get the date everyday, and take the necessary actions if the date is a valuation date (see function event_coupon_autocall)
- get_FRED_series : in order to get the data from FRED by just referring to the ticker.
- balance_of : returns the balance of a given owner.
- owner_of : returns the address of the token’s owner.
- safeTransferFrom : in case the product would be sold from a client to another during its life cycle.

- event_coupon_autocall: represents the payoff of the products and the transfers associated with the dates, as explained in the previous parts. Once the product is terminated, the finished dummy is set to false, and no additional transfers are made.

10. Comments on the relevance

a. Marketplace where the instrument would be exchanged, market size

If this method was adopted by banks, it means no one would have to do this task manually (because it is currently done manually). Thus, the instrument could be adopted by banks, since this is one of the most sold structured products. However, this is not a liquid marker.

b. Your personal opinion on the relevance

This would definitely automate certain procedures which are unfortunately done manually and can often provide uncertainty and conflict since it is not done automatically.

11. References

See our AutoCall class code on the following github repository:
https://github.com/hugo-mi/Autocall_Athena_Smart_Contract/blob/main/ToB23_Autocall_Athena_WilliamArnaud_HugoMichel.ipynb