Structured Products Atlas

Classic building blocks mapped to Greeks & risk premia

Legend (dominant driver) `Delta` `Gamma` `Theta` `Vega` `Rho` `Credit` `Corr` `Div`

Structured notes are typically **Bond + Options** (plus issuer credit). Beyond Greeks, desks monitor **credit spread**, **equity skew**, **dividends**, **correlation** (multi-asset), and **gap / barrier risk**.

Capital Protected	Yield / Income	Autocallables	Exotics / Multi-asset
Capital Protected Note (CPN)	Reverse Convertible	Autocall (Athena style)	Worst-of / Best-of / Basket Note
Participation Note	Discount Certificate / Discount Note	Phoenix Note (conditional coupons)	Barrier Note (KI / KO)
Capped Participation / Call Spread Note	Covered Call Note	Autocallable on Worst-of (multi-asset)	Quanto Note (FX adjustment)
Cliquet / Ratchet Note	Bonus Certificate / Bonus Cap	Callable / Bermudan features (concept)	Asian / Averaging Note
CPPI (dynamic protection)	Range Accrual / Digital Coupon Note		CMS Steepener (rates)
	Variance / Vol-linked Note (concept)		

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1 1. Structured products = bond + options (+ credit)

1.1 1.1 The universal decomposition

> **Definition**
>
> **Desk decomposition.** A classic structured note payoff can often be written as:
>
> $$\text{Note} \approx \underbrace{\text{Zero-coupon bond}}_{\rho \ / \ \text{rates}} + \underbrace{\text{Portfolio of options}}_{\Delta,\Gamma,\Theta,\nu} + \underbrace{\text{Issuer credit adjustment}}_{\text{Credit spread}}.$$

> **Desk intuition**
>
> **Why this matters in interviews / pricing.** If you can decompose a note into vanillas (calls/puts/digitals/barriers), you can: (i) understand the *Greek profile*, (ii) hedge with listed options, and (iii) explain where the margin/coupon comes from (typically: selling convexity or vol).

1.2 1.2 Greeks and extra risk factors

> **Definition**
>
> **Greeks (core).**
>
> $$\Delta = \frac{\partial V}{\partial S}, \quad \Gamma = \frac{\partial^2 V}{\partial S^2}, \quad \Theta = \frac{\partial V}{\partial t}, \quad \nu = \frac{\partial V}{\partial \sigma}, \quad \rho = \frac{\partial V}{\partial r}.$$

> **Desk intuition**
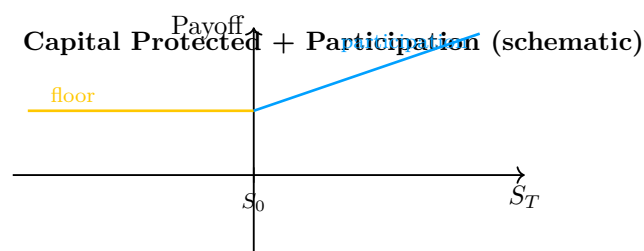>
> **In structured products, Greeks are not enough.**
> - Credit : note valuation depends on issuer curve (especially long maturities).
> - Div : single-name equity notes are very dividend-sensitive (forward level shifts).
> - Corr : basket / worst-of notes embed correlation and tail dependence.
> - Vega : barrier and autocall features are extremely skew-sensitive (downside IV).
> - Gap risk: barriers + discrete observation create jump / gap exposure beyond diffusive Greeks.
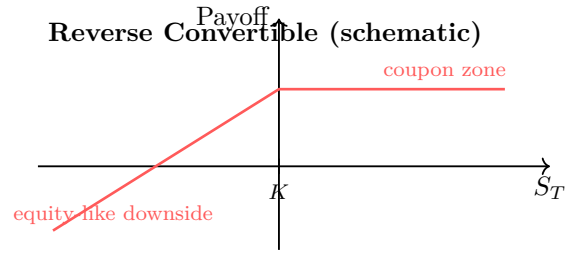
> **Pitfall / risk**
>
> **Never forget: issuer credit risk.** A "capital protected" note protects capital *only if the issuer does not default.*
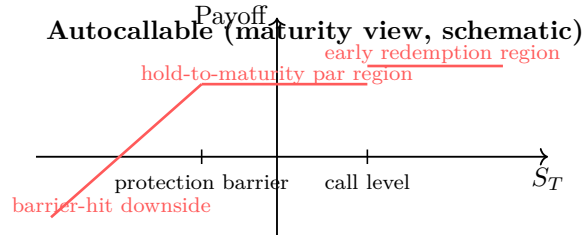
2 2. Payoff intuition (fast schematics)

2.1 2.1 Capital protected participation (floor + upside)

Capital Protected + Participation (schematic)

2.2 2.2 Reverse convertible (coupon + short put flavor)

Reverse Convertible (schematic)

Payoff

coupon zone

K

S_T

equity-like downside

2.3 2.3 Autocall idea (path dependent, schematic at maturity)

Autocallable (maturity view, schematic)

Payoff

early redemption region

hold-to-maturity par region

protection barrier   call level

S_T

barrier-hit downside

3 3. Product catalogue (classic structured notes)

3.1 3.1 Capital protected family

Capital Protected Notes (CPN) & Participation

Capital Protected Note (CPN) — principal protected at maturity   `Primary: Rho`
Typical sensitivities at initiation: `Δ +` `Γ +` `Θ -` `ν +` `ρ +` `Credit`
Economic structure: Buy a zero-coupon bond that grows to 100% at T + use remaining budget to buy calls (or call spread).
Payoff at maturity (schematic): Floor at 100% (issuer-dependent) + upside participation via call(s).
What you are trading (Greeks / risk premia): Mainly `Rho` (bond), plus `Vega` and `Gamma` from the long call.
Key risks / notes: Credit risk of issuer; upside depends on implied vol level; dividends reduce forward (equity); liquidity/fees matter.

Participation Note (uncapped)   `Primary: Delta`
Typical sensitivities at initiation: `Δ +` `Γ +` `Θ -` `ν +` `ρ +` `Credit` `Div`
Economic structure: Bond + long call struck near S_0 (or forward strike).
Payoff at maturity (schematic): At maturity: floor (via bond) + near-linear upside above strike.
What you are trading (Greeks / risk premia): You are *buying* `Vega` and `Gamma`.
Key risks / notes: If IV collapses after issuance, mark-to-market can drop even if spot unchanged. Dividend forecast errors can shift forward and effective participation.

Capped Participation / Call Spread Note   `Primary: Delta`
Typical sensitivities at initiation: `Δ +` `Γ (reduced)` `Θ -` `ν (reduced)` `ρ +` `Credit`
Economic structure: Bond + long call at K_1 and short call at $K_2 > K_1$.
Payoff at maturity (schematic): Upside is capped; cheaper than uncapped participation.
What you are trading (Greeks / risk premia): Delta exposure in a band; Vega/Gamma reduced vs uncapped because of the short call.

Key risks / notes: Cap is the trade-off: in strong rallies you underperform. Short call adds skew exposure and (equity) assignment considerations if physically-settled.

Cliquet / Ratchet Note (equity cliquet) `Primary: Gamma`
Typical sensitivities at initiation: `Δ (varies)` `Γ +` `Θ -` `ν +` `ρ (small)` `Vega` `Credit`
Economic structure: Often replicable as a sum of periodically reset options with caps/floors on each period return.
Payoff at maturity (schematic): Path-dependent: locks in periodic gains; often has local caps and a global floor.
What you are trading (Greeks / risk premia): Long `Gamma` / `Vega` (you benefit from realized vol if structure is long optionality), but details depend on cap/floor.
Key risks / notes: Complexity: realized vol, monitoring dates, and smile dynamics matter. Pricing is model-dependent (local vol / stochastic vol).

CPPI (Constant Proportion Portfolio Insurance) `Primary: Delta`
Typical sensitivities at initiation: `Δ +` `Γ (varies)` `Θ (varies)` `ν (varies)` `ρ +` `Credit` `Vega`
Economic structure: Dynamic allocation between risky asset and cash to maintain a floor; leverage proportional to cushion.
Payoff at maturity (schematic): Not an option payoff: dynamic strategy aiming at capital protection.
What you are trading (Greeks / risk premia): Dominant driver is Delta (allocation), with strong sensitivity to jumps and rebalancing rules.
Key risks / notes: Gap risk can break protection; liquidity constraints, transaction costs, and rebalancing frequency are crucial.

3.2   3.2 Yield enhancement / income notes

Yield / Income (you are usually selling optionality)

Reverse Convertible `Primary: Theta`
Typical sensitivities at initiation: `Δ +` `Γ -` `Θ +` `ν -` `ρ +` `Credit` `Div` `Vega`
Economic structure: Bond + short put (often ATM/OTM) (+ coupon funded by put sale).
Payoff at maturity (schematic): If $S_T \geq K$: redeemed near par + coupons. If $S_T < K$: investor receives shares or suffers equity-linked loss.
What you are trading (Greeks / risk premia): You are selling `Vega` and `Gamma` (short put), harvesting `Theta`.
Key risks / notes: Downside tail risk dominates. Equity skew makes downside IV expensive: coupon largely comes from selling crash protection.

Discount Certificate / Discount Note `Primary: Theta`
Typical sensitivities at initiation: `Δ +` `Γ -` `Θ +` `ν -` `ρ +` `Credit` `Div`
Economic structure: Economically similar to: long underlying exposure + short call (cap) and/or short put depending on exact certificate.
Payoff at maturity (schematic): Buy at a discount, upside capped.
What you are trading (Greeks / risk premia): Carry-oriented: you typically sell some optionality to get the discount (short Vega).
Key risks / notes: Cap risk (miss strong rally). Model: dividend/forward matters a lot for the discount.

Covered Call Note Primary: Theta

Typical sensitivities at initiation: `Δ +` `Γ -` `Θ +` `ν -` `ρ +` `Credit` `Div`

Economic structure: Bond + short call (or long asset + short call via note).

Payoff at maturity (schematic): Upside capped; coupon enhanced.

What you are trading (Greeks / risk premia): You sell upside convexity (short Gamma on rallies) and short Vega; earn Theta.

Key risks / notes: In trending bull markets, underperforms; gap up can produce quick mark-to-market loss on short call.

Bonus Certificate / Bonus Cap Primary: Theta

Typical sensitivities at initiation: `Δ +` `Γ (state-dependent)` `Θ +` `ν (often -)` `ρ +` `Vega` `Credit`

Economic structure: Typical replication intuition: long underlying exposure + short down-and-in put (barrier) + possibly short call for cap.

Payoff at maturity (schematic): If barrier not breached: payoff at least bonus level (and maybe capped). If breached: behaves more like underlying (or discounted).

What you are trading (Greeks / risk premia): Often: you earn carry by being short downside barrier optionality (short Vega near barrier, short Gamma around barrier region).

Key risks / notes: Discrete monitoring + gap risk make hedging hard; barrier probability depends strongly on skew and local vol model.

Range Accrual / Digital Coupon Note Primary: Theta

Typical sensitivities at initiation: `Δ 0` `Γ -` `Θ +` `ν -` `ρ +` `Vega` `Credit`

Economic structure: Coupon accrues when S_t stays within a range (or if S_T is above/below a level). Replicable with digitals / tight spreads.

Payoff at maturity (schematic): Highly non-linear: coupon depends on time spent in region / indicator events.

What you are trading (Greeks / risk premia): Short Gamma around boundaries (range edges); short Vega; earns Theta in calm markets.

Key risks / notes: If spot hugs the boundary, hedging becomes unstable. Discrete observation makes it "jump sensitive".

Variance / Vol-linked Note (concept) Primary: Vega

Typical sensitivities at initiation: `Δ 0` `Γ +` `Θ -` `ν +` `ρ (small)` `Vega` `Credit`

Economic structure: Notes linked to realized variance (or implied variance) via swaps/option replication.

Payoff at maturity (schematic): Payoff tied to realized variance level.

What you are trading (Greeks / risk premia): Pure vol exposure: long or short Vega depending on structure.

Key risks / notes: Path dependence (realized variance), jumps, and volatility-of-vol dominate.

3.3 3.3 Autocallables (the classic flow product)

Autocallables (Athena / Phoenix family)

Autocall (Athena style: unconditional or simple coupons) Primary: Theta

Typical sensitivities at initiation: `Δ +` `Γ -` `Θ +` `ν -` `ρ +` `Credit` `Vega` `Div`

Economic structure: Bond + short option package with early redemption (knock-out) features; coupon funded by selling optionality.

Payoff at maturity (schematic): If underlying above call level on an observation date: early redeem at par + coupon. Else continues.

What you are trading (Greeks / risk premia): Structurally short Vega and short Gamma: coupons are funded by selling convexity/vol + path dependence.

Key risks / notes: Model risk: local vol vs stochastic vol changes call probabilities; discrete observation makes hedging jumpy. Dividend curve matters.

Phoenix Note (conditional coupons + protection barrier, often worst-of)

Primary: Theta

Typical sensitivities at initiation: Δ (tilted) | Γ - | Θ + | ν - | ρ + | Credit | Corr | Vega

Economic structure: Autocall + conditional coupons (paid if underlying above a coupon barrier) + capital protection barrier (often KI).

Payoff at maturity (schematic): If barriers respected: coupons paid and possibly early redemption. If protection barrier breached: downside participation at maturity (often worst-of).

What you are trading (Greeks / risk premia): You are selling downside skew and correlation (worst-of); dominant drivers are short Vega, short Gamma, long Theta.

Key risks / notes: Worst-of makes correlation/tail dependence crucial. Stress in crises: correlation goes to 1, skew steepens, and gap risk hits barriers.

Autocallable on Worst-of Basket

Primary: Corr

Typical sensitivities at initiation: Δ (complex) | Γ - | Θ + | ν - | ρ + | Corr | Vega | Credit

Economic structure: Same autocall logic but referencing worst performer of a basket.

Payoff at maturity (schematic): Maturity payoff depends on worst-of; early redemption depends on basket condition (varies).

What you are trading (Greeks / risk premia): Short correlation is typically embedded (cheap to issuer when correlation is high in stress).

Key risks / notes: Hedging requires basket greeks + correlation/dispersion hedges; worst-of is tail-heavy and very skew-sensitive.

Callable / Bermudan feature (concept)

Primary: Vega

Typical sensitivities at initiation: Δ (varies) | Γ (varies) | Θ (varies) | ν (varies) | ρ + | Vega | Credit

Economic structure: Issuer has call rights at multiple dates; economically a Bermudan option on the note value.

Payoff at maturity (schematic): Payoff depends on optimal exercise policy of issuer.

What you are trading (Greeks / risk premia): Strong model dependence: exercise boundary + vol term structure.

Key risks / notes: Callable features can flip carry profile; always ask: who holds the option to call? issuer or investor.

3.4 3.4 Exotics / Multi-asset / FX / Rates

Exotics and cross-asset classics

Barrier Note (KI / KO, down-and-in / down-and-out)

Primary: Vega

Typical sensitivities at initiation: Δ (state) | Γ (state) | Θ (state) | ν (very sensitive) | ρ + | Vega | Credit

Economic structure: Vanilla options replaced by barrier options (discrete monitoring in practice).

Payoff at maturity (schematic): If barrier hit/not hit: payoff switches regime (knock-in/out).

What you are trading (Greeks / risk premia): Barriers are extremely skew- and local-vol-sensitive; hedging near barrier is hard (Gamma spikes).

Key risks / notes: Gap risk: a jump can cross barrier without trading through it. Observation schedule matters.

Worst-of / Best-of / Basket Note `Primary: Corr`

Typical sensitivities at initiation: Δ (complex) Γ (complex) Θ (often +) ν (complex) ρ + Corr Vega Credit

Economic structure: Payoff depends on min/max or weighted basket; common in retail structured products.

Payoff at maturity (schematic): Worst-of concentrates downside on weakest asset; best-of concentrates upside.

What you are trading (Greeks / risk premia): Correlation and tail dependence dominate.

Key risks / notes: Dispersion/correlation hedges are needed; crises change correlation regime abruptly.

Quanto Note (FX-adjusted payoff) `Primary: Div`

Typical sensitivities at initiation: Δ + Γ + Θ (varies) ν + ρ + Div Credit

Economic structure: Payoff linked to foreign underlying but settled in domestic currency at fixed FX (quanto).

Payoff at maturity (schematic): Investor gets foreign performance without FX exposure (apparently).

What you are trading (Greeks / risk premia): Actually embeds an adjustment depending on FX vol and correlation between underlying and FX.

Key risks / notes: Key risks: FX vol, equity–FX correlation, and dividend/forward consistency.

Asian / Averaging Note `Primary: Gamma`

Typical sensitivities at initiation: Δ (smoother) Γ (reduced) Θ (varies) ν (reduced) ρ + Vega Credit

Economic structure: Options written on an average price (arithmetic/geometric).

Payoff at maturity (schematic): Payoff depends on average level, smoother than vanilla.

What you are trading (Greeks / risk premia): Averaging reduces Gamma/Vega vs vanilla, but introduces path dependence.

Key risks / notes: Pricing/hedging can use approximations; monitoring schedule matters.

CMS Steepener (rates structured note) `Primary: Rho`

Typical sensitivities at initiation: Δ 0 Γ 0 Θ (carry) ν (depends) ρ + Rho Credit

Economic structure: Coupon linked to CMS spread / curve slope (e.g., $a \times (CMS_{10} - CMS_2)$ with caps/floors).

Payoff at maturity (schematic): Payoff depends on interest-rate curve evolution (and convexity adjustments).

What you are trading (Greeks / risk premia): Dominant sensitivities: rates level, curve, convexity (model).

Key risks / notes: Often includes callable/KO features; rate vol and correlation across tenors matter.

4 4. Master checklist (what drives the coupon?)

> **Desk intuition**
>
> **Rule of thumb.** In classic retail structured products, the coupon is typically funded by:
> - selling $\boxed{\text{Vega}}$ (especially downside skew),
> - selling $\boxed{\text{Gamma}}$ (convexity, barrier proximity, range boundaries),
> - embedding $\boxed{\text{Credit}}$ and fees,
> - and in baskets: selling $\boxed{\text{Corr}}$.
>
> If a note looks "too good", ask: *which risk is being sold?* and *what happens in a gap?*

> **Pitfall / risk**
>
> **Interview-grade risk sentence (use it).** "An autocallable / phoenix is typically long carry but structurally short convexity and short downside skew; its valuation is highly sensitive to the volatility surface, discrete barrier monitoring, correlation (worst-of), dividends, and issuer credit spread."

5 Appendix A. Quick mapping table (dominant driver)

Product	Dominant driver	Typical "sold" risk to fund coupon
Capital Protected Note	$\boxed{\text{Rho}}$	none (coupon low), but $\boxed{\text{Credit}}$ matters
Participation Note	$\boxed{\text{Delta}}$ / $\boxed{\text{Vega}}$	long optionality (investor pays via reduced participation)
Call Spread Note	$\boxed{\text{Delta}}$	upside cap (sell call)
Reverse Convertible	$\boxed{\text{Theta}}$	short put: $\boxed{\text{Gamma}}$ + $\boxed{\text{Vega}}$ (downside skew)
Discount / Covered Call Note	$\boxed{\text{Theta}}$	short call (capped upside)
Bonus Certificate	$\boxed{\text{Theta}}$	short barrier downside optionality (gap/skew)
Range Accrual / Digital	$\boxed{\text{Theta}}$	short gamma around boundaries + short vega
Autocall (Athena)	$\boxed{\text{Theta}}$	short vega/gamma + path dependence
Phoenix (worst-of)	$\boxed{\text{Theta}}$ + $\boxed{\text{Corr}}$	short downside skew + short correlation
Barrier note	$\boxed{\text{Vega}}$	skew + gap / monitoring risk
Worst-of basket	$\boxed{\text{Corr}}$	tail dependence / correlation regime
Quanto	$\boxed{\text{Div}}$	FX vol + equity–FX correlation
CMS Steepener	$\boxed{\text{Rho}}$	curve convexity / rate vol

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