

# **A poor man's approach to valuing prepayment option in a fixed rate mortgage**

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Disclaimer: no part of the presentation should be associated with the official view of the NBP

- Fixed rate mortgages contain prepayment optionality
- Prepayment option of Bermudan type
- Pricing the prepayment option requires a valuation model and a calibration universe
- But how to price prepayment option if we have nothing to calibrate? How do we know our pricing model prices the early exercise feature fairly?

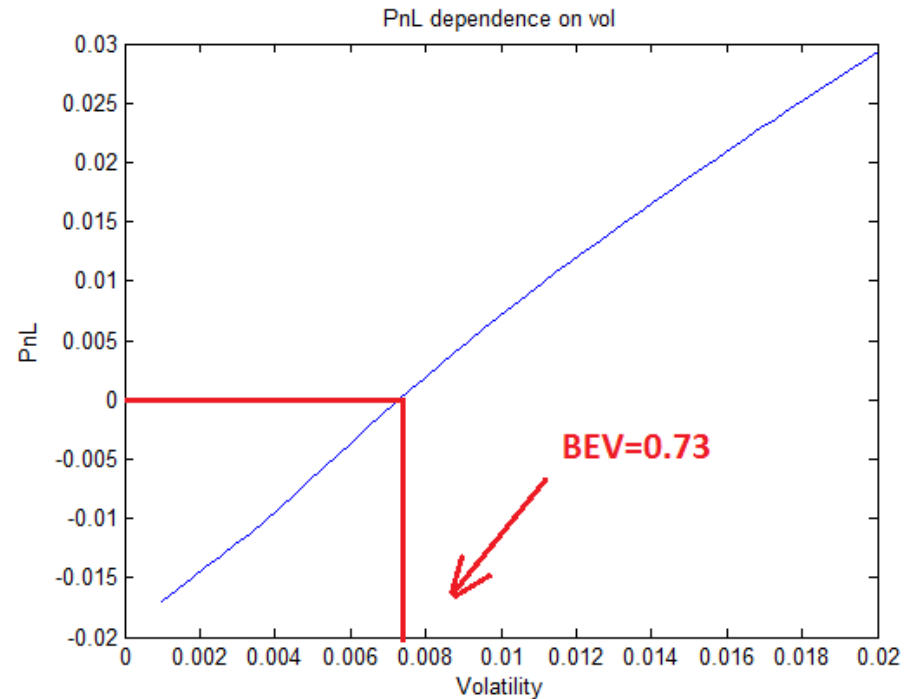
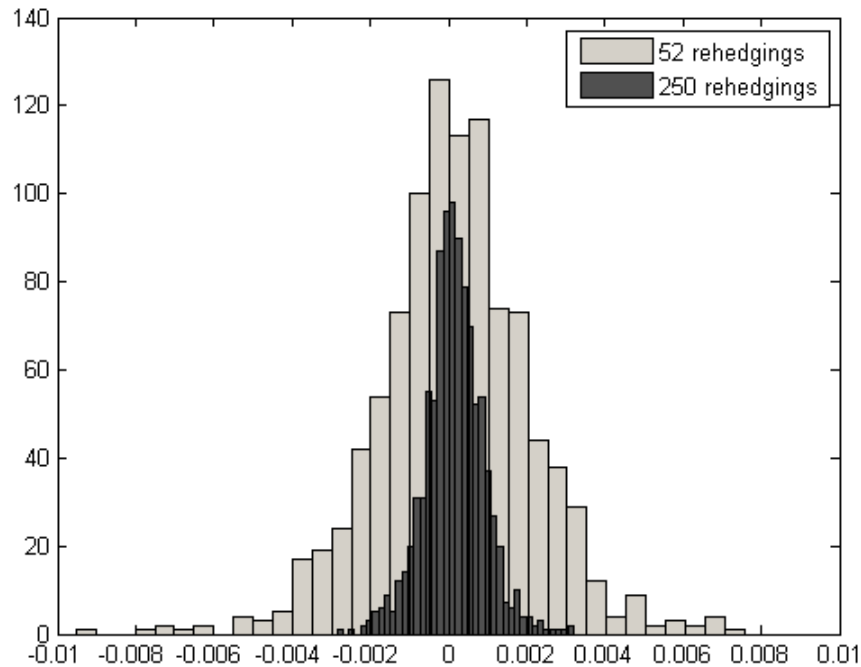
**No liquid swaption market in Poland** – nothing to calibrate pre-payment model to

PLN SwPTN NVOL ATM 1Y5Y		92) Order Book	91) RFS	97) Settings ▾	All Quotes		
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PCS	Firm Name	CCP	Bid	Ask	BSz(MM)	ASz(MM)	Time
ICPL	ICAP PLC	OTC	/	89.0000		x	07:00
SMKO	TP SM+ Vol	OTC	76.7000	76.7000		x	01:39
CMPN	Composite(NY)	OTC	100.0000	100.0000		x	05/29
LAST	Last Update	OTC	100.0000	100.0000		x	05/29

Not knowing where the market *is* we can try to assess where it *should be*.

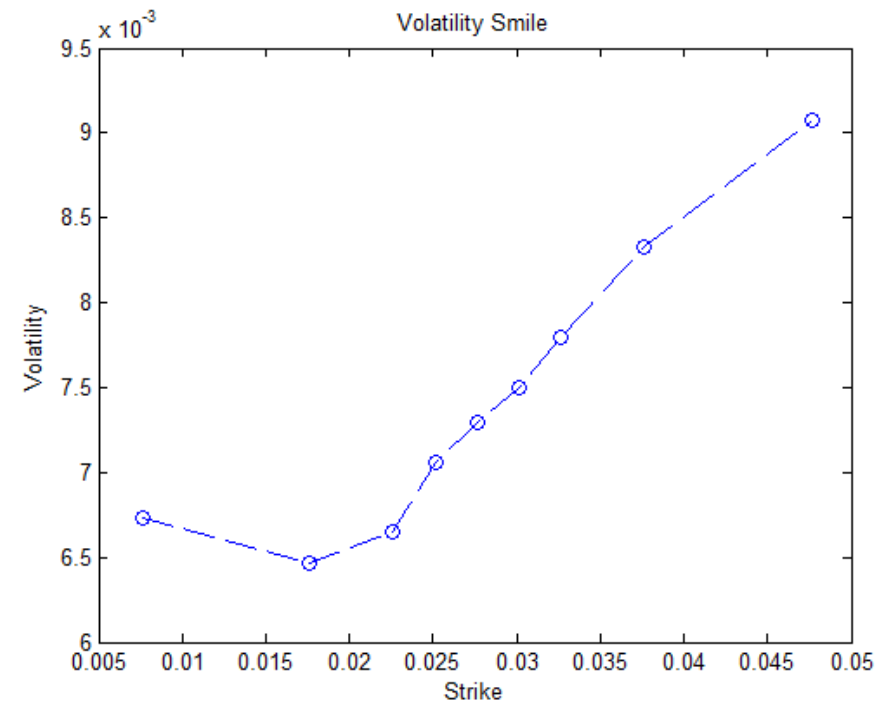
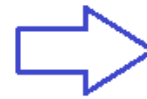
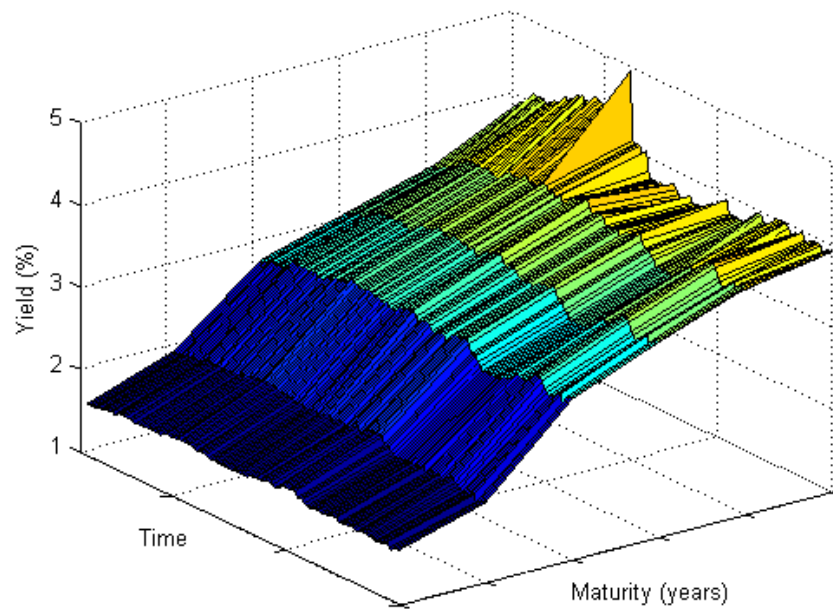
# Swaption delta hedging

Delta-hedging transforms an initial premium into a final payoff

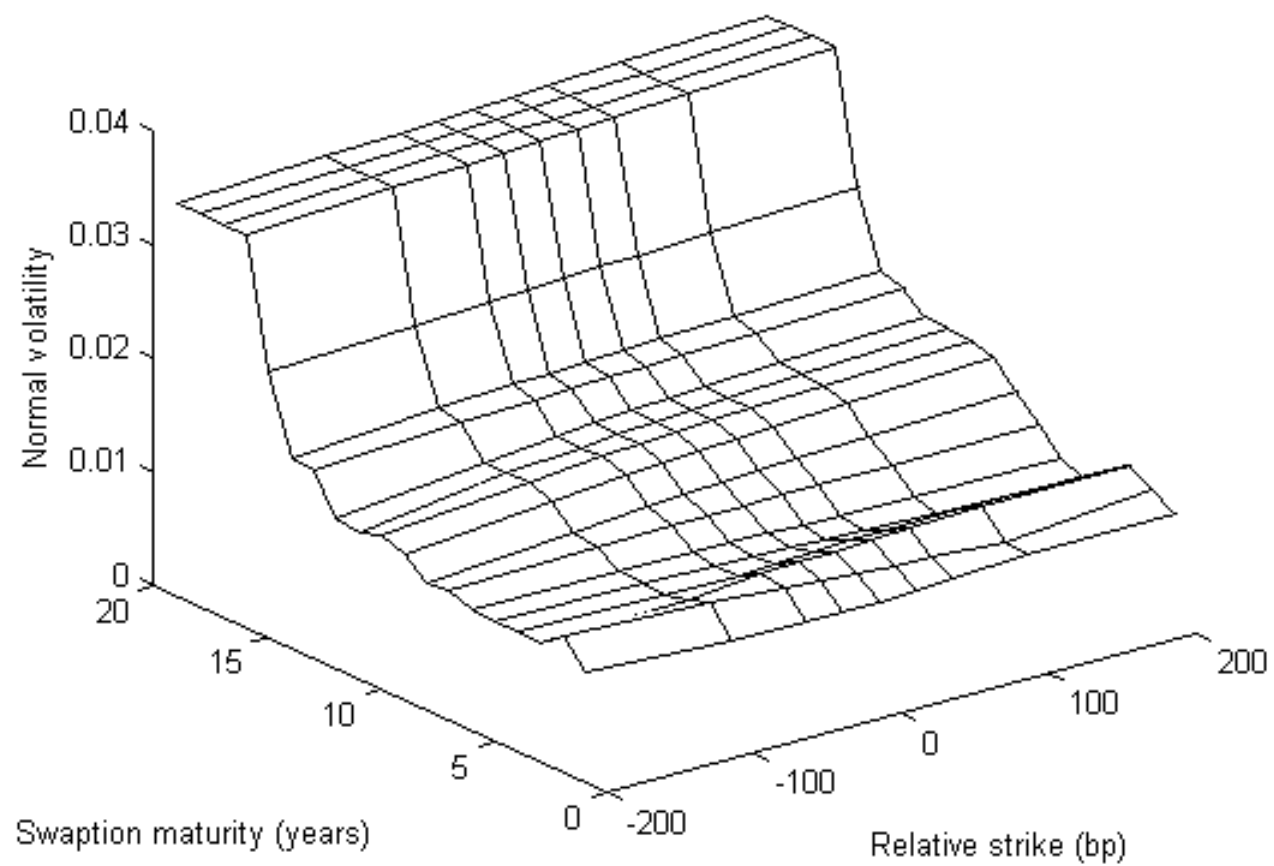


Selling a swaption for a premium and delta-hedging produces a P&L that depends on  $\sigma$ . The volatility that cancels this P&L is called the **break-even vol.**

**Yield curve history gives entire volatility skew as desired**

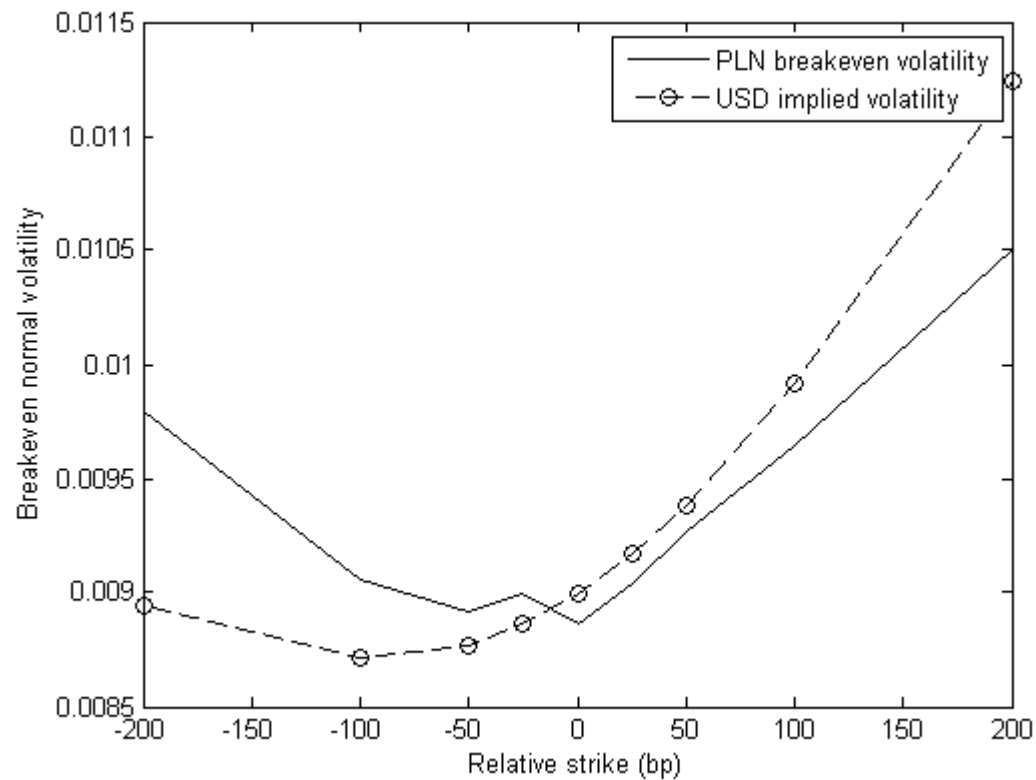


## Estimated breakeven volatility surface



## Estimated volatility levels look sensible

Against the US levels...



As well as PLN ATM levels from ICAP (within ~10-30 bp from mkt)

## The simulated costs of a fixed rate mortgage

(interest rate curve data for the Polish and USD market as of 30 December 2016)

	Swap rate	Credit spread	FRM (no prep.)	Prep. spread	FRM	Prep. option price (share of notional)
Poland (BEV)	3.60%	2.80%	6.40%	<b>1.84%</b>	<b>8.24%</b>	<b>62.19%</b>
USA	2.66%	1.00%	3.66%	1.38%	5.04%	46.84%