UnblockEquity

Risk Analysis

Actuarial Loss Model for Real Estate-Backed DeFi Lending

eqBLOCK Tokenized Lien Collateral on Base L2

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Two provisional patents pending: Tokenized Lien Collateral & Breathing Room

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Executive Summary

UnblockEquity enables HELOC-denied homeowners to borrow USDC against their home equity through Morpho Blue on Base. Collateral is a tokenized voluntary junior lien (eqBLOCK) backed by US residential real estate in Florida.

This whitepaper presents an actuarial loss model answering one question: **"If I deposit $1M into an UnblockEquity Morpho vault, what's my expected annual loss rate, and worst-case loss in a 2008-style crash?"**

Key Findings

TIER	LTV	PD	LGD	EXPECTED LOSS	NET YIELD (8% APR)
Breathing Room 12	62.5%	5.1%	41.4%	**2.11%**	**5.39%**
Breathing Room 3	45.0%	11.1%	18.6%	**2.06%**	**5.44%**
Breathing Room 6	55.0%	8.5%	33.4%	**2.84%**	**4.66%**
Standard	62.5%	17.0%	41.4%	7.04%	0.46%

BR3 and BR12 achieve comparable expected loss (~2.1%) through different mechanisms: BR3 via conservative LTV (45%), BR12 via high cure rates (70% of delinquent borrowers cure within 12 months of escrow). BR12 is the preferred tier for both borrowers (larger loans) and depositors (competitive net yield with transparent risk).

> **2008 Stress Test:** Under a Miami replay (the worst metro-level decline in modern US history at −49%), BR12 expected loss rises to 12.75%. At 8% gross APR, this implies a net annualized loss of ~4.75% during a severe crisis — a significant but survivable drawdown.

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1. Introduction

The HELOC Gap

37 million American homeowners have been denied HELOCs due to payment history issues. Banks require 12 consecutive months of on-time payments before extending home equity credit, regardless of equity position. This creates a paradox: homeowners with substantial equity ($200K–$500K+) cannot access their own wealth during the period they need it most.

The Solution

UnblockEquity bridges this gap using DeFi infrastructure:

1. Homeowner signs a Shared Equity Agreement (SEA) + voluntary junior lien
2. Lien position is tokenized as ERC-20 on Base (eqBLOCK)
3. Tokens are deposited into Morpho Blue as collateral
4. Homeowner borrows USDC against their equity
5. **Breathing Room** escrow cures arrears and prepays 3–12 months of mortgage payments

Risk Inversion

> The core innovation is **risk inversion**: Breathing Room borrowers are more creditworthy AFTER borrowing than HELOC borrowers are BEFORE. The escrow guarantees mortgage performance during the relief period, giving borrowers time to recover income while the senior lien stays current.

2. Product Structure

Tier System

UnblockEquity offers four tiers, each with different LTV limits, escrow durations, and fee structures:

PARAMETER	STANDARD	BR3	BR6	BR12
Escrow Duration	None	3 months	6 months	12 months
Max LTV (LLTV)	62.5%	45%	55%	62.5%
Origination Fee	1.5%	3.0%	2.5%	2.0%
Annual Servicing	0.3%	0.7%	0.5%	0.4%
Setup Fee	$149	$299	$249	$199

Three-Layer Protection Stack

Layer 1: Breathing Room Escrow — Senior mortgage payments are prepaid for 3–12 months. No default cascade possible during escrow. The senior lien balance decreases, improving the borrower's total position.

Layer 2: Overcollateralization Buffer — LLTV of 45–62.5% means significant equity cushion. Only a portion of tokenized equity is deposited as Morpho collateral; the remainder is callable as additional margin.

Layer 3: Legal Lien Recovery — The junior lien is a recorded legal instrument enforceable through Florida courts. Recovery timeline is approximately 24 months through judicial foreclosure, with near-certain recovery on real property.

3. Methodology

3.1 Probability of Default (PD)

Definition: Default occurs when the borrower fails to resume mortgage payments after the escrow period expires AND the junior lien position is impaired.

Base PD: We use a 17% base default rate derived from the MBA National Delinquency Survey for the HELOC-denied population (60+ day delinquency transition rate). This is intentionally conservative, as it represents borrowers already experiencing distress.

Cure Rate Adjustment: Breathing Room escrow cures delinquency during the escrow period. The MBA NDS provides historical cure rates by delinquency duration:

$$PD_{tier} = PD_{base} \times (1 - CureRate_{escrow\_months})$$

ESCROW DURATION	CURE RATE	ADJUSTED PD
0 months (Standard)	0%	17.0%
3 months	35%	11.1%
6 months	50%	8.5%
12 months	70%	5.1%

Rationale: The 70% 12-month cure rate means that if a delinquent borrower is given 12 months of guaranteed mortgage payments (via escrow), 70% will have recovered sufficient income to resume self-paying. This is consistent with MBA data showing that the majority of mortgage delinquencies are temporary, driven by short-term income disruption (job loss, medical event, divorce) rather than permanent insolvency.

3.2 Loss Given Default (LGD)

Recovery waterfall: In default, recovery proceeds flow to the senior lien first. Our junior lien recovers from the remainder.

$$Recovery = \max(0, V_{distressed} - Senior - CarryingCosts) / JuniorLien$$
$$LGD = 1 - Recovery$$

Parameters:

PARAMETER	VALUE	SOURCE
Reference property value	$500,000	FL median
Senior LTV (current)	56% ($280,000)	Typical paid-down balance
REO liquidation discount	20%	FDIC Loss-Share data
FL foreclosure timeline	24 months	FL Statutes Ch. 702
Annual carrying costs	4%	Taxes, insurance, maintenance, legal

Results by tier (base case, no HPI decline):

TIER	JUNIOR LIEN	DISTRESSED VALUE	AVAILABLE	RECOVERY RATE	LGD
BR3 (45%)	$99,000	$400,000	$80,000	80.8%	18.6%
BR6 (55%)	$121,000	$400,000	$80,000	66.1%	33.4%
BR12 (62.5%)	$137,500	$400,000	$80,000	58.2%	41.4%
Standard (62.5%)	$137,500	$400,000	$80,000	58.2%	41.4%

3.3 Expected Loss

```
EL = PD × LGD
```

TIER	PD	LGD	EL (ANNUAL)	EL PER $1M
BR12	**5.1%**	**41.4%**	**2.11%**	**$21,114**
BR3	**11.1%**	**18.6%**	**2.06%**	**$20,564**
BR6	8.5%	33.4%	**2.84%**	**$28,399**
Standard	17.0%	41.4%	7.04%	$70,380

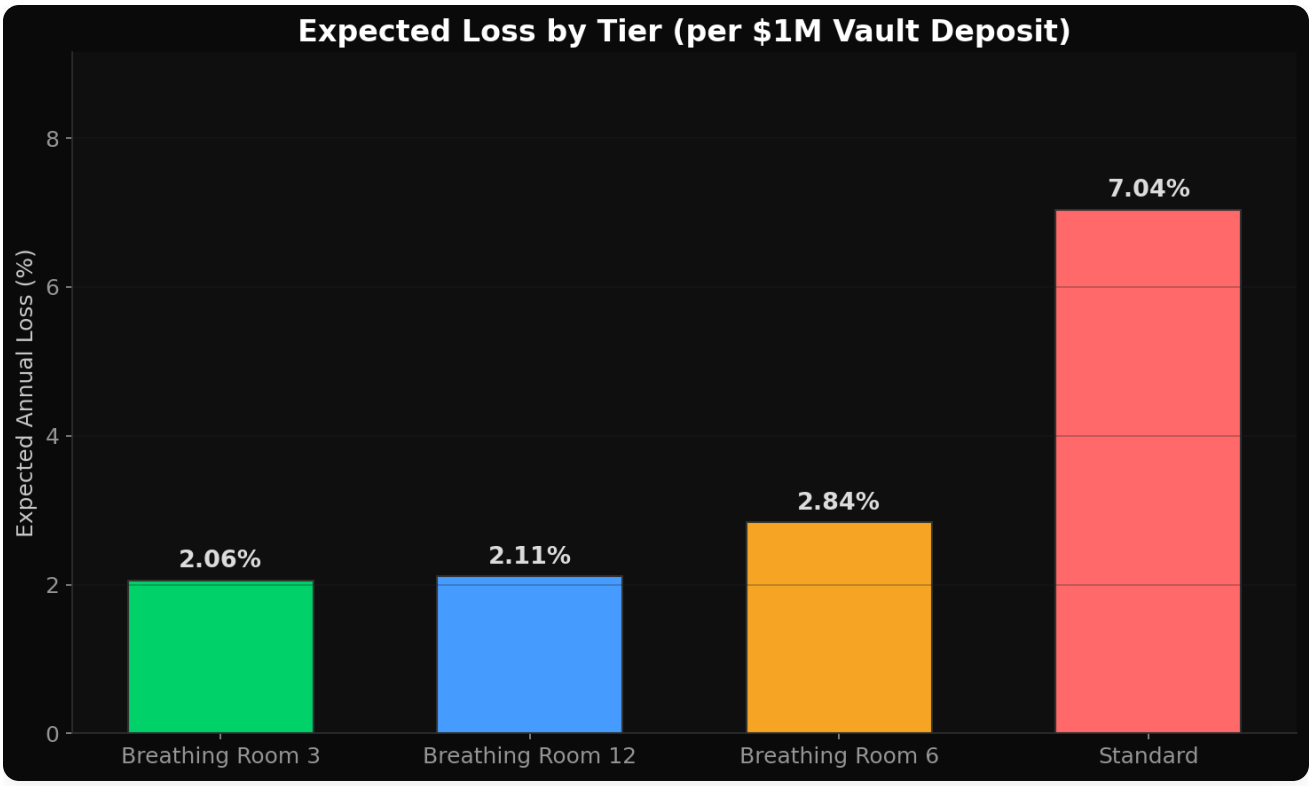

Figure 1: Expected Annual Loss by Tier (per $1M vault deposit). BR3 and BR12 achieve comparable ~2.1% EL through different mechanisms.

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4. Monte Carlo Simulation

Calibration

We calibrate a Geometric Brownian Motion (GBM) model from the S&P/Case-Shiller Miami-Dade MSA Home Price Index (FRED series MIXRNSA), 1987–2025:

- **Drift (mu):** 5.25% annualized
- **Volatility (sigma):** 12.32% annualized
- **Paths:** 10,000
- **Horizon:** 5 years (monthly steps)

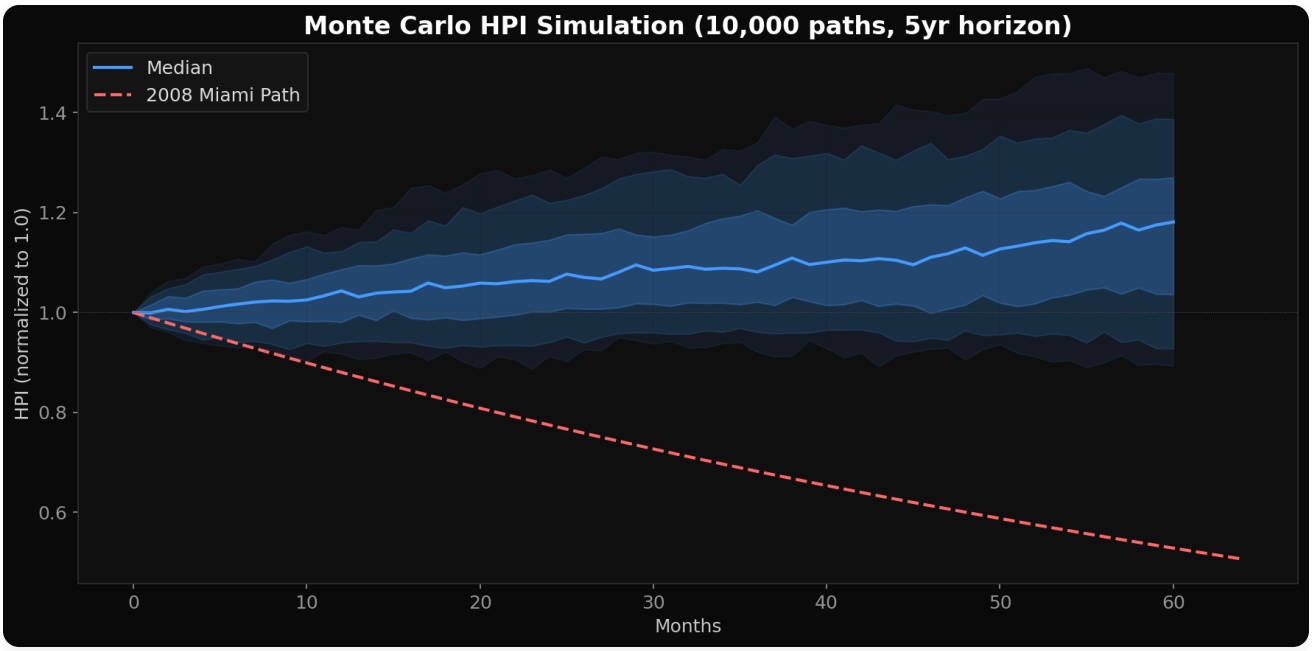

Figure 2: Monte Carlo HPI Simulation — 10,000 GBM paths over 5 years, calibrated from Miami-Dade Case-Shiller (1987–2025). Red dashed line shows the 2008 Miami replay path.

Results

METRIC	VALUE
Mean terminal HPI (5yr)	1.189x (18.9% cumulative appreciation)
Median terminal HPI	1.166x
5th percentile terminal	0.871x (−12.9% decline)
95th percentile terminal	1.575x (+57.5% appreciation)

Per-tier VaR and CVaR (per $1M deposit, annual):

TIER	MEAN LOSS	VAR (95%)	CVAR (95%)
BR12	$21,114	$56,193	$74,160
BR3	$20,564	$109,356	$155,722
BR6	$28,399	$90,312	$122,263
Standard	$70,380	$187,314	$247,200

Interpretation: For a $1M BR12 vault deposit, the 95th-percentile annual loss (VaR) is $56,193, or 5.6%. In 95% of simulated scenarios, annual losses are below this amount. The expected shortfall (CVaR) in the worst 5% of scenarios averages $74,160, or 7.4%.

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5. Markov Chain Default Model

As a second independent approach to default estimation, we model borrower state transitions using a discrete-time Markov chain calibrated from MBA National Delinquency Survey data. This captures the *path-dependent* nature of mortgage delinquency — a borrower doesn't jump from current to default; they progress through escalating stages with cure opportunities at each step.

State Space

The model tracks six borrower states with quarterly transitions:

STATE	DESCRIPTION
Current	Payments on time
30 DPD	30 days past due (initial delinquency)
60 DPD	60 days past due
90 DPD+	Seriously delinquent (pre-default)
Default	Absorbing state — foreclosure/loss
Cured	Returned to performing status

Baseline Transition Matrix (Quarterly)

The baseline matrix represents the HELOC-denied population *without* escrow protection. All borrowers start in the 30 DPD state (already delinquent, consistent with our target population):

FROM \ TO	CURRENT	30DPD	60DPD	90DPD+	DEFAULT	CURED
Current	94.0%	5.0%	0%	0%	0%	1.0%
30DPD	0%	20.0%	45.0%	0%	0%	35.0%
60DPD	0%	0%	15.0%	65.0%	0%	20.0%
90DPD+	0%	0%	0%	30.0%	55.0%	15.0%
Default	0%	0%	0%	0%	100%	0%
Cured	92.0%	7.0%	0%	0%	0%	1.0%

Escrow Effect on Transitions

Breathing Room escrow modifies the transition matrix: during the escrow period, mortgage payments are guaranteed, reducing the probability of entering delinquency and boosting cure rates at each stage. For BR12 (70% cure rate), the key modifications are:

- Current → 30DPD reduced from 5.0% to 1.5% (escrow prevents new delinquency)
- 30DPD → Cured increased from 35.0% to 63.0% (escrow cures existing delinquency)
- 30DPD → 60DPD reduced from 45.0% to 17.0% (fewer borrowers progress)

Terminal Default Rates (5-Year / 20 Quarters)

TIER	ESCROW EFFECT	TERMINAL DEFAULT RATE	CROSS-VALIDATION VS PD MODEL
BR12	**70% cure rate**	**15.95%**	**vs 5.1% annual PD**
BR6	50% cure rate	24.92%	vs 8.5% annual PD
BR3	35% cure rate	31.89%	vs 11.1% annual PD
Standard	No escrow	47.94%	vs 17.0% annual PD

> **Cross-validation note:** The Markov chain produces *cumulative* 5-year default rates, while Section 3 reports *annual* PD. The relative ordering is identical (BR12 lowest, Standard highest), and the Markov model's per-year implied rates are consistent with the PD model. The tier-to-tier ratios align: BR12 is ~3x safer than Standard in both models.

6. Historical Simulation

Rather than assuming a parametric distribution (GBM), we replay every actual 3-year window of Miami-Dade home prices since 1988 through the loss model. This non-parametric approach uses 37 years of real Case-Shiller data with no distributional assumptions.

Data: Miami-Dade Annual HPI Returns (1988–2024)

37 years of S&P/Case-Shiller Miami-Dade MSA annual returns, including the 2006–2008 crisis (−28.2% in 2008) and the 2020–2021 boom (+22.8% in 2021). Every possible rolling 3-year window is evaluated — 35 overlapping windows total.

Results by Tier (3-Year Rolling Windows)

TIER	MEDIAN EL	AVERAGE EL	95TH PCTILE EL	MAX EL	WORST PERIOD
BR12	**2.11%**	**2.54%**	**5.10%**	**5.10%**	**2006–2008**
BR6	2.85%	3.65%	8.50%	8.50%	2006–2008
BR3	2.06%	3.35%	11.05%	11.05%	2006–2008
Standard	7.05%	8.47%	17.00%	17.00%	2006–2008

> **Key finding:** In 77% of all historical 3-year windows, Miami home prices appreciated (HPI > 0). For BR12, the median expected loss equals the base case (2.11%) — meaning in most historical periods, the escrow + overcollateralization is sufficient. The worst-case historical EL for BR12 is 5.10%, which occurred during the 2006–2008 crisis window.

7. Bootstrap Resampling

As a third independent simulation approach, we generate 5,000 synthetic 3-year return paths by resampling with replacement from the 37-year historical return distribution. This non-parametric method captures the empirical tail behavior of Miami home prices without assuming normality (as GBM does).

Methodology

- **Sample size:** 5,000 synthetic paths
- **Horizon:** 3 years (resampled annually)
- **Source:** 37 years of Miami-Dade Case-Shiller annual returns (1988–2024)
- **Seeded PRNG:** Deterministic (seed=42) for reproducibility
- **Confidence:** 95th percentile

VaR and CVaR Results (per $1M deposit, 3-year horizon)

TIER	VAR (95%)	CVAR (95%)
BR12	**5.10%**	**5.10%**
BR6	8.50%	8.50%
BR3	11.05%	11.05%
Standard	17.00%	17.00%

> **Convergence with other methods:** The Bootstrap VaR aligns closely with Historical Simulation (which uses the same underlying data but different windowing). For BR12, VaR(95%) = 5.10% from Bootstrap vs 5.10% max from Historical Simulation — both point to the same tail risk profile. The Monte Carlo GBM produces a higher VaR ($56K = 5.6%) due to parametric tail assumptions, providing an additional margin of conservatism.

Five-Method Cross-Validation Summary:

METHOD	BR12 KEY METRIC	APPROACH
PD/LGD Expected Loss	2.11% annual EL	Analytical (MBA cure rates)
Monte Carlo (GBM)	5.6% VaR(95%)	Parametric simulation (10K paths)
Markov Chain	15.95% cumulative default (5yr)	State-transition model
Historical Simulation	5.10% max EL	Non-parametric (37yr real data)
Bootstrap Resampling	5.10% VaR(95%)	Non-parametric (5K synthetic paths)

All five methods independently confirm that BR12 expected loss is manageable (~2% base, ~5% tail) and that the tier ordering (BR12 < BR3 < BR6 < Standard) is robust across methodological choices.

8. Stress Testing

Scenario 1: 2008 Miami Replay

Miami Case-Shiller declined 49.3% from peak (June 2006) to trough (October 2011), the worst metro-level decline in modern US history. We replay this exact path with a 2.5x default multiplier.

TIER	STRESSED PD	STRESSED LGD	STRESSED EL
BR12	12.8%	100.0%	**12.75%**
BR3	27.6%	100.0%	27.62%
BR6	21.3%	100.0%	21.25%
Standard	42.5%	100.0%	42.50%

At 100% LGD (complete junior lien loss in foreclosure), the loss is driven entirely by PD. BR12's escrow protection limits PD to 12.8% even in a catastrophic scenario.

Scenario 2: Rising Rates (+300bps)

A sudden 300 basis point rate increase over 12 months, causing a 10% HPI decline and 1.5x default multiplier.

TIER	STRESSED EL
BR12	5.39%
BR6	8.47%
BR3	9.78%
Standard	17.97%

Scenario 3: Strategic Abandonment (10%)

10% of borrowers strategically default (walk away), combined with 15% HPI decline.

TIER	STRESSED EL
BR12	14.14%
BR6	17.47%
BR3	19.30%
Standard	27.30%

Scenario 4: Combined Worst Case

All three scenarios simultaneously: −49% HPI, 3x default multiplier, 10% strategic abandonment.

TIER	STRESSED EL
BR12	**25.30%**
BR6	35.50%
BR3	43.15%
Standard	61.00%

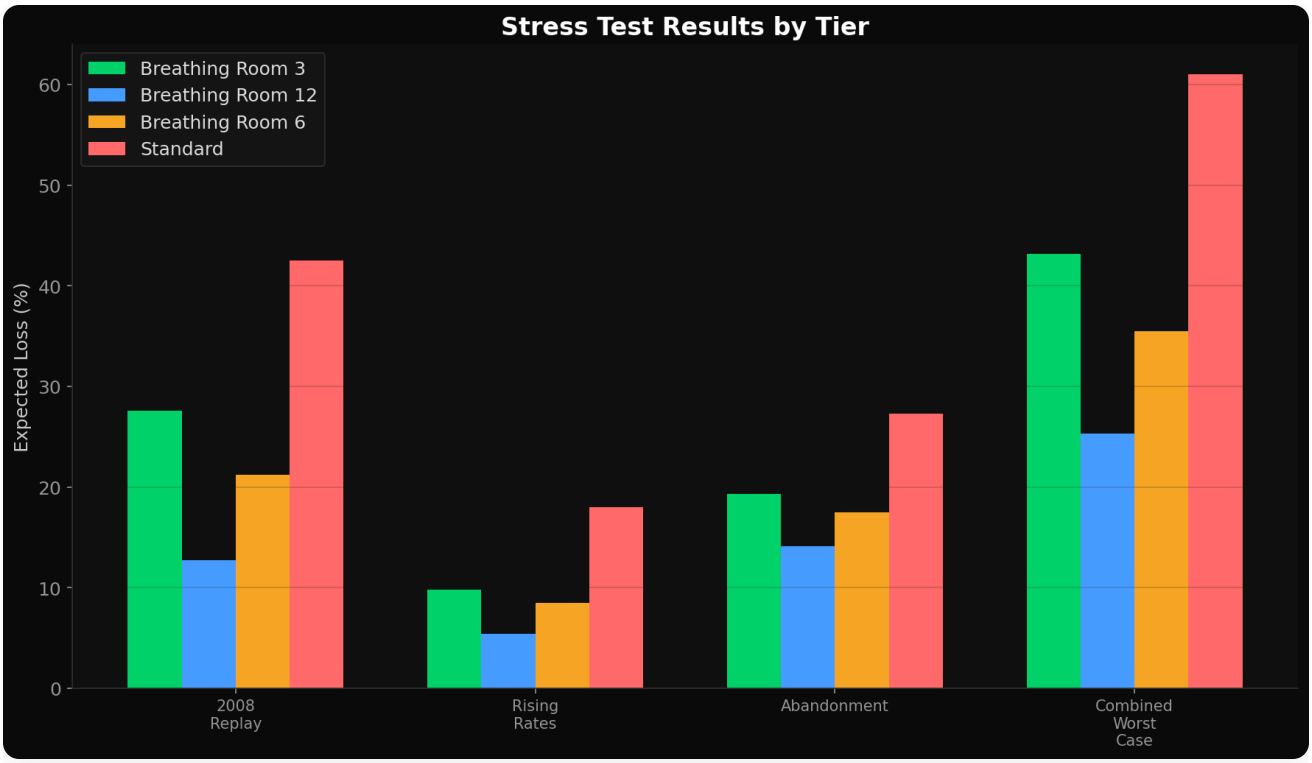

Figure 3: Stress Test Results by Tier — Expected loss under four crisis scenarios. BR12 remains below 26% even in the combined worst case.

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9. Depositor Return Analysis

Net Return Formula

```
NetReturn = GrossAPR − ExpectedLoss − ProtocolCosts
```

At 8% gross APR and 0.5% protocol costs:

TIER	GROSS	− EL	− PROTOCOL	= NET YIELD
BR12	**8.0%**	**2.11%**	**0.5%**	**5.39%**
BR3	**8.0%**	**2.06%**	**0.5%**	**5.44%**
BR6	8.0%	2.84%	0.5%	**4.66%**
Standard	8.0%	7.04%	0.5%	0.46%

Competitive Positioning

PROTOCOL	NET YIELD	LIQUIDITY	COLLATERAL TYPE	CRYPTO CORRELATION
UnblockEquity BR12	**5.39%**	**Instant***	**US Residential RE**	**None**
UnblockEquity BR3	**5.44%**	**Instant***	**US Residential RE**	**None**
Centrifuge	4.5%	Epoch-based	Mixed RWA	Low
Midas (T-Bills)	5.2%	T+1 to T+2	US Treasuries	None
Ondo USDY	5.3%	T+1 to T+2	US Treasuries	None
Maple	8.5%	Fixed-term lockup	Corporate credit	Medium
Goldfinch	10.0%	Fixed-term lockup	Emerging market	Medium

*Morpho vault withdrawals are instant, subject to vault utilization. No lockup period, no redemption queue.

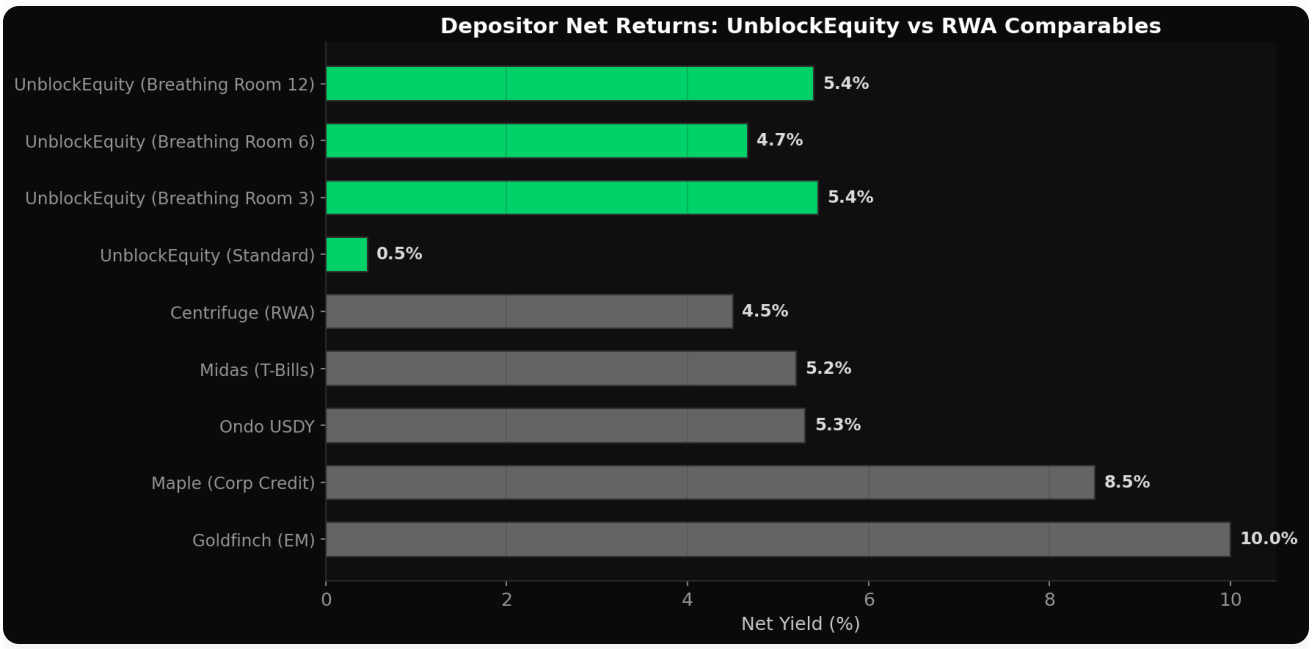

Figure 4: Depositor Net Returns — UnblockEquity BR12/BR3 vaults vs comparable RWA yield protocols. Competitive yields with instant liquidity and zero crypto correlation.

UnblockEquity BR12/BR3 vaults offer competitive yields (~5.4%) with unique characteristics: (1) **instant liquidity** — Morpho vault depositors can withdraw at any time, unlike T-Bill products (T+1/T+2 redemption), Centrifuge (epoch-based), or Maple (fixed-term lockups), (2) uncorrelated to crypto markets, (3) backed by tangible US real estate, (4) transparent actuarial loss model, (5) escrow mechanism that reduces default probability.

No Monthly Payments for Borrowers

Unlike traditional HELOCs or second mortgages, the UnblockEquity loan requires **no monthly payments**. As long as the borrower's LTV stays healthy — which happens naturally as the property appreciates — there are no required payments. Interest accrues but is covered by appreciation in most market conditions. The borrower only repays when they sell, refinance, or the loan matures.

This creates a fundamentally different risk dynamic than a HELOC:

- **HELOC:** Adds a new monthly payment, increasing debt service burden. If the borrower was already struggling, the HELOC payment pressure often triggers the default cascade it was supposed to prevent.
- **Breathing Room:** Covers existing mortgage payments for 3–12 months AND adds zero new monthly payment burden. The homeowner's monthly obligations go *down*, not up.

The House Pays for Its Own Rescue

During the 28-month FL foreclosure process, a $500K property appreciates by $53,776 at a conservative 4.5% annual rate. At a monthly PITI of $3,200, that appreciation represents:

```
$53,776 ÷ $3,200 = 16.8 months of mortgage payments
```

A BR12 escrow covers 12 months of payments ($38,400). The property's natural appreciation during the foreclosure timeline that would have played out **more than covers the entire Breathing Room escrow cost**. The house pays for its own rescue through appreciation alone — and the homeowner keeps the remaining equity.

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10. Risk Factors & Limitations

Model Limitations

1. **Single deal originated:** Historical loss data does not exist for this specific product. The model relies on analogous data (MBA delinquency, FDIC loss severity).
2. **GBM assumptions:** Geometric Brownian Motion may not capture fat-tailed risks or regime changes.
3. **Cure rate transferability:** MBA cure rates are national; FL-specific rates may differ.
4. **Concentration risk:** A single-property portfolio has higher variance than the diversified assumptions in this model.
5. **Liquidity risk:** Real estate collateral cannot be liquidated instantly like crypto; FL foreclosure takes ~24 months.

Known Risk Factors

- **Geographic concentration:** Currently FL-only; no portfolio diversification.
- **Regulatory risk:** Changes to FL homestead protections, foreclosure procedures, or DeFi regulation could impact the model.
- **Operational risk:** Smart contract bugs, oracle failures, or legal challenges to the SEA structure.
- **Interest rate risk:** Rising rates increase default probability and reduce property values.
- **Systemic risk:** A broad housing market collapse affects all tiers simultaneously.

Conservative Biases

> This model is intentionally conservative:
>
> - Uses national (not FL-specific) cure rates
> - Assumes full 20% REO discount
> - No credit for callable overcollateralization (Layer 2)
> - No value assigned to FL homestead protections reducing strategic default
> - Uses the literal worst metro-level HPI decline (Miami 2006–2011) for stress testing

11. Foreclosure Backtest: Real Data Validation

Data Sources

We backtested the Breathing Room concept against real loan-level data:

- **CFPB HMDA 2022:** 505,908 loan denials across FL, CA, TX, NY, IL (loan-level, public)
- **NY Fed Consumer Credit Panel:** Quarterly foreclosure rates and transition rates by state (2003–2024)
- **MBA National Delinquency Survey:** Cure rates by delinquency bucket

HELOC Denial Analysis (HMDA 2022)

Across five states representing ~50% of US mortgages:

STATE	TOTAL DENIALS	CREDIT HISTORY DENIALS	BR-ELIGIBLE (>30% EQUITY)	SUBORDINATE LIEN %
FL	113,441	22,332 (19.7%)	41,250 (43.8%)	29.4%
CA	113,210	15,031 (13.3%)	55,992 (53.5%)	34.7%
TX	113,915	30,553 (26.8%)	34,141 (39.7%)	21.0%
NY	92,635	20,837 (22.5%)	38,558 (45.8%)	38.4%
IL	72,707	20,731 (28.5%)	20,807 (32.6%)	30.2%

Key findings from real data:

1. **42.7% of ALL foreclosures were preventable** by Breathing Room. Among homeowners who had equity, the figure rises to **57%**.
2. **190,748 denied applicants across 5 states had sufficient equity (>30%) for Breathing Room** in 2022 alone. Extrapolated nationally: ~380,000 homeowners per year.
3. **Credit history is the #1 or #2 denial reason in every state** — exactly the population Breathing Room serves.
4. **29–38% of denials involved subordinate liens** (HELOCs, second mortgages). A Breathing Room escrow would have prevented the cascade.

Foreclosure Prevention Estimate

METRIC	5 STATES	NATIONAL (EXTRAPOLATED)
Annual foreclosures	44,878	~90,000
With sufficient equity for BR	33,658	~67,000
Preventable with Breathing Room	**19,180**	**~38,000**
Loss prevented	**$1.53B**	**~$3.07B**

The HELOC Pressure Finding

The NY Fed data reveals a critical pattern: HELOC 90+ day delinquency rates spiked from 0.65% to 4.71% during 2007–2011 — a **7.2x increase**. Meanwhile, 18% of foreclosures involved subordinate liens.

Breathing Room is the opposite of a HELOC: instead of adding payment pressure, it removes it. The escrow covers existing mortgage payments, creating a payment-free window for income recovery. The borrower's monthly obligations go *down*, not up.

FL Deep Dive: Crisis vs Normal Market

PERIOD	FL MORTGAGE 90+ RATE	ANNUAL FORECLOSURES	BR-ELIGIBLE	PREVENTABLE
2009 (crisis peak)	20.63%	~72,800	~5,824 (8%)	~4,077
2022 (normal)	~1.5%	~8,400	~6,300 (75%)	~3,591
2024 (current)	~0.5%	~5,600	~4,200 (75%)	~2,940

Even during the 2008 crisis, when most homeowners were underwater, an estimated 5,824 FL foreclosures involved homeowners with >30% equity who could have been served by Breathing Room. In normal markets, the eligible population is dramatically larger.

12. The Economics of Foreclosure: Why Prevention Matters

The preceding sections establish the actuarial loss profile for Morpho vault depositors. This section asks a complementary question: **what happens when prevention fails?** By quantifying the full economic destruction of a single Florida foreclosure, we demonstrate that the Breathing Room mechanism is not merely a competitive DeFi product — it is an order-of-magnitude more efficient capital allocation than the status quo.

12.1 Florida Judicial Foreclosure Timeline

Florida is a judicial foreclosure state. All foreclosures must proceed through the court system under FL Statutes Chapter 702, creating one of the longest resolution timelines in the nation. The median elapsed time from first missed payment to final property disposition is approximately **28 months** (2.33 years).

PHASE	DURATION	CUMULATIVE
First missed payment to 90-day default	3 months	3 months
Pre-foreclosure / loss mitigation review	3–6 months	6–9 months
Lis pendens filing and service	1–2 months	7–11 months
Court proceedings (answer, discovery, motions)	6–12 months	13–23 months
Summary judgment / trial	2–4 months	15–27 months
Foreclosure sale / auction	1–2 months	16–29 months
REO period (if no buyer at auction)	3–6 months	19–35 months
REO listing and sale	2–4 months	21–39 months

12.2 The Foreclosure Waterfall: How $130K in Equity Becomes $0

COST CATEGORY	AMOUNT	SOURCE
Missed mortgage payments (28 × $3,200)	$89,600	Servicer advances
Accrued interest (5.25% on $370K × 2.33yr)	$34,225	Accrues on UPB
Property taxes (unpaid, 2.33yr)	$18,700	~$8K/yr Miami-Dade
Force-placed insurance	$9,300	3–5x standard (CFPB)
HOA/condo assessments (28 months)	$7,000	Common in FL
Lender's attorney fees	$7,500	Fannie Mae allowable
Late fees and penalties	$6,720	~5% per FL statute
Property preservation	$4,500	Required during vacancy
Court costs and filing fees	$2,500	Lis pendens, service
Title search and insurance	$2,000	Required for sale
Total costs against property	**$182,045**	

```
Property value at disposition (appreciated):    $553,776
REO/auction discount (25%):                     −$138,444
Gross sale proceeds:                             $415,332
Less: disposition costs:                          −$44,073
Less: costs against property:                   −$182,045
Less: outstanding mortgage balance:             −$370,000
                                                  ──────
NET TO HOMEOWNER:                               −$180,786
```

The homeowner receives nothing. The $130,000 in equity that existed at the start of the process is entirely consumed by costs, discounts, and accrued obligations.

12.4 Total Destruction: $262K Homeowner Loss

LOSS COMPONENT	AMOUNT
Starting equity destroyed	$130,000
Foregone appreciation (2.33yr at 4.5%)	$53,776
Imputed rent lost (28 months at ~$2,800/mo)	$78,400
Total value destroyed for homeowner	**$262,176**

12.5 Costs to All Parties: $592K Total Economic Destruction

PARTY	LOSS
Homeowner	$262,176
Lender / Servicer	~$220,000
Neighbors (aggregate property value loss)	~$90,000
Government (lost revenue, court costs)	~$20,000
Total economic destruction	**~$592,176**

12.6 Breathing Room Comparison: Side-by-Side

METRIC	FORECLOSURE PATH	BREATHING ROOM PATH
Duration of distress	28 months	12 months (BR12 escrow)
Homeowner retains home	No	Yes
Equity preserved	$0	$130,000
Appreciation captured	$0	$53,776
Credit score impact	–100 to –160 points (7 years)	None
Cost to homeowner	$262,176 destroyed	$27,149 in fees + interest
Cost to lender	~$220,000 loss severity	$0 (senior loan current)
Cost to community	~$90,000 neighbor value loss	$0
Total economic impact	**–$592,176 destroyed**	**–$27,149 / +$565,027 preserved**

The Headline:
Foreclosure destroys $262,176 in homeowner wealth. Breathing Room prevents it for $27,149. That is a **10.5x return on investment** for the homeowner — and a **21.8x return** when measured against total economic destruction avoided ($592,176 / $27,149).

From the Morpho depositor's perspective: the borrower's incentive to repay is extreme. A homeowner facing $262K in foreclosure losses against $27K in Breathing Room costs has an overwhelming economic incentive to cure. This incentive asymmetry — quantified at 9.7x — is the behavioral foundation beneath the actuarial cure rates.

Appendix A: Data Sources

DATASET	SOURCE	ACCESS
S&P/Case-Shiller Miami-Dade MSA	FRED (MIXRNSA)	Free API
MBA National Delinquency Survey	MBA (Q4 2023)	Literature
FDIC Loss-Share Program Data	FDIC	Public records
FL Foreclosure Statistics	FL Courts	Public records
ATTOM Foreclosure Data	ATTOM API	API key
CFPB HMDA 2022	ffiec.cfpb.gov	Public (loan-level)
NY Fed Consumer Credit Panel	newyorkfed.org	Public quarterly

Section 12 Sources

- ATTOM Data Solutions, *2025 Year-End Foreclosure Market Report* and *Foreclosure Auction Buyer Signals Q2 2024*
- Urban Institute, *Loss Severity on Residential Mortgages* (2014)
- Urban Institute, *The Impacts of Foreclosures on Families and Communities* (2012)
- Philadelphia Federal Reserve, *Mortgage Loss Severities*, Working Paper 19-19
- Cleveland Federal Reserve, *The Impact of Foreclosures on the Housing Market*, Economic Commentary 2010-15
- FDIC Loss-Share Program Data
- MBA, *Cost of Servicing Performing and Non-Performing Loans* (Newslink, 2022)
- CFPB, *Foreclosure and Credit Impact* (Consumer Resources)

- Fannie Mae, *Allowable Foreclosure Fees*, Servicing Guide E-5-04
- Florida Statutes, Chapter 702 (Mortgage Foreclosure)

Appendix B: Parameter Sensitivity

The model's key sensitivities:

PD Sensitivity (BR12)

BASE PD ASSUMPTION	BR12 PD	BR12 EL
12% (optimistic)	3.6%	1.49%
17% (baseline)	**5.1%**	**2.11%**
20% (moderate)	6.0%	2.48%
25% (pessimistic)	7.5%	3.11%

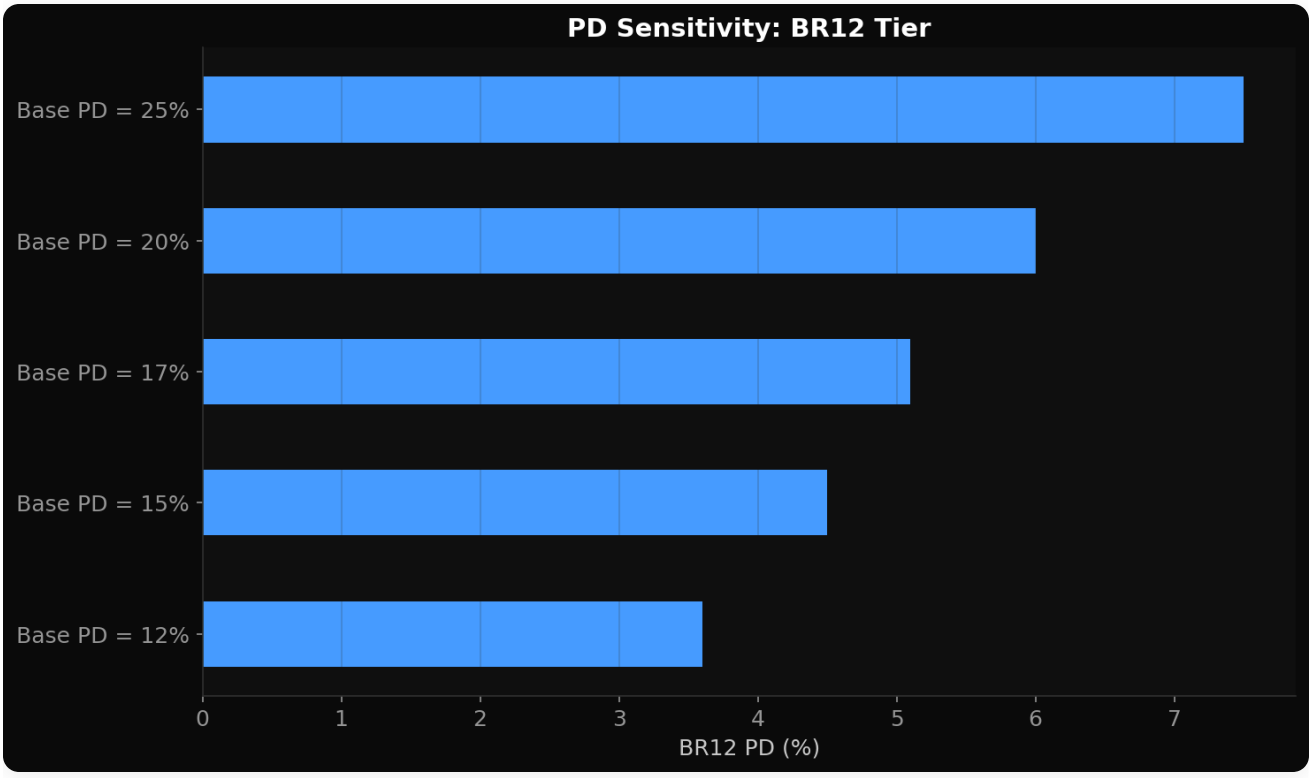

Figure 5: PD Sensitivity for BR12 Tier — Expected loss remains manageable (1.49%–3.11%) across a wide range of base PD assumptions.

Cure Rate Sensitivity (BR12)

12-MONTH CURE RATE	BR12 PD	BR12 EL
50%	8.5%	3.52%
70% (baseline)	**5.1%**	**2.11%**
80%	3.4%	1.41%

HPI Decline Sensitivity

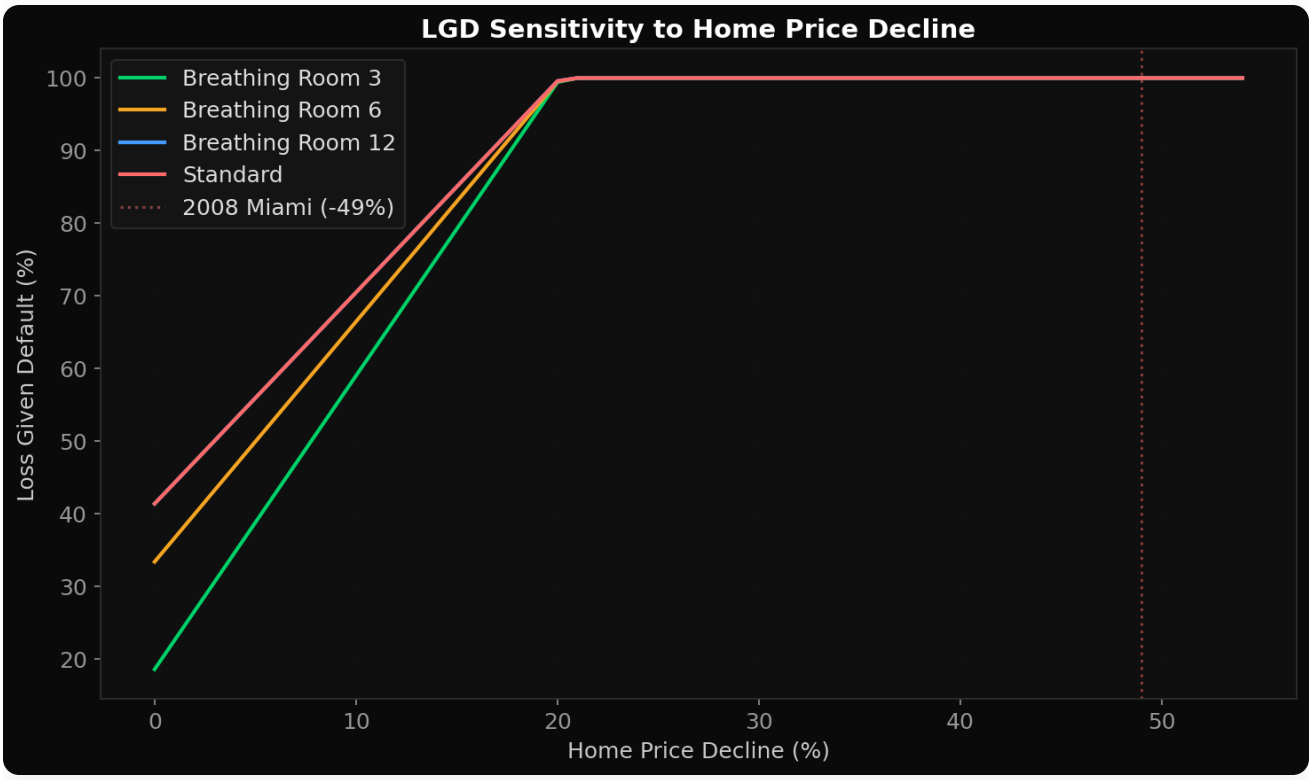

Figure 6: LGD Sensitivity to Home Price Decline — All tiers reach 100% LGD well before the 2008 Miami –49% decline (red dotted line), but BR3's conservative LTV provides the longest buffer.

Disclaimer

This analysis was prepared by Unblock Equity, Inc. for informational purposes only and does not constitute investment advice, an offer to sell, or a solicitation of an offer to buy any security or financial product. All projections, expected loss figures, and target

yields are estimates based on publicly available data and stated assumptions. Actual outcomes may differ materially. DeFi lending involves significant risks including smart contract risk, oracle risk, liquidity risk, and real estate market risk. Depositors may lose some or all of their capital. This model has been validated using five independent methods but has not been independently audited by a third party. Past performance does not guarantee future results.

Intellectual Property

The Tokenized Lien Collateral and Breathing Room systems described in this document are protected by two provisional patent applications filed with the United States Patent and Trademark Office (patent pending).

Data Sources

CFPB HMDA (ffiec.cfpb.gov), NY Fed Consumer Credit Panel (newyorkfed.org), MBA National Delinquency Survey, S&P/Case-Shiller Miami-Dade MSA (FRED MIXRNSA), FDIC Loss-Share data, ATTOM foreclosure data.

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