Pachira Fund

Can Money Grow on Trees?

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Outline

Introduction

Objectives

Define our problem

- Stagnant Pool Problem
- Implicitly addressed by Uniswap v3

Present our Solution

- Liquidity Trees
- Simulation Results

Objective Question Revisted

- Can Money Grow on Trees?

What are we Solving?

Stagnant Pool Problem

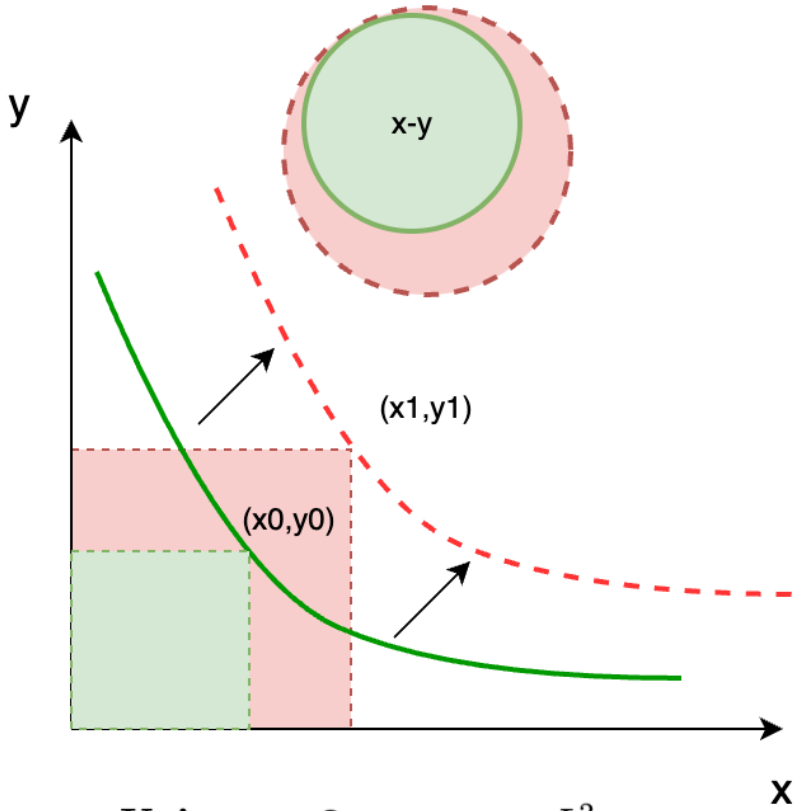
Lay Definition:

- How do we increase ΔV on stagnated liquidity in pool over some time interval t?

Uniswap v3 has implicitly addressed this problem:

- Increasing the depth of order book (virtually)
- Makes large trades more efficient
- Hence increasing the *possibility* of more ΔV
- However, does nothing to induce more trading volume

UNISWAP V3



Uniswap v2: $x_0 * y_0 = L_0^2$
Uniswap v3: $x_1 * x_1 = L_1^2$

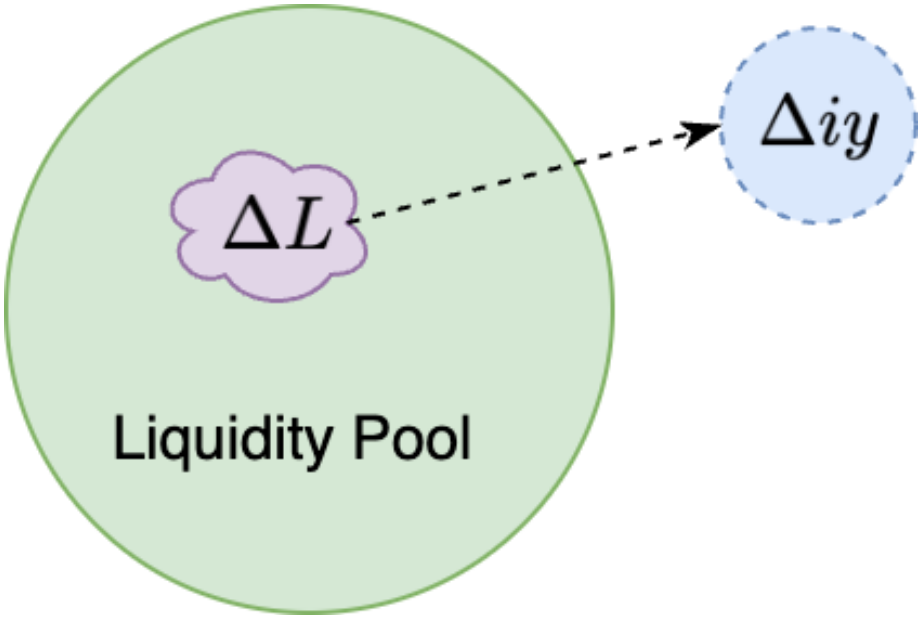
$$L_1 > L_0$$

Figure 1: Graphical illustration on how depth is virtually increased using Uniswap v3

Indexing Problem: Posed

CPT Indexing Problem

- Given a position ΔL, what is the indexed value in only one of the two pairing assets (x,y)



Indexing Problem: Solution

This system describes the mathematical operations that are effectively being done in the contract code when performing an *efficient* two-step withdrawal (ie, withdrawal both assets + swap one for the remaining) operation:

$$\Delta x = \frac{\Delta L x}{L} \tag{1}$$

$$\Delta y = \frac{\Delta L y}{L} \tag{2}$$

$$\Delta iy = \Delta y + \frac{\gamma \Delta x (y - \Delta y)}{(x - \Delta x) + \gamma \Delta x} \tag{3}$$

LET'S INCLUDE A NEW DIMENSION ...

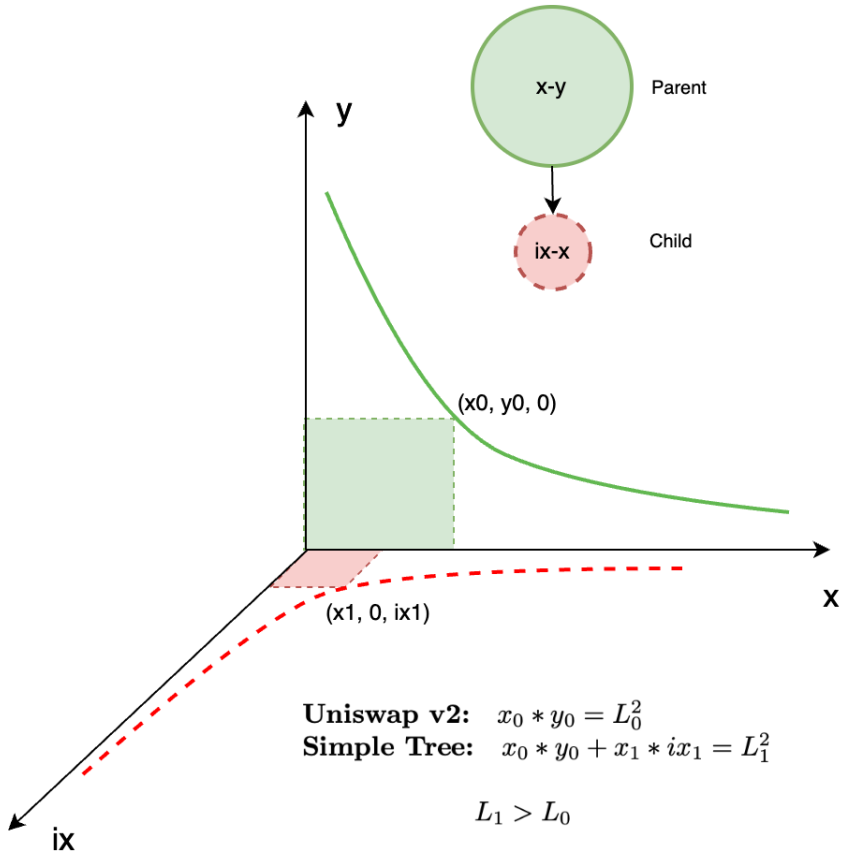


Figure 2: Include a new dimension (ix); liquidity ΔL gets indexed to Δix, and new market is formed on ix-x plane

How does this Work?

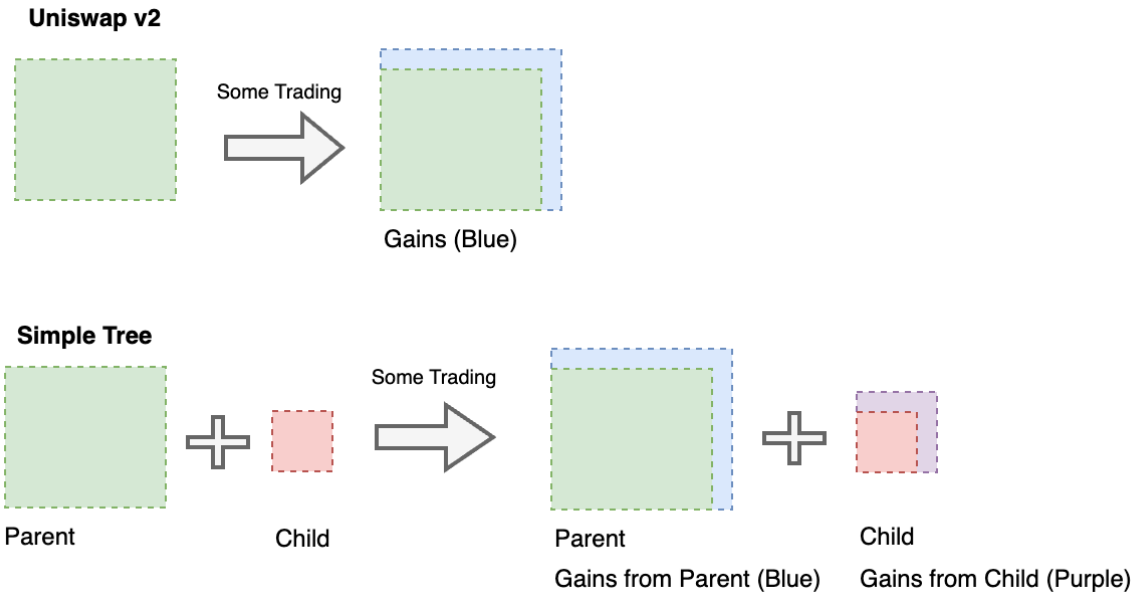


Figure 3: Boxes represent liquidity under CPT curve; creating a new market out of indexed liquidity indexed liquidity is a way to address the stagnant pool problem; in short we've leveraged some of the green, got red and made some extra purple

Liquidity Trees

Full Tree

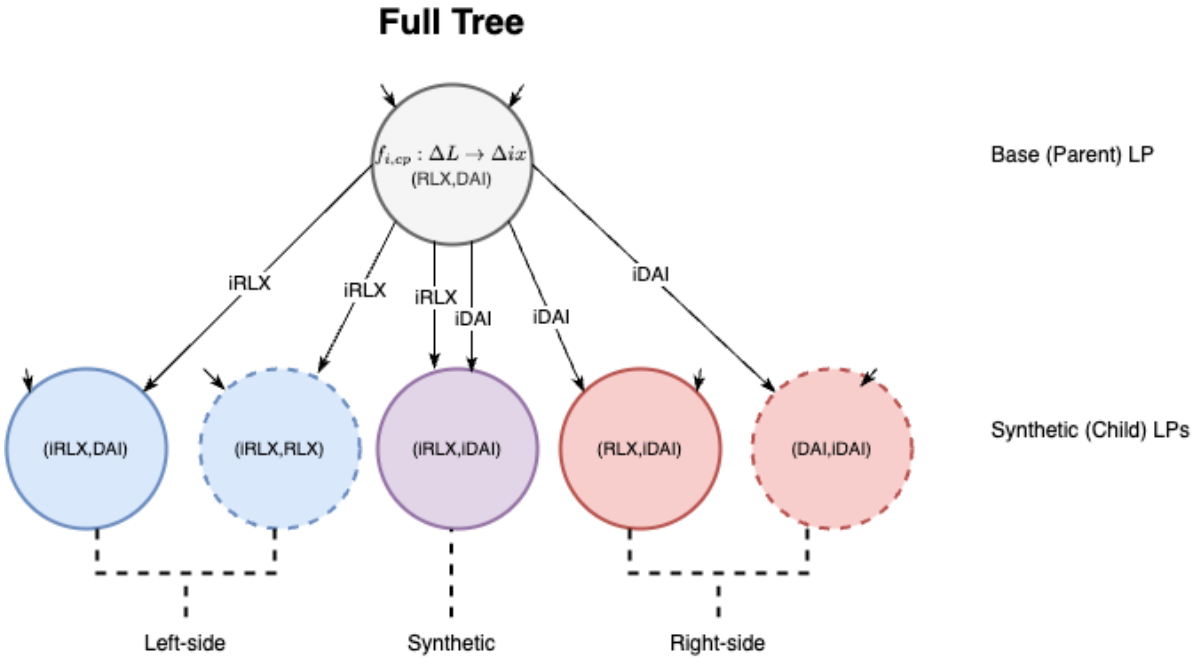


Figure 4: Full CPT liquidity tree represented as a computational tree structure comprised of left-sided, right-sided and synthetic pools

Liquidity Trees can be represented as computational graphs where nodes are denoted as DEX operations and arcs are denoted as indexed capital transitioning between the parent node and the child

Sub Trees

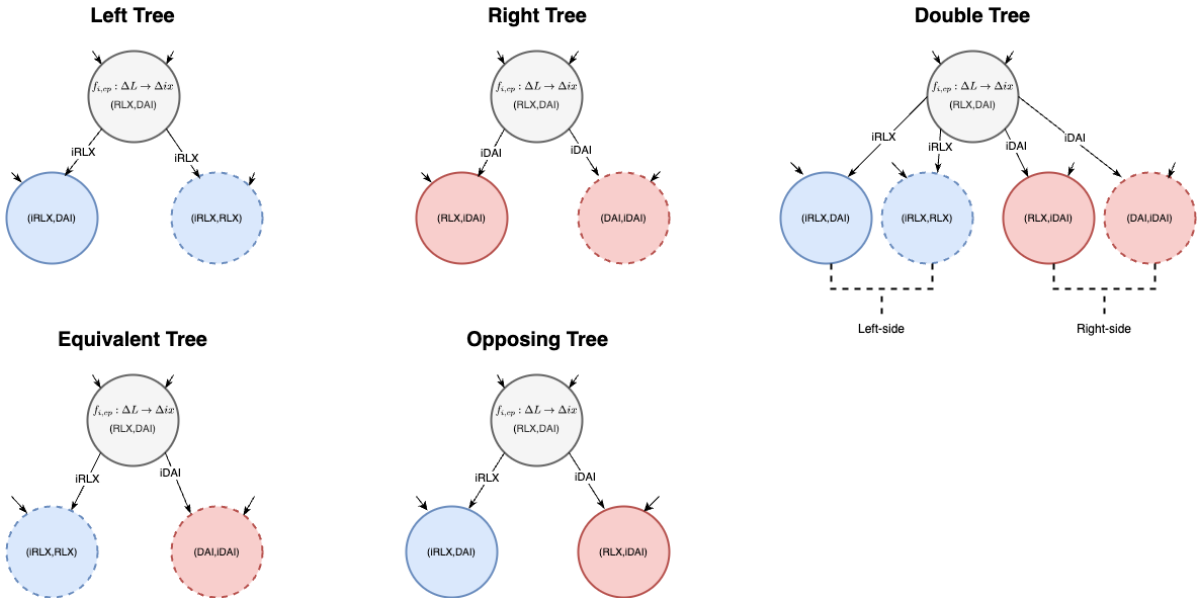
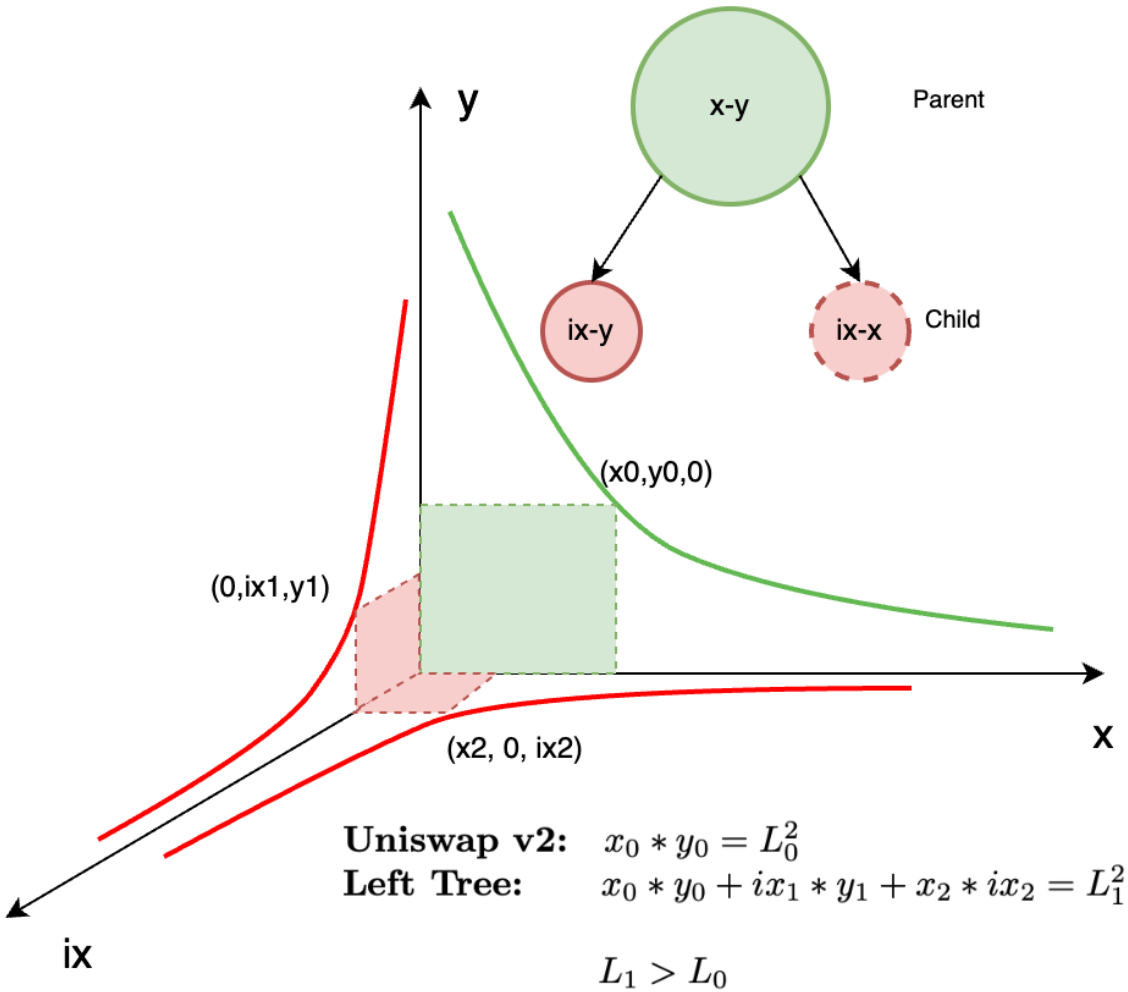


Figure 5: Sub-trees comprised of: (TOP LEFT) left tree; (TOP CENTER) right tree; (TOP RIGHT) double tree; (BOTTOM LEFT) equivalent tree; (BOTTOM CENTER) opposing Tree

Simulation Results

Left Tree

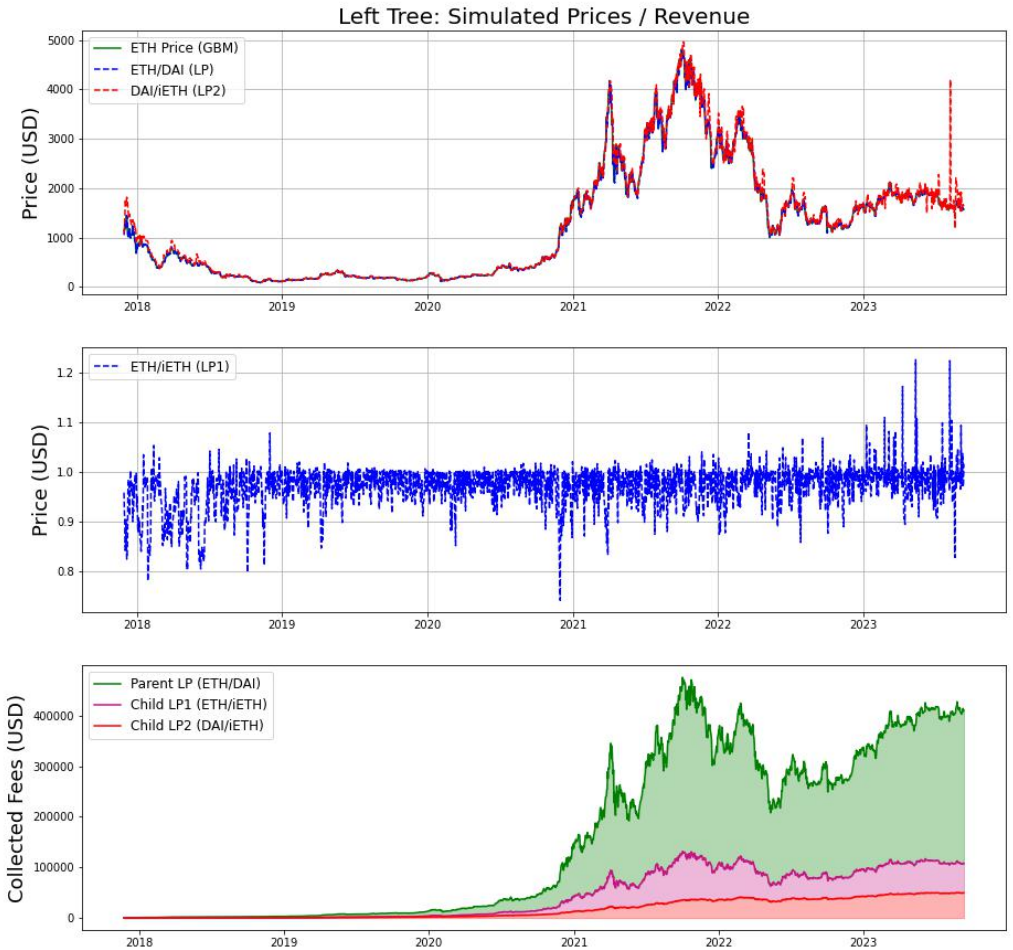


Uniswap v2: $x_0 * y_0 = L_0^2$

Left Tree: $x_0 * y_0 + ix_1 * y_1 + x_2 * ix_2 = L_1^2$

$L_1 > L_0$

Left Tree: Simulated Price / Revenue (1)



Left Tree: Simulated Price / Revenue (2)

Metric	Totals		
Revenue (LP) / LP Liquidity	19.4%		
Revenue (LP+LP1+LP2) / LP Liquidity	26.3%		
Revenue Boost (Indexed Liquidity)	35.61%		
Percentage Indexed	7.51%		
	Sub-totals		
	LP (ETH-DAI)	**LP1 (iETH-ETH)**	**LP2 (iETH-DAI)**
Liquidity	$1,559,145	$71,961	$162,118
Revenue	$302,140	$57,927	$49,673
Revenue / Liquidity	19.4%	80.5%	30.64%

Table 1: Metrics harvested from Left-tree simulation using ETH & DAI (Jan 2018 to Oct 2023)

Our Objective Question

In Summary

Stagnant Pool Problem

- Defined stagnant pool problem and how it can be addressed

Liquidity Trees: A new DeFi Primitive

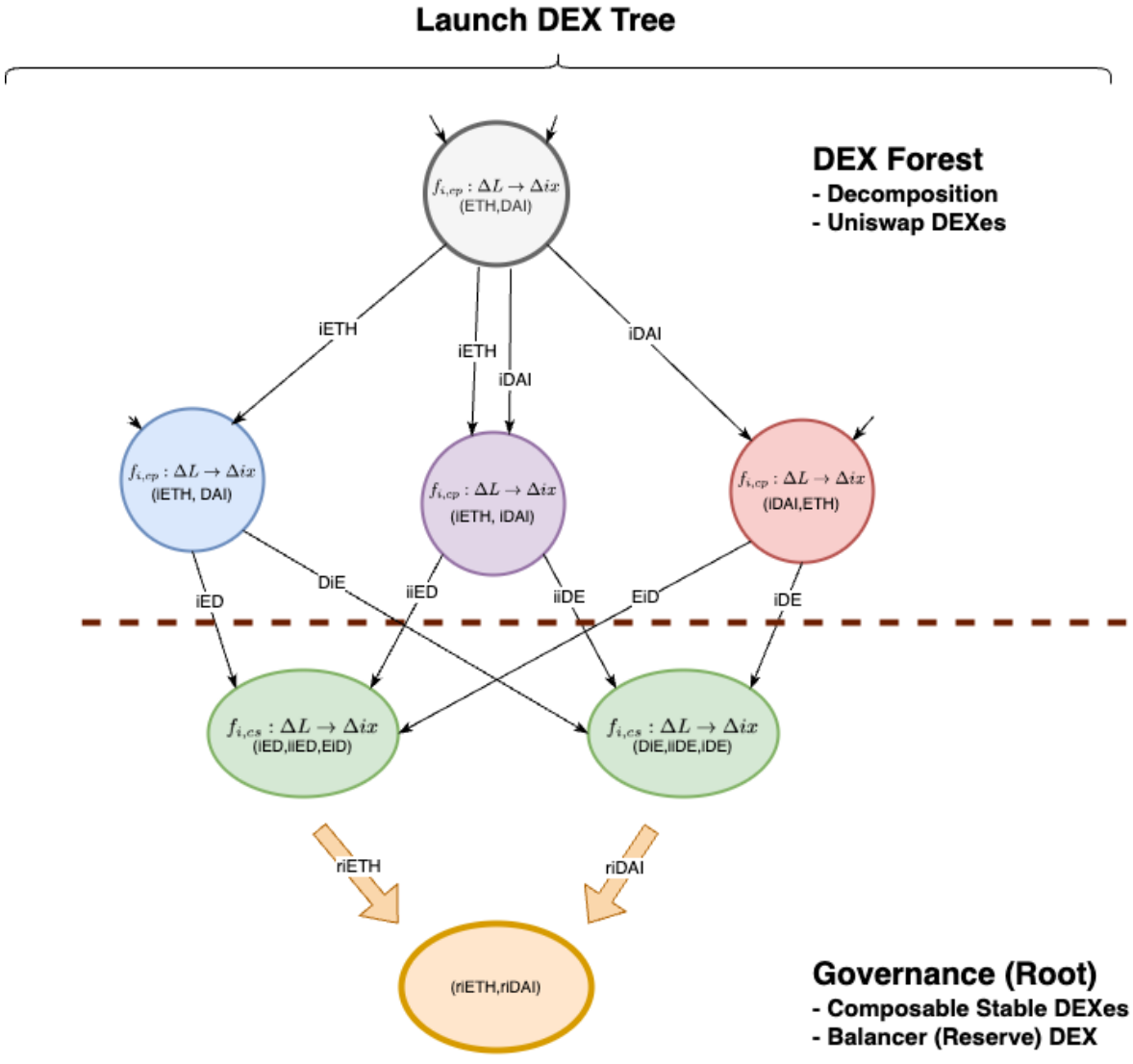
- New DeFi primitive, which we call Liquidity Trees
- Utilizes fully collateralized liquidity, and can be represented as undirected graphs or algebraically in $\mathbb{R}^n$
- Simulations support our reasoning

Pachira Token Launch

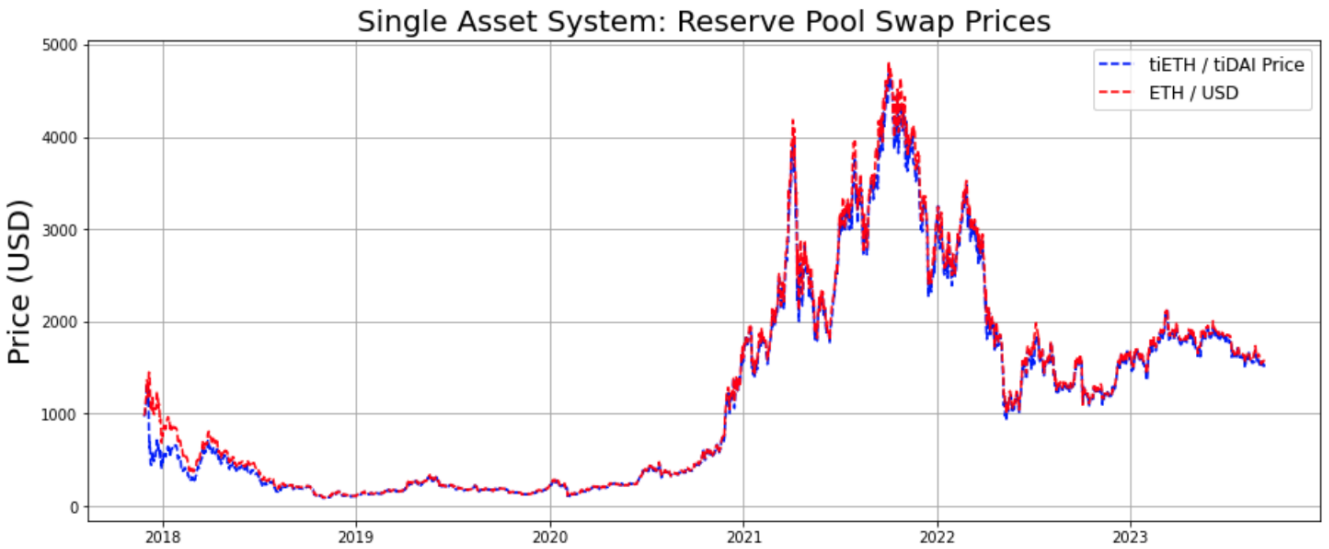
- Combining Liquidity Trees with a governance system for Pachira Fund token launch

Thank you!

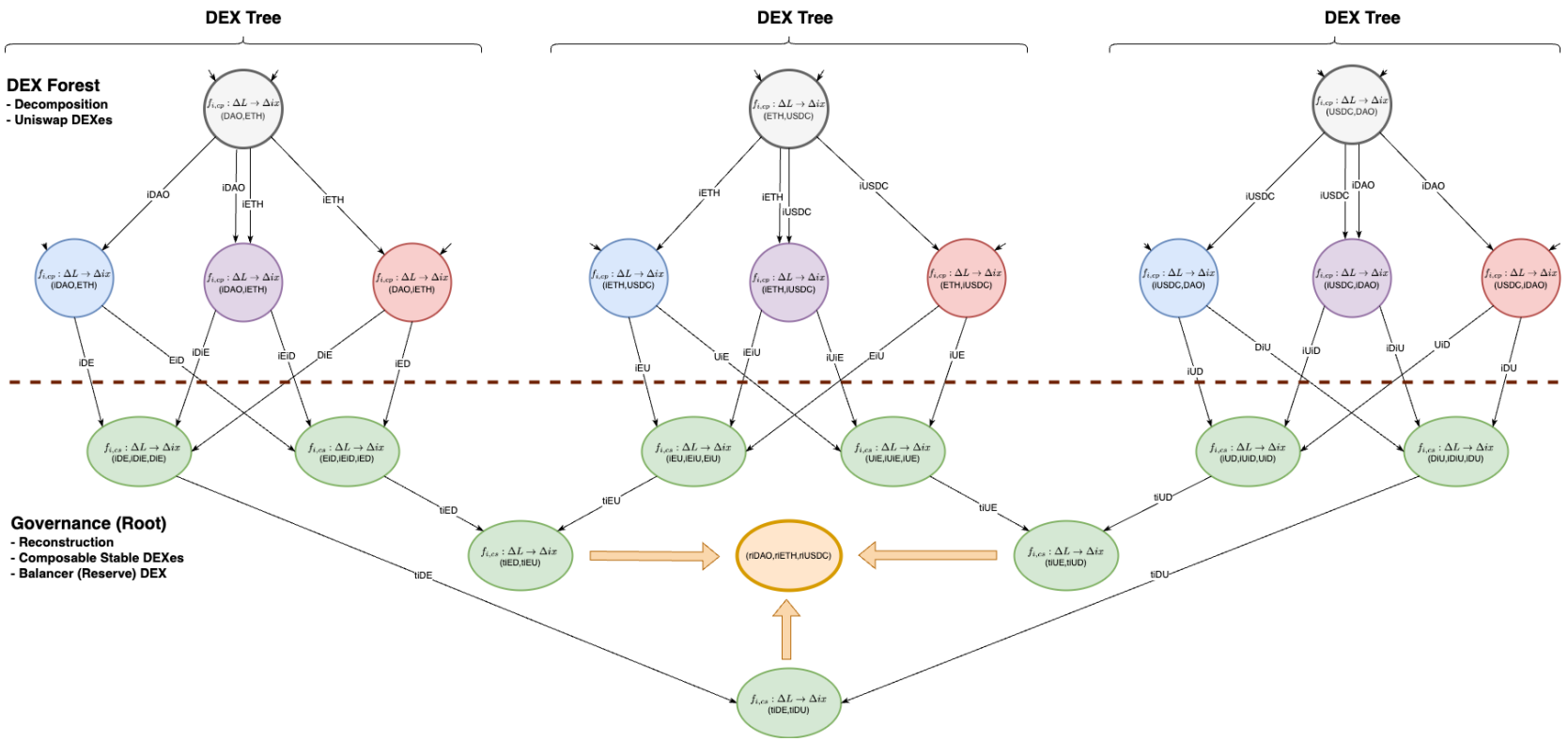
Appendix 1: Pachira Token Launch



APPENDIX 2: RESERVE SWAP PRICES



APPENDIX 3: PACHIRA TOKEN LAUNCH



Appendix 4: Reserve Swap Prices