# Kiwik Feature Spec: Market Card Image ↔ Graph Rotation

> **Purpose**: Implement an auto-rotating display on market cards that transitions between the market cover image and a dynamically-drawn price history graph. This adds dynamism, reinforces that markets are "live," and provides valuable price trend information at a glance.
>
> **Design Philosophy**: The animation should feel organic and alive—like the market is breathing. The graph line should draw as if being sketched by hand, not rendered by a computer. Timing is critical: too fast feels chaotic, too slow feels sluggish.

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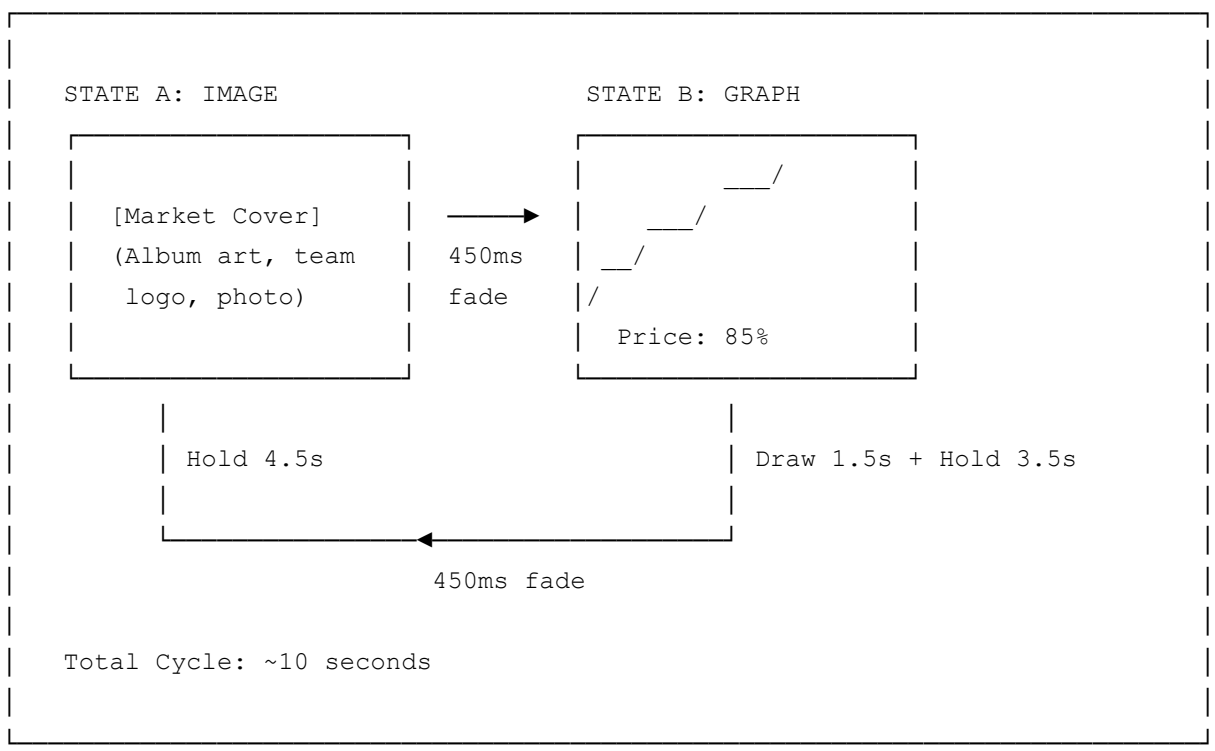
## Visual Concept

### State Diagram




### What Users See

1. **Market card displays cover image** (e.g., Bad Bunny for music market, team logo for sports)
2. **Smooth crossfade to graph view** (image fades out, graph fades in simultaneously)
3. **Graph line draws from left to right** (like being sketched in real-time)
4. **Current price point pulses briefly** (draws attention to current probability)
5. **Hold on graph** (user absorbs trend information)
6. **Smooth crossfade back to image**
7. **Cycle repeats**

---

## Timing Specification

### Master Timing Table

| Phase | Duration | Cumulative | Purpose |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Image display | 4500ms | 0-4500ms | Let user see/recognize the market |
| Crossfade to graph | 450ms | 4500-4950ms | Smooth transition |
| Graph line drawing | 1500ms | 4950-6450ms | The “wow” moment |
| Endpoint pulse | 300ms | 6450-6750ms | Highlight current price |
| Graph hold | 3250ms | 6750-10000ms | Absorb trend data |
| Crossfade to image | 450ms | 10000-10450ms | Return to visual |
| **Total cycle** | **~10000ms** | | Full rotation |

## Timing Rationale

### Why 450ms Crossfade?

```
< 300ms  → Feels abrupt, jarring, "flashy"
300-350ms → Acceptable but slightly rushed
400-500ms → Sweet spot: perceptually instant yet smooth
> 600ms  → Feels sluggish, draws attention to the transition itself

Recommendation: 450ms with ease-in-out easing
```

### Why 1500ms Line Drawing?

```
< 800ms  → Mechanical, robotic, loses the "hand-drawn" feel
800-1200ms → Acceptable for short/simple lines
1200-1800ms → Optimal: feels organic, satisfying to watch
> 2500ms → Tests patience, feels slow

Recommendation: 1500ms with ease-out easing (fast start, gentle finish)
```

### Why 4500ms Image Hold?

```
Users need time to:
1. Notice the card (~500ms)
2. Recognize the image content (~1000ms)
3. Read the market question (~2000ms)
4. Prepare for transition (~1000ms)
```

```
Shorter durations create cognitive overload.
Longer durations feel static/boring.
```

#### Why 3250ms Graph Hold?

```
Shorter than image hold because:
- Graph is more information-dense (needs focus, not recognition)
- Users either "get it" quickly or need more time than we can give
- Keeps the overall cycle feeling dynamic

The 1500ms draw time + 3250ms hold ≈ same total as image phase
```

### Timing Constants (for implementation)

```
const TIMING = {
  IMAGE_HOLD: 4500,
  CROSSFADE: 450,
  LINE_DRAW: 1500,
  ENDPOINT_PULSE: 300,
  GRAPH_HOLD: 3250,
  TOTAL_CYCLE: 10000,

  // Stagger offset between cards
  CARD_STAGGER: 2500,
};
```

---

## Graph Drawing Animation

### SVG Path Drawing Technique

The "line drawing" effect uses SVG's `stroke-dasharray` and `stroke-dashoffset` properties. The path is rendered with a dash pattern equal to its total length, then animated from fully hidden to fully visible.

#### How It Works

```
1. Calculate total path length
2. Set stroke-dasharray to path length (creates one "dash" = entire line)
3. Set stroke-dashoffset to path length (hides entire line)
4. Animate stroke-dashoffset to 0 (reveals line progressively)
```

### CSS Implementation

```
.graph-line {
  fill: none;
  stroke: var(--color-primary);
  stroke-width: 2.5px;
  stroke-linecap: round;
  stroke-linejoin: round;

  /* These values set by JS based on actual path length */
  stroke-dasharray: var(--path-length);
  stroke-dashoffset: var(--path-length);

  /* Animation triggered by adding .drawing class */
  transition: stroke-dashoffset 1.5s ease-out;
}

.graph-line.drawing {
  stroke-dashoffset: 0;
}
```

### JavaScript Path Length Calculation

```
// After SVG renders, calculate actual path length
const calculatePathLength = (pathElement) => {
  const length = pathElement.getTotalLength();
  pathElement.style.setProperty('--path-length', length);
  return length;
};

// Usage
const path = document.querySelector('.graph-line');
calculatePathLength(path);
```

## Easing Function Deep Dive

```
Recommended: ease-out
CSS: cubic-bezier(0, 0, 0.58, 1)
Custom: cubic-bezier(0.25, 0.46, 0.45, 0.94) — slightly softer

Behavior:
- Starts at full speed
- Gradually decelerates
```

```
- Mimics hand-drawn stroke (confident start, careful finish)

Avoid:
- linear: Robotic, unnatural
- ease-in: Slow start feels laggy/hesitant
- ease-in-out: Slow start unnecessary for line drawing
```

### Line Drawing with Area Fill

For added visual impact, fill the area under the line after the line completes drawing:

```
.graph-area {
  fill: var(--color-primary);
  opacity: 0;
  transition: opacity 0.4s ease 1.5s; /* Delay until line finishes */
}

.graph-area.visible {
  opacity: 0.1; /* Subtle fill */
}
```

---

## Transition Effects

### Option A: Simple Crossfade (Recommended)

The simplest and cleanest approach. Both layers exist; we animate opacity.

```
.card-visual-container {
  position: relative;
  aspect-ratio: 16 / 9; /* Or your card image ratio */
  overflow: hidden;
  border-radius: 8px;
}

.visual-layer {
  position: absolute;
  inset: 0;
  transition: opacity 450ms ease-in-out;
}

.visual-layer--image {
  z-index: 1;
}
```

```
.visual-layer--graph {
  z-index: 2;
  opacity: 0;
  pointer-events: none;
}

/* When showing graph */
.card-visual-container.show-graph .visual-layer--image {
  opacity: 0;
}

.card-visual-container.show-graph .visual-layer--graph {
  opacity: 1;
  pointer-events: auto;
}
```

### Option B: Clip/Wipe Reveal

Graph “wipes” in from left to right, synchronized with line drawing. More dynamic but more complex.

```
.visual-layer--graph {
  clip-path: inset(0 100% 0 0); /* Hidden: clipped from right */
  transition: clip-path 1.5s ease-out; /* Same duration as line draw */
}

.card-visual-container.show-graph .visual-layer--graph {
  clip-path: inset(0 0 0 0); /* Fully visible */
}
```

### Option C: Scale + Fade

Graph fades in while scaling from 95% to 100%. Adds subtle depth.

```
.visual-layer--graph {
  opacity: 0;
  transform: scale(0.95);
  transition:
    opacity 450ms ease-in-out,
    transform 450ms ease-out;
}

.card-visual-container.show-graph .visual-layer--graph {
  opacity: 1;
```

```
  transform: scale(1);
}
```

### Recommendation

Start with **Option A (Simple Crossfade)**. It's clean, performant, and doesn't compete with the line-drawing animation for attention. The line draw IS the visual interest—the transition should be invisible.

---

## Component Architecture

### React Component Structure

```
MarketCard/
├── MarketCard.jsx           # Main card component
├── MarketCardVisual.jsx     # Handles image ↔ graph rotation
├── PriceGraph.jsx           # SVG graph with drawing animation
├── useRotationCycle.js      # Custom hook for timing logic
└── styles.module.css        # Component styles
```

### Component Hierarchy

```
<MarketCard>
  <MarketCardVisual
    image={market.coverImage}
    priceHistory={market.priceHistory}
    currentPrice={market.currentPrice}
  />
  <MarketCardContent>
    <CategoryTag />
    <MarketQuestion />
    <ProbabilityBar />
    <TimeRemaining />
  </MarketCardContent>
</MarketCard>
```

### MarketCardVisual Component

```
// MarketCardVisual.jsx
import { useState, useEffect, useRef } from 'react';
import PriceGraph from './PriceGraph';
```

```
import styles from './styles.module.css';

const TIMING = {
  IMAGE_HOLD: 4500,
  CROSSFADE: 450,
  LINE_DRAW: 1500,
  GRAPH_HOLD: 3250,
};

const MarketCardVisual = ({
  image,
  priceHistory,
  currentPrice,
  autoRotate = true,
  initialDelay = 0
}) => {
  const [showGraph, setShowGraph] = useState(false);
  const [isDrawing, setIsDrawing] = useState(false);
  const [isPaused, setIsPaused] = useState(false);
  const timeoutRef = useRef(null);

  useEffect(() => {
    if (!autoRotate || isPaused) return;

    const startCycle = () => {
      // Phase 1: Show image (already showing)
      timeoutRef.current = setTimeout(() => {
        // Phase 2: Transition to graph
        setShowGraph(true);
        setIsDrawing(true);

        // Phase 3: Line drawing completes
        setTimeout(() => {
          setIsDrawing(false);
        }, TIMING.LINE_DRAW);

        // Phase 4: Hold graph, then transition back
        setTimeout(() => {
          setShowGraph(false);
        }, TIMING.LINE_DRAW + TIMING.GRAPH_HOLD);

      }, TIMING.IMAGE_HOLD);
    };

    // Initial delay for staggering multiple cards
    const initialTimer = setTimeout(startCycle, initialDelay);
```

```
  // Set up repeating cycle
  const cycleInterval = setInterval(() => {
    startCycle();
  }, TIMING.IMAGE_HOLD + TIMING.CROSSFADE + TIMING.LINE_DRAW + TIMING.GRAPH_HOL

  return () => {
    clearTimeout(initialTimer);
    clearTimeout(timeoutRef.current);
    clearInterval(cycleInterval);
  };
}, [autoRotate, isPaused, initialDelay]);

// Pause on hover
const handleMouseEnter = () => setIsPaused(true);
const handleMouseLeave = () => setIsPaused(false);

return (
  <div
    className={`${styles.visualContainer} ${showGraph ? styles.showGraph : ''}`
    onMouseEnter={handleMouseEnter}
    onMouseLeave={handleMouseLeave}
  >
    {/* Image Layer */}
    <div className={`${styles.layer} ${styles.imageLayer}`}>
      <img
        src={image}
        alt=""
        loading="lazy"
        className={styles.coverImage}
      />
    </div>

    {/* Graph Layer */}
    <div className={`${styles.layer} ${styles.graphLayer}`}>
      <PriceGraph
        data={priceHistory}
        currentPrice={currentPrice}
        isDrawing={isDrawing}
        showArea={!isDrawing && showGraph}
      />
    </div>

    {/* Optional: Visual indicator dots */}
    <div className={styles.indicators}>
      <span className={`${styles.dot} ${!showGraph ? styles.active : ''}`} />
      <span className={`${styles.dot} ${showGraph ? styles.active : ''}`} />
    </div>
```

```
    </div>
  );
};

export default MarketCardVisual;
```

## PriceGraph Component

```
// PriceGraph.jsx
import { useRef, useEffect, useState } from 'react';
import styles from './styles.module.css';

const PriceGraph = ({
  data,
  currentPrice,
  isDrawing,
  showArea
}) => {
  const pathRef = useRef(null);
  const [pathLength, setPathLength] = useState(0);

  // Generate SVG path from price data
  const generatePath = (data, width, height) => {
    if (!data || data.length === 0) return '';

    const padding = 10;
    const graphWidth = width - (padding * 2);
    const graphHeight = height - (padding * 2);

    const xStep = graphWidth / (data.length - 1);

    const points = data.map((value, index) => {
      const x = padding + (index * xStep);
      const y = padding + graphHeight - (value / 100 * graphHeight);
      return `${x},${y}`;
    });

    return `M ${points.join(' L ')}`;
  };

  // Generate area path (same line + bottom edge)
  const generateAreaPath = (data, width, height) => {
    const linePath = generatePath(data, width, height);
    if (!linePath) return '';

    const padding = 10;
```

```
  const lastX = width - padding;
  const firstX = padding;
  const bottom = height - padding;

  return `${linePath} L ${lastX},${bottom} L ${firstX},${bottom} Z`;
};

// Calculate path length after render
useEffect(() => {
  if (pathRef.current) {
    const length = pathRef.current.getTotalLength();
    setPathLength(length);
  }
}, [data]);

const width = 300;
const height = 150;
const linePath = generatePath(data, width, height);
const areaPath = generateAreaPath(data, width, height);

// Current price point position
const lastDataPoint = data[data.length - 1];
const dotX = width - 10;
const dotY = 10 + (height - 20) - (lastDataPoint / 100 * (height - 20));

return (
  <svg
    viewBox={`0 0 ${width} ${height}`}
    className={styles.graphSvg}
    preserveAspectRatio="none"
  >
    {/* Background grid (optional) */}
    <defs>
      <pattern id="grid" width="30" height="30" patternUnits="userSpaceOnUse">
        <path
          d="M 30 0 L 0 0 0 30"
          fill="none"
          stroke="currentColor"
          strokeWidth="0.5"
          opacity="0.1"
        />
      </pattern>
    </defs>
    <rect width="100%" height="100%" fill="url(#grid)" />

    {/* Area fill (appears after line draws) */}
    <path
```

```
        d={areaPath}
        className={`${styles.graphArea} ${showArea ? styles.visible : ''}`}
      />

      {/* Main price line */}
      <path
        ref={pathRef}
        d={linePath}
        className={`${styles.graphLine} ${isDrawing ? styles.drawing : ''}`}
        style={{
          '--path-length': pathLength,
          strokeDasharray: pathLength,
          strokeDashoffset: isDrawing ? 0 : pathLength,
        }}
      />

      {/* Current price dot */}
      <circle
        cx={dotX}
        cy={dotY}
        r="5"
        className={`${styles.priceDot} ${!isDrawing && showArea ? styles.visible
      />

      {/* Price label */}
      <text
        x={dotX - 12}
        y={dotY - 12}
        className={`${styles.priceLabel} ${!isDrawing && showArea ? styles.visibl
      >
        {currentPrice}%
      </text>
    </svg>
  );
};

export default PriceGraph;
```

## CSS Styles

```
/* styles.module.css */

/* Container */
.visualContainer {
  position: relative;
  aspect-ratio: 16 / 9;
```

```
  overflow: hidden;
  border-radius: 8px 8px 0 0;
  background: var(--bg-secondary);
}

/* Layers */
.layer {
  position: absolute;
  inset: 0;
  transition: opacity 450ms ease-in-out;
}

.imageLayer {
  z-index: 1;
}

.graphLayer {
  z-index: 2;
  opacity: 0;
  pointer-events: none;
  background: var(--bg-primary);
  display: flex;
  align-items: center;
  justify-content: center;
  padding: 16px;
}

.showGraph .imageLayer {
  opacity: 0;
}

.showGraph .graphLayer {
  opacity: 1;
  pointer-events: auto;
}

/* Cover Image */
.coverImage {
  width: 100%;
  height: 100%;
  object-fit: cover;
}

/* Graph SVG */
.graphSvg {
  width: 100%;
  height: 100%;
```

```
}

/* Graph Line */
.graphLine {
  fill: none;
  stroke: var(--color-primary);
  stroke-width: 2.5px;
  stroke-linecap: round;
  stroke-linejoin: round;
  transition: stroke-dashoffset 1.5s ease-out;
}

.graphLine:not(.drawing) {
  stroke-dashoffset: var(--path-length) !important;
}

.graphLine.drawing {
  stroke-dashoffset: 0 !important;
}

/* Area Fill */
.graphArea {
  fill: var(--color-primary);
  opacity: 0;
  transition: opacity 0.4s ease;
  transition-delay: 0.2s; /* Slight delay after line completes */
}

.graphArea.visible {
  opacity: 0.1;
}

/* Price Dot */
.priceDot {
  fill: var(--color-primary);
  opacity: 0;
  transform-origin: center;
  transition: opacity 0.3s ease, transform 0.3s ease;
}

.priceDot.visible {
  opacity: 1;
  animation: pulseDot 1s ease-in-out;
}

@keyframes pulseDot {
  0%, 100% { transform: scale(1); }
```

```
  50% { transform: scale(1.4); }
}

/* Price Label */
.priceLabel {
  font-size: 12px;
  font-weight: 600;
  fill: var(--color-primary);
  opacity: 0;
  transition: opacity 0.3s ease;
}

.priceLabel.visible {
  opacity: 1;
}

/* Indicator Dots */
.indicators {
  position: absolute;
  bottom: 8px;
  left: 50%;
  transform: translateX(-50%);
  display: flex;
  gap: 6px;
  z-index: 10;
}

.dot {
  width: 6px;
  height: 6px;
  border-radius: 50%;
  background: white;
  opacity: 0.4;
  transition: opacity 0.3s ease;
}

.dot.active {
  opacity: 1;
}

/* Reduced Motion */
@media (prefers-reduced-motion: reduce) {
  .layer,
  .graphLine,
  .graphArea,
  .priceDot,
  .priceLabel {
```

```
    transition: none !important;
    animation: none !important;
  }

  .graphLine {
    stroke-dashoffset: 0 !important;
  }
}
```

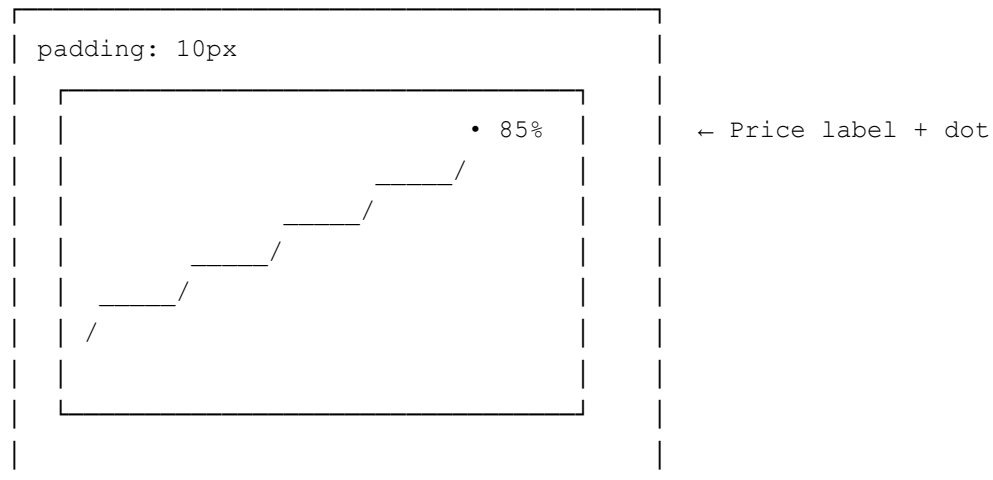
---

# Graph Visual Design

## Color Coding by Outcome

```
// Determine line color based on which outcome is displayed
const getLineColor = (outcome, probability) => {
  if (outcome === 'yes') {
    // Green spectrum based on probability
    if (probability >= 70) return '#16a34a'; // Strong green
    if (probability >= 50) return '#22c55e'; // Medium green
    return '#86efac'; // Light green
  } else {
    // Neutral/red spectrum for "No"
    if (probability >= 70) return '#dc2626'; // Strong red (high No probability)
    if (probability >= 50) return '#94a3b8'; // Neutral gray
    return '#cbd5e1'; // Light gray
  }
};
```

## Graph Dimensions & Layout



```
│  [7d]                          [Now]   │  ← Optional time labels
│                                        │
└────────────────────────────────────────┘
```

```
Aspect ratio: 16:9 (matches typical card images)
Y-axis: 0% to 100% (implicit, not labeled)
X-axis: Last 7 or 30 days of price data
```

### Subtle Grid Background

```
<defs>
  <pattern id="grid" width="30" height="30" patternUnits="userSpaceOnUse">
    <path
      d="M 30 0 L 0 0 0 30"
      fill="none"
      stroke="currentColor"
      strokeWidth="0.5"
      opacity="0.08"
    />
  </pattern>
</defs>
<rect width="100%" height="100%" fill="url(#grid)" />
```

### Line Styling

```
.graphLine {
  stroke-width: 2.5px;      /* Visible but not chunky */
  stroke-linecap: round;    /* Soft line endings */
  stroke-linejoin: round;   /* Smooth corners */
}
```

---

## Interaction Behaviors

### Pause on Hover

When user hovers over a card, pause the rotation cycle. They're engaged and shouldn't be interrupted.

```
const [isPaused, setIsPaused] = useState(false);

// In useEffect, check isPaused before continuing cycle
```

```
useEffect(() => {
  if (isPaused) return;
  // ... rotation logic
}, [isPaused]);

// Event handlers
<div
  onMouseEnter={() => setIsPaused(true)}
  onMouseLeave={() => setIsPaused(false)}
>
```

## Resume Logic

When unpausing, you have two options:

### Option A: Resume from current state

```
// Continue from wherever we paused
// Simpler, but might cut phases short
```

### Option B: Start fresh cycle

```
// Reset to beginning of cycle
// More predictable, cleaner
const handleMouseLeave = () => {
  setIsPaused(false);
  setShowGraph(false);
  setIsDrawing(false);
  // Will start fresh cycle on next interval
};
```

## Manual Toggle (Optional)

Allow users to click to toggle between image and graph:

```
const handleClick = () => {
  setIsPaused(true); // Stop auto-rotation
  setShowGraph(prev => !prev);
  if (!showGraph) {
    setIsDrawing(true);
    setTimeout(() => setIsDrawing(false), TIMING.LINE_DRAW);
  }
};
```

### Touch Devices

On mobile, hover isn't available. Consider:

```
// Tap to pause/play
const handleTap = () => {
  setIsPaused(prev => !prev);
};

// Or: Tap to toggle view
const handleTap = () => {
  setShowGraph(prev => !prev);
};
```

---

## Performance Optimization

### Key Principles

```
1. Use CSS transitions/animations (GPU-accelerated)
2. Avoid animating layout properties (width, height, margin)
3. Use transform and opacity only
4. Limit simultaneous animations
5. Pause off-screen cards
```

### Intersection Observer for Visibility

Only animate cards that are in the viewport:

```
const useVisibility = (ref) => {
  const [isVisible, setIsVisible] = useState(false);

  useEffect(() => {
    const observer = new IntersectionObserver(
      ([entry]) => setIsVisible(entry.isIntersecting),
      { threshold: 0.2 }
    );

    if (ref.current) observer.observe(ref.current);
    return () => observer.disconnect();
  }, [ref]);

  return isVisible;
```

```
};

// In component
const containerRef = useRef(null);
const isVisible = useVisibility(containerRef);

// Only run cycle when visible
useEffect(() => {
  if (!isVisible) return;
  // ... rotation logic
}, [isVisible]);
```

### Stagger Card Animations

Don’t start all cards simultaneously—creates visual chaos and performance spike:

```
// Parent component
const MarketCardList = ({ markets }) => {
  return (
    <div className="market-grid">
      {markets.map((market, index) => (
        <MarketCard
          key={market.id}
          {...market}
          initialDelay={index * 2500} // 2.5s stagger
        />
      ))}
    </div>
  );
};
```

### Will-Change Optimization

Hint to browser about upcoming animations:

```
.layer {
  will-change: opacity;
}

/* Remove after animation settles (optional) */
.layer:not(.transitioning) {
  will-change: auto;
}
```

### Limit Simultaneous Animations

If many cards are visible, limit how many can animate at once:

```
const MAX_SIMULTANEOUS = 4;

// Track which cards are currently animating
const [animatingCards, setAnimatingCards] = useState(new Set());

const canAnimate = (cardId) => {
  return animatingCards.size < MAX_SIMULTANEOUS;
};
```

---

## Accessibility Considerations

### Reduced Motion

Respect user's motion preferences:

```
@media (prefers-reduced-motion: reduce) {
  .layer {
    transition: none !important;
  }

  .graphLine {
    transition: none !important;
    stroke-dashoffset: 0 !important; /* Show immediately */
  }

  .priceDot {
    animation: none !important;
  }
}


// In component
const prefersReducedMotion = window.matchMedia(
  '(prefers-reduced-motion: reduce)'
).matches;

// If reduced motion, show graph without animation
if (prefersReducedMotion) {
  setIsDrawing(false); // Skip drawing phase
}
```

### Screen Reader Considerations

The rotation is purely visual. Ensure the information is available textually:

```
<div className={styles.visualContainer} aria-hidden="true">
  {/* Visual rotation content */}
</div>

{/* Accessible price information */}
<div className="sr-only">
  Current probability: {currentPrice}%
  Trend: {trend === 'up' ? 'increasing' : 'decreasing'} over last 7 days
</div>
```

### Pause Control

Provide a way to stop all animations:

```
<button
  className={styles.pauseAllButton}
  onClick={() => setGlobalPause(prev => !prev)}
  aria-label={globalPause ? 'Resume animations' : 'Pause animations'}
>
  {globalPause ? '▶' : '⏸️'}
</button>
```

---

## Edge Cases

### No Price History Data

If a market is new and has no historical data:

```
if (!priceHistory || priceHistory.length < 2) {
  // Don't show graph rotation
  // Or show a flat line at current price
  return <StaticImage image={image} />;
}
```

### Image Load Failure

```
const [imageError, setImageError] = useState(false);

<img
  src={image}
  onError={() => setImageError(true)}
  alt=""
/>

{imageError && (
  <div className={styles.fallbackImage}>
    <CategoryIcon category={market.category} />
  </div>
)}
```

### Very Short Price History

If only a few data points, the graph looks sparse:

```
// Interpolate additional points for smoother line
const interpolateData = (data, targetPoints = 20) => {
  if (data.length >= targetPoints) return data;

  const result = [];
  const step = (data.length - 1) / (targetPoints - 1);

  for (let i = 0; i < targetPoints; i++) {
    const index = i * step;
    const lower = Math.floor(index);
    const upper = Math.ceil(index);
    const t = index - lower;

    if (upper >= data.length) {
      result.push(data[data.length - 1]);
    } else {
      result.push(data[lower] * (1 - t) + data[upper] * t);
    }
  }

  return result;
};
```

### Extreme Price Swings

If price swings from 5% to 95%, the graph is very vertical. Consider clamping or smoothing:

```
// Optional: Apply smoothing to reduce visual noise
const smoothData = (data, windowSize = 3) => {
  return data.map((_, index, arr) => {
    const start = Math.max(0, index - windowSize);
    const end = Math.min(arr.length, index + windowSize + 1);
    const window = arr.slice(start, end);
    return window.reduce((a, b) => a + b, 0) / window.length;
  });
};
```

### Component Unmount During Animation

Clean up timeouts to prevent memory leaks and state updates on unmounted components:

```
useEffect(() => {
  const timeouts = [];

  const addTimeout = (fn, delay) => {
    const id = setTimeout(fn, delay);
    timeouts.push(id);
    return id;
  };

  // Use addTimeout instead of setTimeout
  addTimeout(() => {/* ... */}, 1000);

  return () => {
    timeouts.forEach(clearTimeout);
  };
}, []);
```

---

## Implementation Code

### Complete Standalone Example

Here's a complete, copy-paste ready implementation:

```
// MarketCardWithRotation.jsx
import { useState, useEffect, useRef, useCallback } from 'react';

// ============================================
// TIMING CONFIGURATION
```

```
// ============================================
const TIMING = {
  IMAGE_HOLD: 4500,
  CROSSFADE: 450,
  LINE_DRAW: 1500,
  GRAPH_HOLD: 3250,
  TOTAL_CYCLE: 10000,
};

// ============================================
// PRICE GRAPH COMPONENT
// ============================================
const PriceGraph = ({ data, currentPrice, isDrawing, showFill }) => {
  const pathRef = useRef(null);
  const [pathLength, setPathLength] = useState(0);

  const width = 280;
  const height = 140;
  const padding = 12;

  // Generate SVG path
  const generatePath = useCallback(() => {
    if (!data || data.length < 2) return '';

    const graphWidth = width - (padding * 2);
    const graphHeight = height - (padding * 2);
    const xStep = graphWidth / (data.length - 1);

    const points = data.map((value, index) => {
      const x = padding + (index * xStep);
      const y = padding + graphHeight - ((value / 100) * graphHeight);
      return `${x},${y}`;
    });

    return `M ${points.join(' L ')}`;
  }, [data]);

  // Area path for fill
  const generateAreaPath = useCallback(() => {
    const linePath = generatePath();
    if (!linePath) return '';

    const graphHeight = height - (padding * 2);
    const bottom = padding + graphHeight;
    const lastX = width - padding;
    const firstX = padding;
```

```
  return `${linePath} L ${lastX},${bottom} L ${firstX},${bottom} Z`;
}, [generatePath]);

useEffect(() => {
  if (pathRef.current) {
    setPathLength(pathRef.current.getTotalLength());
  }
}, [data]);

const linePath = generatePath();
const areaPath = generateAreaPath();

// Calculate dot position
const lastValue = data?.[data.length - 1] || 50;
const dotY = padding + (height - padding * 2) - ((lastValue / 100) * (height -

return (
  <svg viewBox={`0 0 ${width} ${height}`} style={{ width: '100%', height: '100%
    {/* Subtle grid */}
    <defs>
      <pattern id="graphGrid" width="28" height="28" patternUnits="userSpaceOnU
        <path d="M 28 0 L 0 0 0 28" fill="none" stroke="#e5e7eb" strokeWidth="0
      </pattern>
    </defs>
    <rect width="100%" height="100%" fill="url(#graphGrid)" />

    {/* Area fill */}
    <path
      d={areaPath}
      fill="#3b82f6"
      style={{
        opacity: showFill ? 0.1 : 0,
        transition: 'opacity 0.4s ease',
      }}
    />

    {/* Price line */}
    <path
      ref={pathRef}
      d={linePath}
      fill="none"
      stroke="#3b82f6"
      strokeWidth="2.5"
      strokeLinecap="round"
      strokeLinejoin="round"
      style={{
        strokeDasharray: pathLength,
```

```
          strokeDashoffset: isDrawing ? 0 : pathLength,
          transition: isDrawing ? 'stroke-dashoffset 1.5s ease-out' : 'none',
        }}
      />

      {/* Current price dot */}
      <circle
        cx={width - padding}
        cy={dotY}
        r="5"
        fill="#3b82f6"
        style={{
          opacity: showFill ? 1 : 0,
          transform: showFill ? 'scale(1)' : 'scale(0)',
          transformOrigin: 'center',
          transition: 'all 0.3s ease',
        }}
      />

      {/* Price label */}
      <text
        x={width - padding - 8}
        y={dotY - 10}
        textAnchor="end"
        fontSize="11"
        fontWeight="600"
        fill="#3b82f6"
        style={{
          opacity: showFill ? 1 : 0,
          transition: 'opacity 0.3s ease',
        }}
      >
        {currentPrice}%
      </text>
    </svg>
  );
};

// ============================================
// MARKET CARD VISUAL ROTATION
// ============================================
const MarketCardVisual = ({
  image,
  priceHistory,
  currentPrice,
  initialDelay = 0,
}) => {
```

```
const [showGraph, setShowGraph] = useState(false);
const [isDrawing, setIsDrawing] = useState(false);
const [isPaused, setIsPaused] = useState(false);
const containerRef = useRef(null);
const timeoutsRef = useRef([]);

// Clear all timeouts
const clearTimeouts = () => {
  timeoutsRef.current.forEach(clearTimeout);
  timeoutsRef.current = [];
};

// Add timeout with tracking
const addTimeout = (fn, delay) => {
  const id = setTimeout(fn, delay);
  timeoutsRef.current.push(id);
  return id;
};

// Run one rotation cycle
const runCycle = useCallback(() => {
  // Phase 1: Transition to graph
  setShowGraph(true);
  setIsDrawing(true);

  // Phase 2: Line finishes drawing
  addTimeout(() => {
    setIsDrawing(false);
  }, TIMING.LINE_DRAW);

  // Phase 3: Hold graph, then switch back
  addTimeout(() => {
    setShowGraph(false);
  }, TIMING.LINE_DRAW + TIMING.GRAPH_HOLD);
}, []);

useEffect(() => {
  if (isPaused) return;

  // Initial delay for staggering
  addTimeout(() => {
    runCycle();

    // Set up repeating interval
    const interval = setInterval(() => {
      if (!isPaused) runCycle();
    }, TIMING.TOTAL_CYCLE);
```

```
    timeoutsRef.current.push(interval);
  }, initialDelay + TIMING.IMAGE_HOLD);

  return clearTimeouts;
}, [isPaused, initialDelay, runCycle]);

// Check for reduced motion preference
const prefersReducedMotion =
  typeof window !== 'undefined' &&
  window.matchMedia?.('(prefers-reduced-motion: reduce)').matches;

const containerStyle = {
  position: 'relative',
  aspectRatio: '16 / 9',
  overflow: 'hidden',
  borderRadius: '8px 8px 0 0',
  backgroundColor: '#f3f4f6',
};

const layerStyle = {
  position: 'absolute',
  inset: 0,
  transition: prefersReducedMotion ? 'none' : 'opacity 450ms ease-in-out',
};

return (
  <div
    ref={containerRef}
    style={containerStyle}
    onMouseEnter={() => setIsPaused(true)}
    onMouseLeave={() => setIsPaused(false)}
  >
    {/* Image Layer */}
    <div style={{
      ...layerStyle,
      zIndex: 1,
      opacity: showGraph ? 0 : 1,
    }}>
      <img
        src={image}
        alt=""
        style={{ width: '100%', height: '100%', objectFit: 'cover' }}
      />
    </div>

    {/* Graph Layer */}
```

```
      <div style={{
        ...layerStyle,
        zIndex: 2,
        opacity: showGraph ? 1 : 0,
        backgroundColor: '#ffffff',
        padding: '16px',
        display: 'flex',
        alignItems: 'center',
        justifyContent: 'center',
      }}>
        <PriceGraph
          data={priceHistory}
          currentPrice={currentPrice}
          isDrawing={isDrawing}
          showFill={!isDrawing && showGraph}
        />
      </div>

      {/* Indicator Dots */}
      <div style={{
        position: 'absolute',
        bottom: '8px',
        left: '50%',
        transform: 'translateX(-50%)',
        display: 'flex',
        gap: '6px',
        zIndex: 10,
      }}>
        {[false, true].map((isGraphDot, i) => (
          <span
            key={i}
            style={{
              width: '6px',
              height: '6px',
              borderRadius: '50%',
              backgroundColor: 'white',
              opacity: (showGraph === isGraphDot) ? 1 : 0.4,
              transition: 'opacity 0.3s ease',
            }}
          />
        ))}
      </div>
    </div>
  );
};

export default MarketCardVisual;
```

## Acceptance Criteria

### Core Functionality

- Cards automatically rotate between image and graph views
- Rotation cycle completes in ~10 seconds
- Graph line draws from left to right over 1.5 seconds
- Crossfade transitions are smooth (450ms)
- Current price point appears after line draws

### Timing

- Image displays for ~4.5 seconds before transitioning
- Graph displays for ~5 seconds total (1.5s draw + 3.5s hold)
- Cards stagger their start times (2.5s offset between cards)

### Interaction

- Rotation pauses when user hovers over card
- Rotation resumes when user moves mouse away
- Touch devices: tap pauses/plays rotation

### Visual Quality

- Line drawing animation feels organic (ease-out)
- Graph has subtle grid background
- Price dot pulses briefly when appearing
- Area fill fades in after line completes
- Indicator dots show current view state

### Performance

- Animations run at 60fps

- Off-screen cards pause their rotation
- No memory leaks (timeouts cleared on unmount)
- No layout shift during transitions

### Accessibility

- Respects `prefers-reduced-motion` (instant transitions)
- Graph data available as text for screen readers
- Pause control available for users who need it

### Edge Cases

- Handles missing price history (shows image only)
- Handles image load failure (shows fallback)
- Works with varying amounts of price data
- Component cleanup prevents state updates after unmount

---

## Testing Checklist

### Manual Testing

- Watch several full cycles on desktop
- Hover to pause, verify it stops
- Move mouse away, verify it resumes
- Test on mobile (touch to pause)
- Enable reduced motion in OS, verify instant transitions
- Scroll cards in/out of view, verify pause/resume

### Performance Testing

- Profile with React DevTools (no excessive re-renders)
- Profile with Chrome DevTools (60fps animations)
- Test with 20+ cards visible simultaneously

- Test on low-end device / throttled CPU

### Cross-Browser

- Chrome (latest)
- Firefox (latest)
- Safari (latest)
- Edge (latest)
- iOS Safari
- Android Chrome

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