When Silicon Valley Meets Wall Street: Why is FinTech overengineered?

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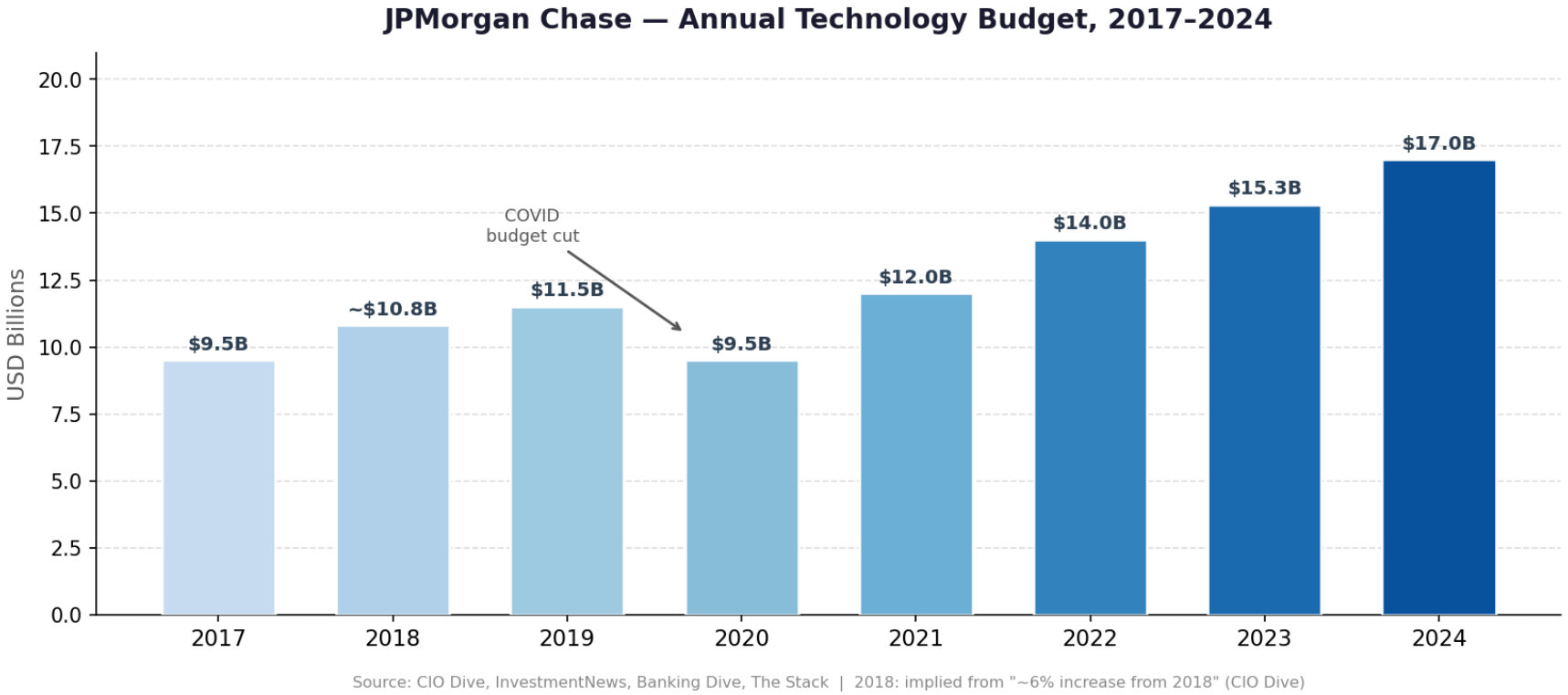
CARF-FSA Symposium 2026

When Silicon Valley Meets Wall Street

- Financial firms pour enormous $$ into financial technology
- 2025 BoA survey: *"AI spending has gone **too far**"*
  - *Flash Boys*: same alarm about HFT a decade earlier
- Pattern repeats across waves — HFT, quant strategies, now AI
  - Something structural is driving this?


JPMorgan Chase — Annual Technology Budget, 2017–2024
USD Billions
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
$9.5B
~$10.8B
$11.5B
COVID
budget cut
$9.5B
$12.0B
$14.0B
$15.3B
$17.0B
2017
2018
2019
2020
2021
2022
2023
2024
Source: CIO Dive, InvestmentNews, Banking Dive, The Stack | 2018: implied from "~6% increase from 2018" (CIO Dive)

A Boom That Even Insiders Are Questioning

- **Human capital:** draws a surge in engineering talent
  - Wall Street now hiring AI engineers at record salaries
- **Opacity**: *"Major US banks are like a tech company — they build everything from scratch and* ***keep it secret****."*
  [practitioner interview, JP Morgan]
- High price volatility, oligopolistic market, ...

The Standard Story

- **Arms race:** each firm invests because rivals do
  - Individually rational, collectively wasteful
  - Classic prisoner's dilemma

	Stay Slow	Go Fast
Stay Slow	$(\$100, \$100)$	$(\$0, \$200 - c)$
Go Fast	$(\$200 - c, \$0)$	$(\$100 - c, \$100 - c)$

What is Missing?

- **What the standard theory misses:**
  - Tech is built in-house by engineers under employment contracts
  - (Single entity responsible for both trading and engineering)
  - (Core technology is publicly observable)

- New theory built on two overlooked frictions
  - **Opacity:** market cannot see the firm's actual technology
  - **Incentive problems:** engineer bears effort costs; firm can fire

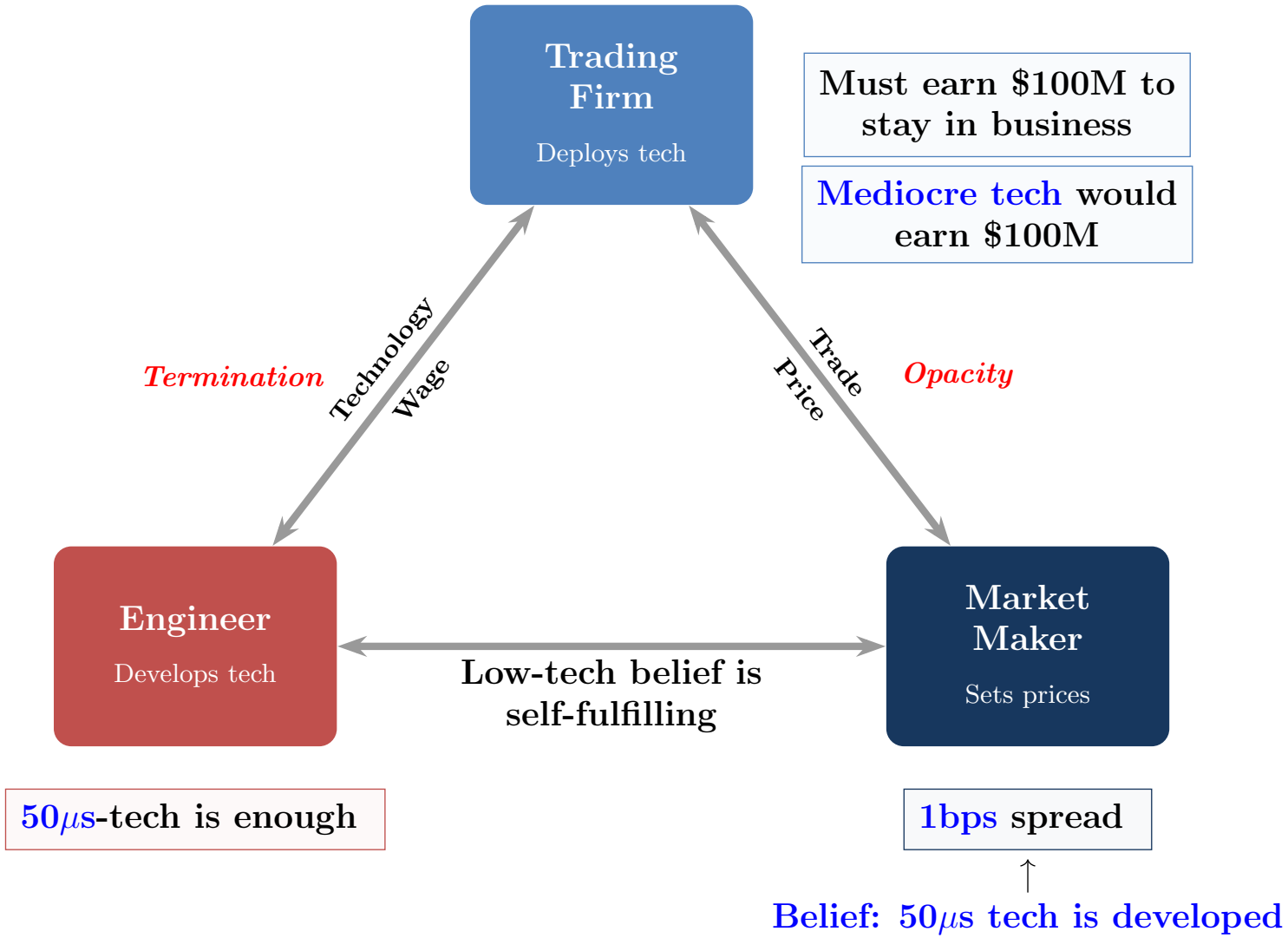
Three Players

- **Engineer:** develops tech through costly effort
- **Trading firm:** observes innovation result and *can fire* engineer
- **Market maker:** *cannot see the technology*
  - Sets price (provides liquidity) based on **belief** about technology

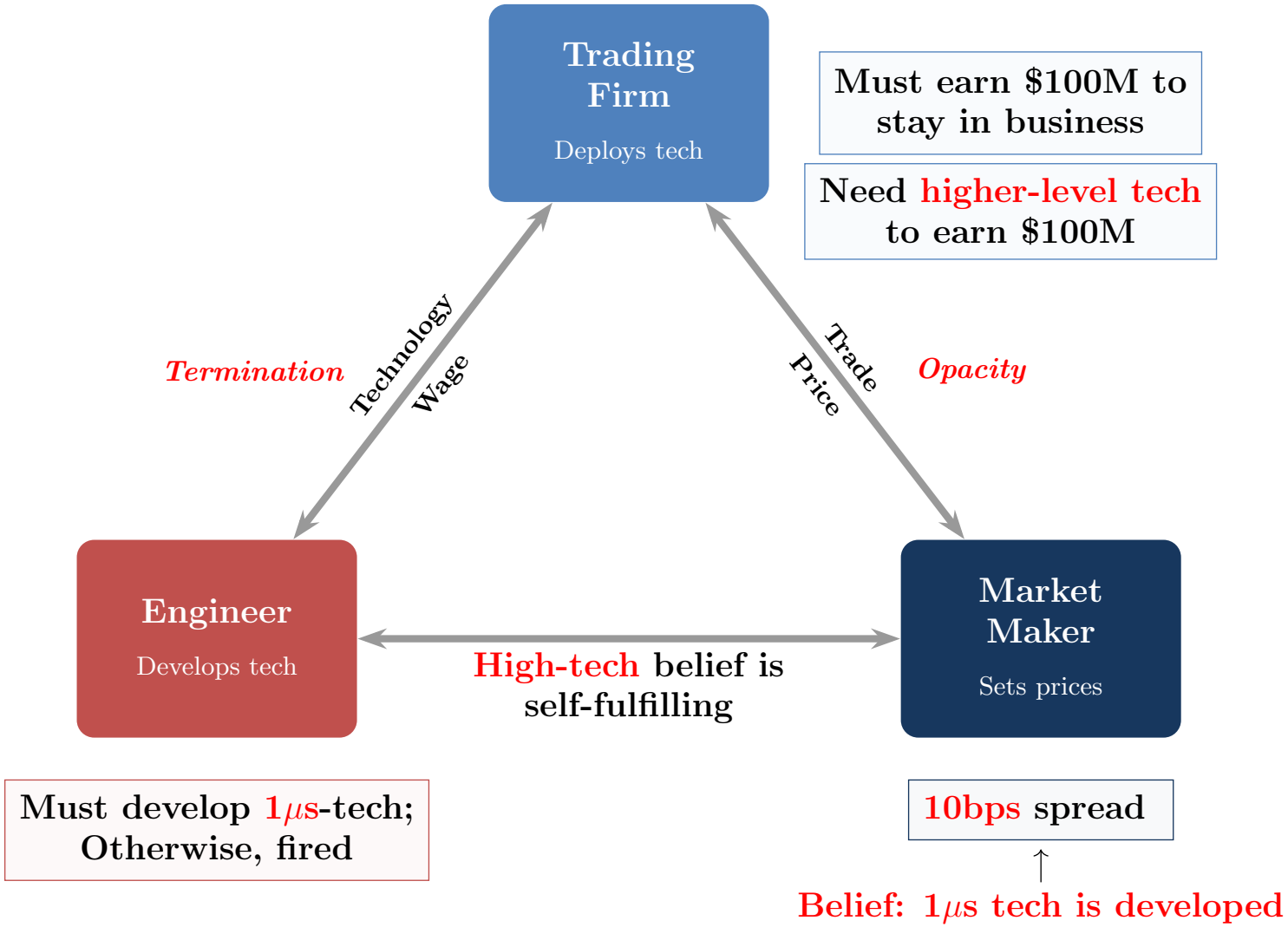
Engineer: Keep the job, or keep it simple?

- Engineer: *How much do I need to build to keep my job?*
  - Developing better technology is personally costly
  - But must avoid termination
- With **opaque** tech, answer depends on market beliefs

When Market Anticipates Low-level Tech



When Market Anticipates High-level Tech



Same Economy, Two Different Outcomes

- High- and low-tech eqm arise
  - Same fundamentals, but **beliefs alone** trigger overengineering
- Engineer overinvests not for value creation, but to avoid being fired
- **High-tech equilibrium is Pareto inferior**

	Low-Tech World	High-Tech World
Market liquidity	Liquid	Illiquid
Price volatility	Lower	Higher
Firm trading profit	Moderate	Large
Firm/Engineer Welfare	Better off	Worse off
Ordinary investors	Better off	Worse off

What Does This Theory Predict?

- **High fixed engineer salaries**
  - Engineer overinvests *knowing its inefficient*
  - Potentially deviate, but high fixed wage justifies over-engineering
- **Oligopolistic structure**
  - Competition compresses firms' trading profits
  - Engineers face high dismissal risk $\Rightarrow$ innovate more
  - *'Top 6 HFTs account for 80% of arb. races in LSE' [Budish, 2022]*
- **Non-fin. innovations precede finance overengineering**
  - ChatGPT shifts *beliefs* about what is feasible in finance
  - Belief shift alone can tip the system

Fingerprint for Identifying Over-engineering

- Reaction of **financial market** differs across two equilibria

Reaction to wage shock

Low-Tech World		High-Tech World	
↑	Higher engineer salary	↑	Higher engineer salary
↑	→ Retention bar rises	↑	→ Retention bar rises
↑	→ Engineer innovates **MORE**	↓	→ Engineer innovates **LESS**
↑	→ Market **LESS** liquid	↓	→ Market **MORE** liquid

- Market reaction reveals which equilibrium we are in
- Same policy, opposite responses

A New Theory of Financial Over-engineering

- Not just an arms race; it can arise **within a single firm**
- Labor market policy **beyond the labor market**:
  - Wage structure, Non-compete clause enforcement, etc
  - Financial market instability and inefficient innovation
- Tech booms can be **belief-driven,** not fundamental
  - Disclosure requirements: shift beliefs, prevent overengineering
- *The right question is not 'how good is the technology?'*
  - *but* **'which equilibrium are we in?'**