

Payments

MGT 4074 Fintech & Crypto Tokens, Section A, Spring 2025

Joseph Hall

Georgia Institute of Technology

October 27, 2025

Roadmap

- 1 Final Project Rubrics
- 2 In the News
- 3 Payments 101
- 4 In the News
- 5 Fast Payment Blockchains
- 6 Credit Cards

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Final Project Rubric: Smart Contracts

The Rubric for Smart Contract Final Projects is:

- **40 Points: Concept**

- Does this solution address a pressing need?
- Does this application play to the strengths of blockchain technology?
- Are the economics sound to the point where people will use it?

- **50 Points: Execution**

- Does the contract runs smoothly?
- Does your code clearly do what it says it does?
- Does it minimize gas costs?

- **10 Points: Marketing**

- Is it presented attractively?
- Do I want to use it?
- Consider making a logo and/or catchy name for your project.

Final Project Rubric: Mini-Thesis

The Rubric for Mini-Thesis Final Projects is:

- **40 Points: Strong Thesis Statement**

- Does the answer to this question have big implications for policy or management?
- Is the question controversial?

- **50 Points: Empirical Support for Thesis Statement**

- Is the data source large, comprehensive, and suitable to answer the question?
- Do the data visualizations clearly support the thesis statement?
- Does your code clearly do what it says it does?

- **10 Points: Presentation Quality**

- Is your thesis statement clearly and concisely articulated on the title slide?
- Are your data visualizations well-labeled and attractive?
- Does the presentation flow and hold the audience's attention?

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US Treasury Stablecoins



- Does “the fabric on which dollars are issued” matter?

US Treasury Stablecoins



- Does “the fabric on which dollars are issued” matter?
- What about rule of law, low corruption, stability, and investor protections?

US Treasury Stablecoins



- Does “the fabric on which dollars are issued” matter?
- What about rule of law, low corruption, stability, and investor protections?
- More coordination around dollars = more *Seignorage* for the U.S.

U.S. Trade Deficit



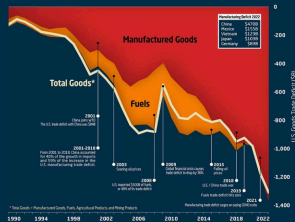
Balaji @balajis · 5h

A deindustrialized America simply does not produce enough to pay for what it consumes.

It prints money instead. And exchanges these pieces of paper for valuable goods.

But if the world stops using that money, the US has a real problem. So, alienating allies is not a good idea.

Dominance of Manufactured Goods in the U.S. Trade Deficit



U.S. Trade Deficit



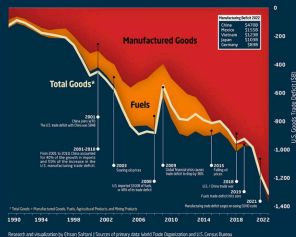
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Balaji is arguing the United States profits from **seignorage** because the U.S. dollar is a superior currency for international exchange to explain why the trade deficit is actually a good thing (he's right)

U.S. Trade Deficit



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The U.S. dollar has historically been a strong **store of value** and **medium of exchange** for international trade. Might that change? If it does, what consequences would that have?

SP500 vs Bitcoin



- Why the close correlation?

SP500 vs Bitcoin



- Why the close correlation? Institutional investors who own both and buy/sell whole portfolio in unison?

SP500 vs Bitcoin



- Why the close correlation? Institutional investors who own both and buy/sell whole portfolio in unison?
- Is Bitcoin a hedge against the stock market?

6 Credit Cards

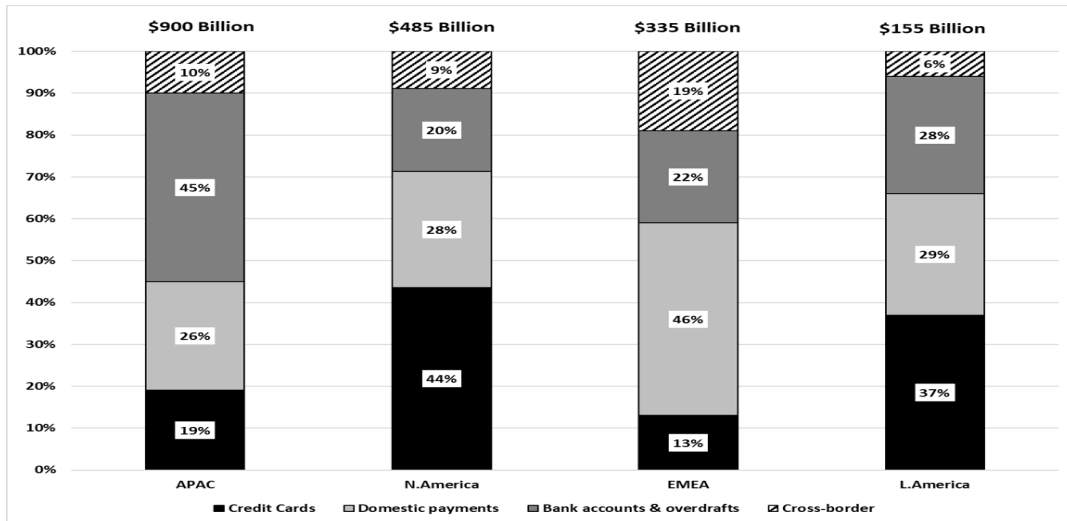
Payment Types and Fees

The \$2 trillion-dollar (McKinsey 2020 estimate) payments industry has grown, fueled by e-commerce and the digital economy

Consumers and businesses face **many pain points** in payments and money transfer: **slow, non-transparent & costly particularly when they cross national borders.**

- A **bank wire** from one bank to another, for example, costs around \$20 and \$30 for outgoing transfer (2024) and \$10 for incoming transfer (2024) and takes several business days to arrive.
- Sending a **remittance** overseas may incur costs representing around 10% of the proceeds (depending on sending and receiving countries) and could take weeks to arrive.
 - Latin America received \$145 Billion in remittances in 2021, approximately equal to all foreign direct investment (World Bank)
- When sending a cross-border payment, the bank will deduct a **currency conversion fee** of up to 3% and may delay the FX trade until it is advantageous for them.

Payment Fees by Banks by Area



Payment Fees by Banks by Area

A \$2 Trillion Industry: [McKinsey](#) estimates it generates 40% of bank revenues

Huge differences in payment industry revenue models by continent:

- Credit cards are the dominant revenue stream in North America
- Europe, Middle East and African banks rely on domestic payment fees (mostly debit cards)
- Bank account fees and overdrafts are the dominant model in Asia-Pacific

Settlement

A payment is **settled** when all balances are updated to reflect the payment

- Historically, banks have used **deferred net settlement**:
 - Each bank sends(/receives) **one** payment to the central clearinghouse at the end of each day equal to their **net outflows**

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 - DNS also solves a problem called **gridlock** (next slide)
 - There is exposure to **counterparty risk**: a member can run away mid-day and default on their payables
- **Real-time gross settlement** is the modern standard
 - Cost of digital payments on centralized systems approach zero
 - High gas fees in decentralized systems, and liquidity/gridlock problems for interbank transfers, remain good reasons to use DNS

Gridlock

Gridlock can occur when desired trading volume is much higher than liquidity:

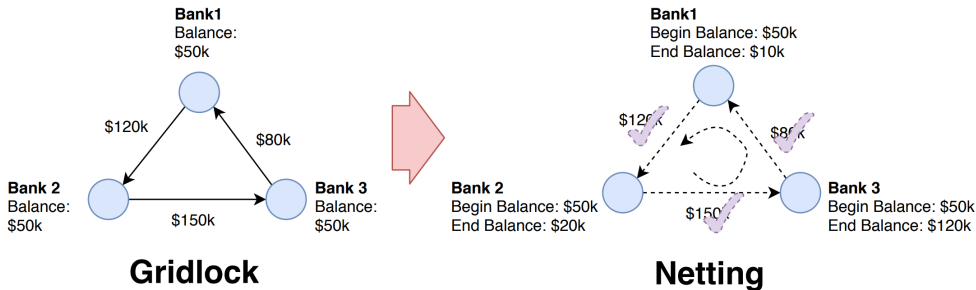


Fig. 1. Illustration of a gridlock scenario and netting procedure

Source: Cao et al (Ant & IBM)

Gridlock

Why does gridlock exist?

- Banks prefer to hold as little liquidity as possible – why?

Gridlock

Why does gridlock exist?

- Banks prefer to hold as little liquidity as possible – why?
 - Would prefer to lend out money instead of keeping it in a vault
- “Accident of history”/ sticky technology – moving money between banks used to be technologically cumbersome

Current Banking Payment Infrastructure

The Payment Rails: Electronic payments travel along a physical network of cables and wires connecting computers globally, known as the "payment rails".

- **B2B payments use the Large value transfer system (LVTS):** large sums of money and financial securities travel between banks, businesses & government in 1 day or less, with many countries offering real-time gross settlement (RTGS).
 - USA: Fedwire and CHIPS. Canada: Lynx. Europe: TARGET2.
- **Consumer payments** via checks, credit & debit use "smaller rails" with slower settlement: usually a few days.
 - USA: Automated Clearing House (ACH). Canada: ACSS
 - Bo's Chase credit card on March 10th: transactions pending from March 7th

Pending (3)		\$53.56
	QUIKTRIP 03/09/2025	\$24.60 >
	CHINA KITCHEN 03/09/2025	\$14.48 >
	CHINA KITCHEN 03/07/2025	\$14.48 >

Payment Industry FinTech Companies

More \$1 billion fintech unicorns have been born in payments than in any other area of financial services.

Payments represent a vast opportunity for disruption.

- Fintechs are providing new payment methods, targeting **underserved customers**, **automating billing**, **reducing FX costs**, and **facilitating international remittances**.
- These innovations create trust, reduce frictions, and bring valuable services to unbanked populations.
 - USA: PayPal, Square & Stripe
 - Europe: Adyen, Klarna & Wise (formerly TransferWise)
 - India: Paytm & Razorpay
 - China: Ant Group & Tencent WePay

What is a Unicorn Company

TOTAL NUMBER OF UNICORN COMPANIES WORLDWIDE: 1,217
TOTAL CUMULATIVE VALUATION: ~\$3,776 billion

What is a unicorn company?

A unicorn company, or unicorn startup, is a private company with a valuation over \$1 billion. As of November 2023, there are over 1,200 unicorns around the world. Popular former unicorns include [Airbnb](#), [Facebook](#), and [Google](#). Variants include a decacorn, valued at over \$10 billion, and a hectocorn, valued at over \$100 billion. Download the full list today to see each company's valuation, investors, and more.

Source

Stripe

From payment processor Stripe's [annual letter](#):

“Businesses on Stripe generated \$1.4 trillion in total payment volume in 2024, up 38% from the prior year, and reaching a scale equivalent to around 1.3% of global GDP. We attribute this year's rapid growth in part to our long-standing investments in building machine learning and artificial intelligence into our products.”

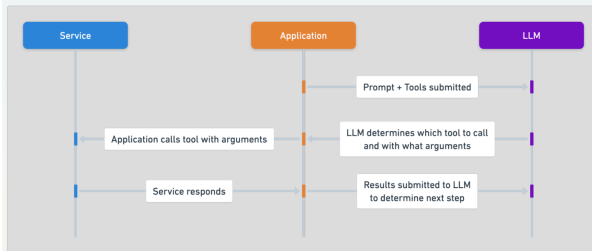
Stripe support for Agentic Workflow

What is an agentic workflow?

An “agentic workflow” combines large language models and function calling to achieve an objective. For example, consider searching for and purchasing a flight. A user may query, “Book a flight from New York to San Francisco on 4/24 for under \$500.” To achieve this, we need to be able to:

1. Turn the query into variables – `origin`, `destination`, `departure_time`, and `budget`.
2. Search and filter a flight database provided those variables.
3. Present the user with the options and enable them to select.
4. Purchase the flight.

Frameworks including [Vercel's AI SDK](#), [LangChain](#), and [CrewAI](#) make it easier to build multi-agent workflows, breaking down each task and assigning to specialized agents. “Tools” can be provided to an agent – in this case to search online or to execute a purchase. These tools are code snippets that the LLM provider can “ask” the agent framework to execute.



Stripe API for AI agents

Integrate function calling

With Stripe's agent toolkit, you can provide your agents access to the Stripe API. It natively supports [Vercel's AI SDK](#), [LangChain](#), and [CrewAI](#), and works with any LLM provider that supports function calling. It's built on top of Stripe's [Node.js](#) and [Python](#) SDKs.

For example, imagine we want to build a “business partner” agent that can help facilitate tasks like invoicing users. We can instantiate a new `StripeAgentToolkit` with our secret key and pass its tools to the agent.

```
import {StripeAgentToolkit} from '@stripe/agent-toolkit/ai-sdk';
import {openai} from '@ai-sdk/openai';
import {generateText} from 'ai';

const toolkit = new StripeAgentToolkit({
  secretKey: "sk_test_123",
  configuration: {
    actions: {
      // ... enable specific Stripe functionality
    },
  },
});

await generateText({
  model: openai('gpt-4o'),
  tools: {
    ...toolkit.getTools(),
  },
  maxSteps: 5,
  prompt: 'Send <email address> an invoice for $100',
});
```

Give your AI agent a credit card

Create a card

Create a [Card API](#) and assign it to the cardholder. This request contains the ID of the `Cardholder` object, `currency`, and `virtual` for the card type.

Issuing-only

Issuing with Treasury

Command Line

Select a language

cURL ↕



```
$ curl https://api.stripe.com/v1/issuing/cards \  
> -u "sk_test_4eC39HqLyjWDarjtT1zdp7dc:" \  
> -d cardholder=ich_1MGlTC2eZvKYlo2CJnowP9Z5 \  
> -d currency=usd \  
> -d type=virtual
```

Stripe returns a `Card` object upon creation, and sends the `issuing_card.created` [webhook](#) event.

- A real human's name must still be on the credit card (why?)

Stripe acquisition of Bridge

“In October, we announced our acquisition of [Bridge](#), the world’s leading stablecoin orchestration platform. Bridge enables businesses to do almost anything involving stablecoins: they make stablecoin-based applications easy to deploy and scale. They’re used by everyone from Scale AI to the world’s largest hodler [sic], the US government.

The top stablecoin use cases today involve tangible, real-world activity. CFOs use stablecoins to manage corporate treasury, immigrants use them for remittance, citizens of countries with unstable currencies use them for dependable savings, and payments teams use them to enable customers from countries with low card penetration. Some of our favorite examples: SpaceX uses Bridge to repatriate funds from Starlink sales in Argentina, Nigeria, and other markets. DolarApp, a neobank in Mexico, uses Bridge to help individuals receive USD payments from payroll providers like Deel. Airtm uses Bridge to disburse payments to workers all over Latin America.”

Welcome! Today is Wednesday, October 29, 2025

This is our third-to-last lecture of the semester!

Review: The Kelly Criterion

From the quiz on Monday: what does the Kelly Criterion say to bet when offered +200 on a 50% true probability event?

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Odds are 2

Edge / Odds = $0.5/2 = 25\%$ of your net worth.

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Stablecoin Payments Jump 70% Since New Regulation

From Bloomberg via Matt Levine:

“Business-to-business transfers make up the most of stablecoin payments at \$6.4 billion monthly - nearly two-thirds of the total and up 113% since February, the report said. This marks the first time business payments have exceeded peer-to-peer consumer transactions, which held steady at \$1.6 billion monthly, according to Artemis. Companies are using stablecoins to bypass traditional international banking delays.”

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- Top use case: cross-border B2B payments where **settlement speed** is a priority
- **The total is still tiny** relative to bank-railed payments (70% of a small number is small)
- 50% of all currency moving to and from Venezuela is now in the form of Stablecoins, evading sanctions

Sports Dominate Prediction Markets

At Bloomberg Intelligence, Jackson Gutenplan and Geovanni Alvarado have a note out today titled "Sports Betting Dominates Prediction Markets":

Kalshi's volume surge in September coincided with the start of the NFL season, and our analysis found 69% of September volume was in NFL and college football-related contracts. In total, \$2.5 billion was wagered on sports at Kalshi in September, 88% of all volume. Though other markets are also active — \$89 million wagered on crypto, \$108 million on finance/economy (including Fed decisions) and \$61 million on politics — Kalshi is essentially the first national sports-betting ecosystem.

Super Bowl futures can now be in one's brokerage account, and this may expand to prop bets and parlays, erasing any line between trading and gambling. Given an ETF can be structured around derivative futures, if the status quo continues it's conceivable to have sports bets in an IRA. When will we have the first Knicks Championship ETF?

Are Sports Prediction Markets Legal?

The law as written in the Code of Federal Regulations is awfully clear. No they are not! And yet, **prosecutorial discretion** is again the phrase of the day.

On the federal level, the CFTC has yet to weigh in. The commission canceled a public roundtable on prediction markets in April and has not rescheduled it. President Donald Trump's nominee to lead the commission, Brian Quintenz, sits on the Kalshi board and owns stock in the company. Quintenz, who served as CFTC commissioner during Trump's first term, is waiting to be confirmed by the Senate. Quintenz [has said](#) he will resign from the Kalshi board and divest his stock, if confirmed. The CFTC did not return a request for comment.

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Source: [ESPN](#)

Do Retail Prediction Markets Have a Legitimate Economic Purpose?

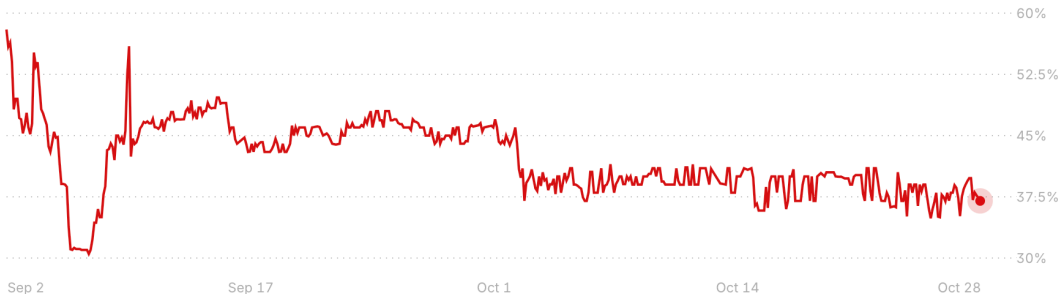


Will the Supreme Court rule in favor of Trump's tariffs?



37% chance ▼ 21 ⓘ

Kalshi



\$250,014 vol

6H 1D 1W 1M ALL

Are Retail Prediction Markets Good for Corporate Hedging?

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- Only \$250,000 market depth on Kalshi – could a corporate importer drop \$1 million into this market?
 - Absolutely not.
- Importers are doing this trade, but not on a retail exchange: Jefferies, Oppenheimer among Wall Street banks writing “tariff insurance” for corporates, some *over \$100 million* notional
- Does this mean Kalshi is useless?

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- Does this mean Kalshi is useless? Not necessarily! Kalshi provides a publicly-available **reference price** for these privately-negotiated contracts
 - The provision of **reference prices** in financial markets is extremely important, especially when they are prone to manipulation! See, for instance, how major banks recently started indexing contracts to the [SOFR reference rate](#), instead of LIBOR, precisely because SOFR is a public market price (unlike LIBOR)

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Corporate Blockchains

Recall when we discussed the **decentralization trade-off**: a decentralized system requires *redundancy* to be trustless, and this redundancy is very computationally expensive. Corporate blockchains (AKA “permissioned”, “private”, “high-throughput”, or “performance”) blockchains dispense with trustlessness to prioritize speed above all.

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- **Stripe** (enterprise payments provider) has acquired the **Bridge** platform (more like a UI/SAAS for businesses) and the **Tempo** blockchain
- **Tether** (#1 stablecoin issuer) is affiliated with **Plasma**
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Each of these projects promises Real-Time Gross Settlement on the order of milliseconds and relies on regulated Stablecoins as medium of exchange.

Advantages of Fast Payment Blockchains

If decentralization is abandoned as a goal, why even encode payments on a blockchain instead of just a trusted database?

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Some advantages of Blockchain technology remain despite losing decentralization:

- **Smart Contracts** can run verifiably on private blockchains (subject to censorship – but not manipulation, as we discussed earlier)
- **Digital Signatures** create tamper-proof records
- **Customizable Privacy** can allow users to toggle and verifiably control their level of anonymity (a priority for, e.g., Arc)

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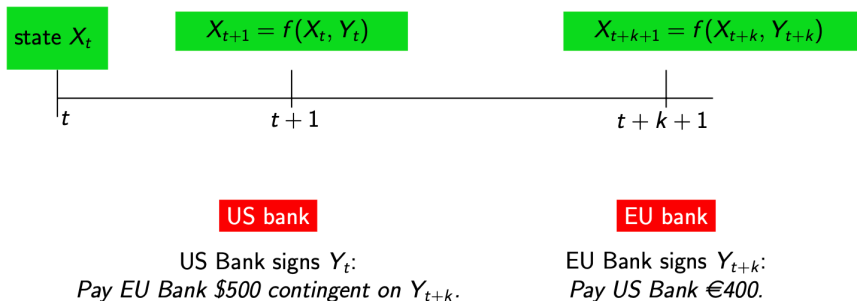
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However, serious criticisms remain that a corporate-controlled, government-controlled system will deliver competitive prices and guarantees against censorship and inflation:

Omed Malekan

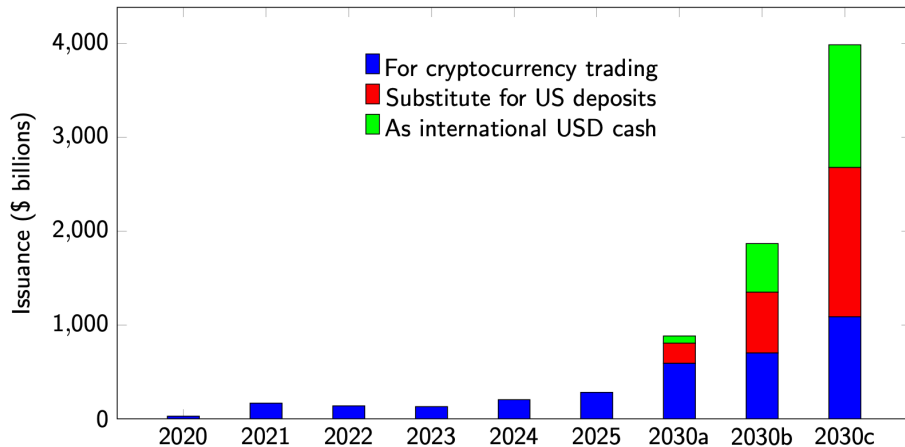
Smart Contract Use Case for Corporate Blockchains: FX Trade



- Blockchains allow *contingent transfers* without trusting the counterparty or even a clearinghouse (Graphics by Darrell Duffie)
- [Jura](#) (France and Switzerland), [Cedar](#) (FRBNY + Singapore)

Projected Growth of Stablecoins

Citi's forecast of the stablecoin market



Data: Citi, September, 2025

Macroeconomic Concerns

A number of macroeconomic concerns have been raised around the possibility of corporate stablecoins displacing traditional payment rails:

- **Excessive Leverage:** Stablecoin issuers may over-mint, make bad investments, or be run on
- **Loss of Credit Supply:** If traditional banks lose deposits they may make fewer loans, harming growth

My opinions: Critique 1 is weak because Stablecoin issuers will be no harder to regulate macroprudentially than banks (they may in fact be much easier to regulate) in the long run. My response to critique 2 is that consumers should have the choice to hold cash-like, non-interest-bearing digital assets without them being secretly lent out.

- These are the exact same concerns the United States faced with private banknotes in the Free Banking Era (1863 to 1935)!

Ye Olde StableCoins



Free Banking Era vs. Modern “Stablecoin Era”

The Free Banking Era ended with a disastrous economic collapse. Have we learned our lesson?

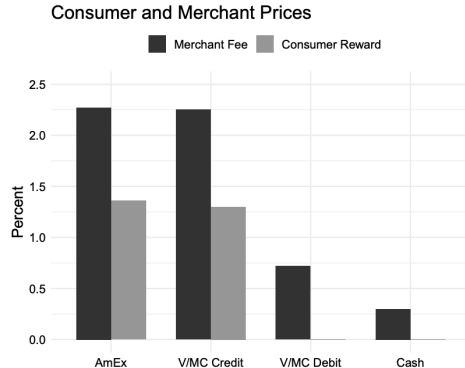
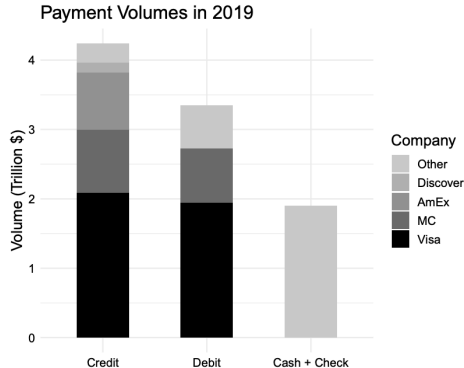
- **Collateral Requirements:** FBA allowed state-issued bonds to be used as collateral, which frequently defaulted! GENIUS Act only allows federal bonds as collateral in U.S..
- **Fungibility:** Lack of fungibility between banknotes hindered their ability to function as money. This concern is particularly strong today in Europe, which lacks fiscal unity → e.g. Greek stablecoins might not trade at par with German ones.
- **Seignorage:** Banks collected interest on bonds while issuing interest-free notes (or today, stablecoins), allowing them to capture *seignorage* instead of the federal government! This can weaken the financial position of the U.S. Treasury.

Source: [Stephan Luck, FRBNY for Liberty Street Economics](#)

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Credit Cards Dominate U.S. Payments



Source: [Lulu Y. Wang, Kellogg SOM](#)

Credit Cards Bundle Payments and Lending

- A Credit Card is not just a payment, but also a revolving loan that starts incurring interest if it is not repaid at the end of the month following the purchase
- Why are credit cards so popular relative to debit cards in the U.S.?

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 - Americans are impatient and optimistic, so we just love to borrow (Hall (2025))
 - The **Durbin Amendment** caps interchange fees for debit cards but not for credit cards → banks steer customers towards using cards to collect more fees from merchants (Wang (2024))
 - Merchants are increasingly **surcharging** to equalize these fees and make cardholders internalize the card fee, but cardholders continue to perceive this as an *unfair business practice*, harming brand value of merchants who do surcharge.
- Creditworthy customers are also more profitable customers for businesses! Merchants pay interchange for access to high-margin customer flow. Would you rather fill up your store with Low-FICO or High-FICO customers?

Credit Cards Comprise Two Parallel Economies

The economics of High- and Low-FICO (credit score) credit cards are totally different, despite using the same type of contract!

Cost Side (from bank's perspective)

- **High FICO**: High volume but low default rate: cost is **rewards expenses** (paying to give cardholders AmEx Lounges etc.)
- **Low FICO**: Low volume but high default rate: cost is **chargeoffs** (loan not paid and no collateral)

Revenue Side (from bank's perspective)

- **High FICO**: High volume = high **interchange income**
 - Banks can demand higher fees from merchants to process payments from richer, more profitable customers
- **Low FICO**: Keeping high balances, and not paying off in full, for many months means means high **interest and fee income**

Credit Cards Comprise Two Parallel Economics

In summary:

- **low-FICO** credit cards are a lending business comparable to payday loans.
- **high-FICO** credit cards are a utility and service business comparable to subscriptions.

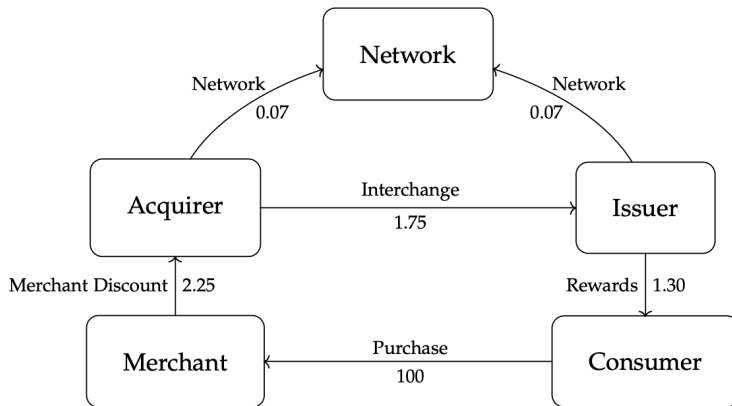
Credit Card Payment Infrastructure: Fees

Table 9.1. Fees Charged for \$100 Credit Card Payment

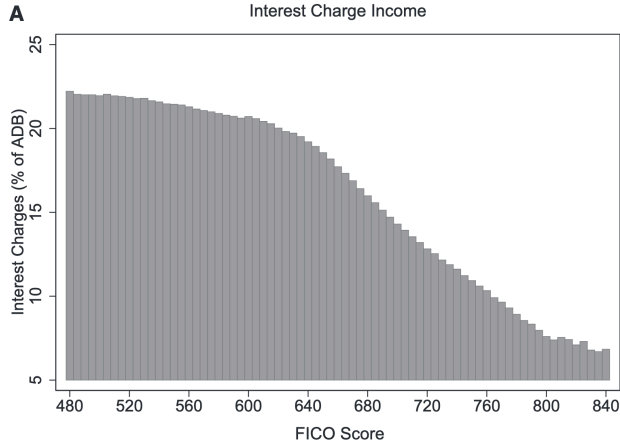
Who	Amount	%	Notes
Customer pays	\$ 100.00		
Less: Merchant discount	\$ 2.00	2.00	Merchant fee + interchange
Less: Assessment fee	\$ 0.11	0.11	VISA, MasterCard
Less: Processing fee	<u>\$ 0.50</u>	0.50	\$0.50/transaction
Merchant receives	\$ 97.39		
Who gets what?			
Issuing bank	\$ 1.75	1.75	Interchange fee
Card network	\$ 0.11	0.11	Assessment fee
Payment gateway/processor	\$ 0.50	0.50	Processing fee
Merchant bank	\$ 0.25	0.25	Merchant fee (surcharge)

Credit Card Payment Flowchart

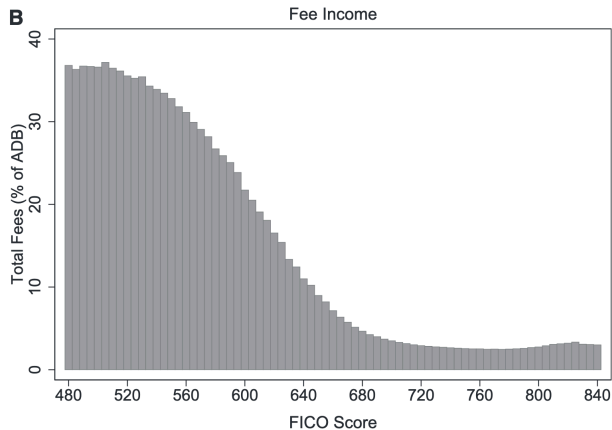
Figure 1: Illustration of payment flows in a payment network.



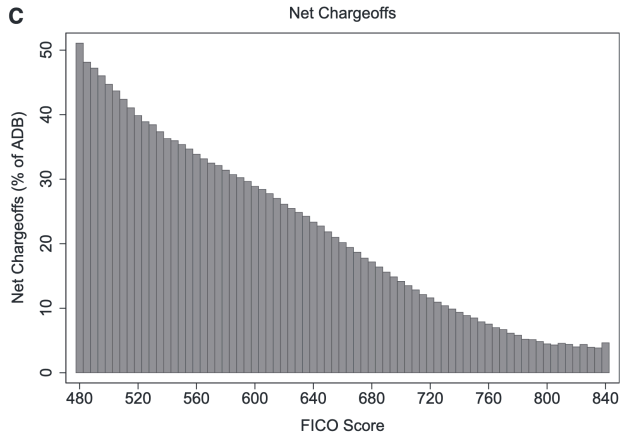
Credit Cards Comprise Two Parallel Economies



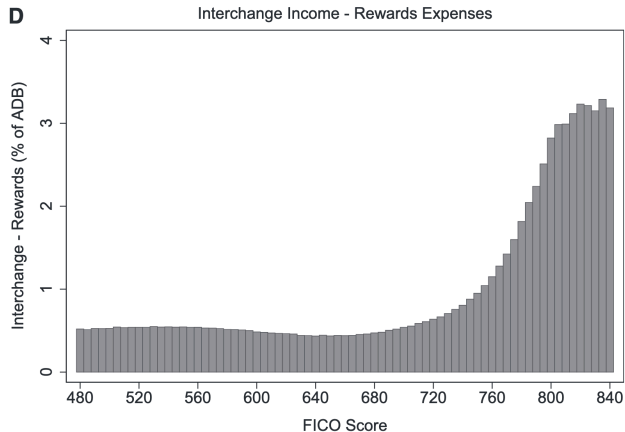
Credit Cards Comprise Two Parallel Economies



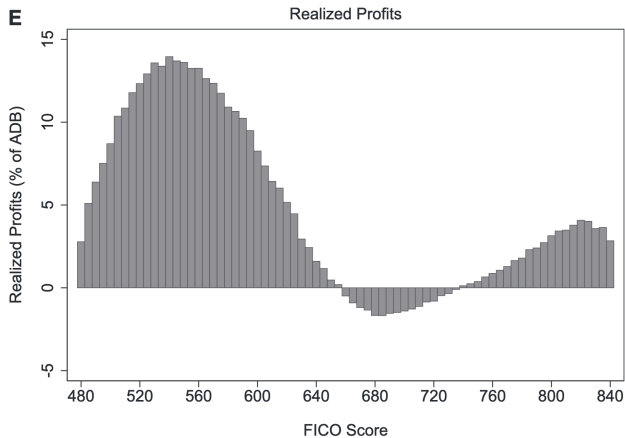
Credit Cards Comprise Two Parallel Economies



Credit Cards Comprise Two Parallel Economies



Credit Cards Comprise Two Parallel Economies



Source: [Agarwal et al \(2015\)](#)