

Why does your \$100 bill not know if it is paying rent or funding crime?

The limitations of “dumb” money:

- A banknote carries no conditions — once spent, the sender loses all control
- Cash cannot enforce spending rules, expiry dates, or recipient restrictions
- Wire transfers have no built-in logic — they move value, nothing more
- Governments cannot target stimulus to specific goods or regions

Real-world consequences:

- **Aid leakage:** commonly cited estimates place diversion at 20–30% of aid disbursements (Source: UN OCHA and Transparency International reviews); exact figures are inherently hard to measure
- **Tax fraud:** cash economy enables unreported transactions
- **Welfare misuse:** cash benefits can be spent on anything
- **Corporate expense fraud:** employees misuse company cards

The core limitation:

Money today is a *bearer instrument* — whoever holds it controls it. There is no way to embed rules into the money itself.

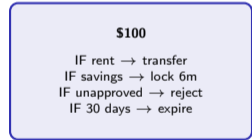
Key insight: Physical cash and traditional bank transfers are “dumb” — they carry value but no instructions.

Money has been “dumb” for 5,000 years — programmable money adds conditional logic to value transfer for the first time.

Today:
“Dumb”
money



Future:
“Smart”
money



Imagine your salary arriving as programmable tokens that manage your budget automatically

The scenario:

It is the 1st of the month. Your salary of €4,000 arrives — not as a single bank transfer, but as programmable tokens with built-in rules:

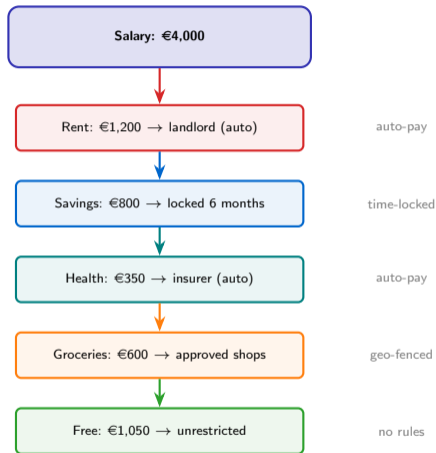
- **Rent (30%):** €1,200 auto-transfers to your landlord
- **Savings (20%):** €800 locks in a savings contract for 6 months — you cannot touch it early
- **Health insurance:** €350 auto-pays your insurer
- **Groceries (15%):** €600 tagged for approved supermarkets only
- **Discretionary (25%):** €1,050 unrestricted — spend on anything

What changes:

- No missed rent payments — the money moves itself
- No willpower needed for saving — the lock is in the code
- Budgeting happens *in the money*, not in a separate app

The question: Helpful automation or loss of freedom?

Programmable salary automates budgeting at the money layer — but the same rules that help you save could also restrict your freedom if set by someone else.



What is programmable money — and how do IF-THEN rules get embedded in tokens?

Definition: Programmable Money

Digital currency with embedded smart contract logic that enforces conditions on how, when, where, and by whom the money can be spent. The rules execute automatically — no intermediary needed.

Types of programmable rules:

- **Time conditions:** expires after 30 days, unlocks on a date
- **Spending restrictions:** valid only at approved merchants
- **Geographic limits:** spendable only within a city or region
- **Conditional release:** released when delivery is confirmed
- **Non-transferable:** cannot be sent to another person
- **Audit trail:** every transaction recorded permanently

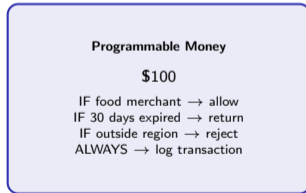
The formula:

Digital currency + smart contract = programmable money
(A **smart contract** is a program stored on a blockchain that executes automatically when conditions are met — like a vending machine for financial agreements.)

Key insight: Traditional money separates value from rules. Programmable money merges them. — the rules travel with the value.



+ smart
contract



How did Shenzhen distribute 10 million RMB in programmable digital red envelopes?

China's e-CNY pilot (Shenzhen, October 2020):

- Shenzhen government distributed 10 million RMB (\$1.5 million) in digital red envelopes
- 50,000 citizens won 200 RMB each via lottery
- Downloaded the e-CNY wallet app to receive tokens

Programmable rules embedded in the tokens:

- **Expiry:** must be spent within 7 days or tokens vanish
- **Merchant restriction:** valid only at 3,389 approved retailers
- **Non-transferable:** cannot be sent to another person
- **Geography:** spendable only in Luohu district, Shenzhen

Results:

- 88% of recipients spent their tokens
- Stimulated \$2.6 million in additional spending
- Government tracked every transaction in real time

Key insight: This was stimulus that expired — forcing spending, targeting local businesses, and generating a complete audit trail.

Shenzhen's digital red envelopes showed that programmable money can achieve 88% spending rates — but at the cost of full transaction surveillance.

Feature	e-CNY Red Envelope
Amount	200 RMB per person
Recipients	50,000 citizens
Total distributed	10 million RMB
Valid period	7 days
Merchants	3,389 approved
Geography	Luohu district only
Transferable	No
Redemption rate	88%
Tracking	Full real-time audit

Comparison with traditional stimulus:

Cash stimulus cheques in the US had no expiry, no spending restrictions, and no real-time tracking. Studies estimate 33% was saved, not spent.

The trade-off: Higher spending rate, but complete government surveillance of every transaction.

Worked example: \$10M in programmable disaster relief — from 30% leakage to under 5%

Scenario: Earthquake in Southeast Asia. UN distributes \$10 million in relief funds to 50,000 affected households.

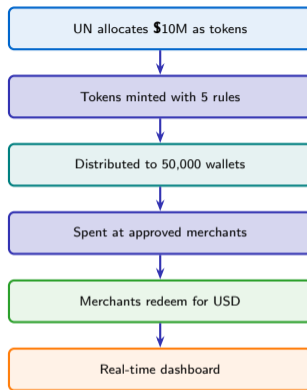
Traditional cash distribution:

- Cash transported to distribution points
- Recipients sign paper receipts
- Estimated leakage: 30% (diversion, corruption, theft)
- Audit happens months later via sampling
- Net reaching victims: \$7 million

Programmable token distribution:

- \$200 per household as programmable tokens
- **Rule 1:** food and medicine purchases only
- **Rule 2:** expires after 30 days (prevents hoarding)
- **Rule 3:** geo-fenced to affected region
- **Rule 4:** real-time audit trail for every transaction
- **Rule 5:** non-transferable (prevents resale)

Result (hypothetical scenario): leakage modelled at under 5%.
Net reaching victims: ~\$9.5 million.



	Cash	Tokens
Budget	\$10M	\$10M
Leakage	30%	<5%
Reaches victims	\$7M	\$9.5M
Audit	Months	Real-time

Leakage figures modelled from UN OCHA / Transparency International aid-diversion

Programmable relief tokens can save \$2.5M per \$10M distributed by eliminating diversion — but recipients lose the freedom to spend as they choose.

The dark side: when programmable money becomes a tool of control and surveillance

Government surveillance:

- Every transaction recorded and traceable
- Government sees what you buy, where, and when
- No possibility of anonymous transactions
- Spending patterns reveal political views, health, relationships

Financial coercion:

- **Forced spending:** expiry dates mean you must spend or lose value
- **Geo-fencing:** restricts mobility and cross-border transactions
- **Merchant restrictions:** government decides what you can buy
- **Negative interest:** programmed value decay to force spending

Social credit integration:

- Low social score = restricted spending categories
- Dissidents could have money programmed to exclude transport
- Tax debts could auto-deduct from your wallet
- Programmable money + social credit = unprecedented control

Warning: The same features that make disaster relief efficient also make financial authoritarianism possible.

SAME FEATURE

Targeted aid

Spending surveillance

Anti-fraud expiry

Forced spending

Regional stimulus

Mobility restriction

Audit transparency

Where is programmable money being deployed — from central banks to corporate payroll?

Central Bank Digital Currencies (CBDCs):

- **China e-CNY:** most advanced, 260M+ wallets, pilot in 25+ cities
- **EU digital euro:** ECB preparation phase, launch target 2027–2028
- **Bahamas Sand Dollar:** live since 2020 (first CBDC)
- **Nigeria eNaira:** live since 2021, limited adoption
- 130+ countries exploring CBDCs (BIS survey)

DeFi programmable tokens:

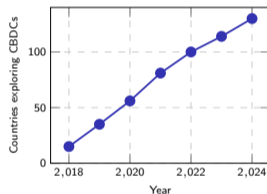
- Stablecoins with built-in yield (e.g., DAI / Sky savings rate)
- Vesting contracts: tokens unlock over time for employees
- Conditional payments: escrow released on delivery confirmation
- *2026 regulatory context:* EU MiCA stablecoin rules in force since June 2024; US GENIUS Act (signed 2025) licences payment stablecoin issuers federally

Corporate and institutional:

- JPMorgan Onyx: programmable payments for institutions
- Programmable payroll: salary tokens with auto-deductions
- Supply chain payments: conditional on delivery verification

130+ countries are exploring programmable money through CBDCs — the question is no longer “if” but “how” and “with what safeguards.”

Project	Type	Status
e-CNY	CBDC	Pilot (25+ cities)
Digital euro	CBDC	Preparation
Sand Dollar	CBDC	Live (2020)
eNaira	CBDC	Live (2021)
DAI / Sky	DeFi	Live
JPM Onyx	Corp	Live (B2B)



Source: BIS, Atlantic Council. Figures illustrative.

Is programmable money a tool for financial inclusion or financial control?

The inclusion argument:

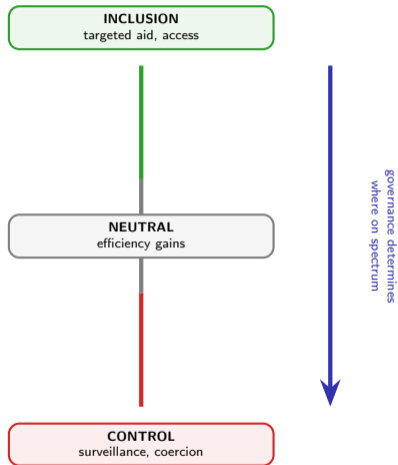
- **Targeted welfare:** ensures benefits reach food and medicine
- **Financial literacy in code:** budgeting automated, not taught
- **Reduced corruption:** real-time audit eliminates diversion
- **Access for unbanked:** CBDC wallets without bank accounts
- **Lower remittance costs:** programmable cross-border transfers

The control argument:

- **Surveillance money:** every transaction visible to the state
- **Weaponised finance:** freezing accounts without court orders
- **Behavioural nudging:** negative interest rates force spending
- **Censorship:** blocking donations to opposition groups
- **Social engineering:** reward “good” spending, penalise “bad”

Key insight: The difference between inclusion and control is not the technology — it is the governance framework around it.

Programmable money sits on a spectrum from inclusion to control — democratic governance and privacy safeguards determine the outcome.



**Programmable money can enforce rules automatically —
but the same technology that enables targeted aid
also enables unprecedented financial surveillance.**

Positive potential

- Targeted welfare
- Reduced aid leakage
- Automated budgeting
- Anti-corruption audit

Negative potential

- Transaction surveillance
- Forced spending (expiry)
- Mobility restriction
- Social credit coupling

What matters most

- Democratic governance
- Privacy safeguards
- Opt-out rights
- Independent oversight

The debate over programmable money is not technical — it is political. Who writes the rules? Who can change them? Who oversees the system?

Discussion Question

A government proposes replacing cash welfare with programmable tokens. The tokens:

- Expire in 30 days (cannot be saved)
- Can only purchase food, medicine, and utilities
- Cannot be transferred to another person
- Generate a full transaction log for audit

Debate: *Is this efficient social policy that protects taxpayer money — or authoritarian control that removes the dignity of choice from welfare recipients?*

Consider: Who decides what counts as “essential”? What if someone needs to buy a birthday gift for their child?

Further Reading

- Auer et al. (2022), “Central bank digital currencies: motives, economic implications and the research frontier,” *BIS Working Papers*
- Brunnermeier et al. (2019), “The Digitalization of Money”
- Atlantic Council CBDC Tracker: atlanticcouncil.org/cbdctracker