

Philosophy *of* Money

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University of Bayreuth, 4-6 July 2025

2 Requirements for 5/6 ECTS

Short essay (with presentation). 2,000 words

Long essay. 4,000 words

Topics. Anything from the syllabus, or anything relating to the philosophy of money

Expectations. Engage with literature, defend your own independent claim

Details: see <https://matthiasbrinkmann.de/slides/guide.pdf>

Deadlines.	Send proposal (required):	15 August
	Receive major feedback (voluntary):	1 September
	Handing in (required):	1 October

3 Interdisciplinarity

Money is addressed in various disciplines, such as

- Economics: what are the economic impacts of different monetary systems and monetary policies? How can money be explained through individual incentives?
- History: how did money first originate? What different monetary systems have existed over time? What led to changes in these systems?
- Anthropology/Sociology: what is the social significance of money in different societal systems? What are the social impacts of a monetary system?
- Political Science: which political forces lead to changes in the monetary system?

4 Money in Philosophy

1. Social Ontology: what is money?
2. Political Philosophy: how should money be politically regulated, organised, created, etc.?
3. Philosophy of Science/Economics: does money pose special problems for measurement, economic research, etc.?
4. Applied Ethics: how should banks behave? what is the function of finance?
5. Ethics: is there something wrong with putting prices on everything?

We will mostly deal with questions 1 and 2. There is not that much philosophical research on these questions!

5 Schedule

Friday, 4 July

- 12.30-13 Introduction
- 13-14 Money as medium of exchange
- 14-15 Money as debt P, A
- 15-17 Money in social ontology

Saturday, 5 July

- 10-11.30 Money creation P, A
- 11.30-13 Alternative monetary systems P

- 14-15.30 Legitimacy of central banks P
- 15.30-17 Monetary policy, inflation P, A
- 17-18 Unorthodox monetary policy P

Sunday, 6 July

- 10-13 Cryptocurrencies P
- 14-15 Usury and interest
- 15-16 Social meaning of money P
- 16-16.30 Closing, Feedback

We will keep a flexible schedule!

Your Questions! (10 mins.)

Write down for yourself:

- What am I most interested in (in the philosophy of money)?
- What do I want to understand by the end of this seminar?
- What are my expectations?

1

The Nature and Functions of Money

8 Functions of Money

A standard view in economics: Money has three functions,

1. Medium of exchange
2. Unit of account
3. Store of value

9 Questions

Functions: 1. Medium of exchange, 2. Unit of account, 3. Store of value

1. Does money have to fulfill *all* these functions to be considered money?
 - a. Can we imagine money that only fulfills some of these functions?
 - b. Are there historical examples of money only fulfilling some of these functions?
2. Is one of these functions **more fundamental** than the others for the definition of money?

10 Questions about the functions of money

1. Must money fulfill all these functions to be considered money?

Counterexample for unit of account without medium of exchange: “Unidade Real de Valor” (URV)

- 1994: Economic reforms in Brazil (Plano Real) due to hyperinflation of the existing *cruzeiro real*
- URV introduced as a stable price index
- No printed/physical form of the URV; prices expressed in URV, paid in *cruzeiro reais*

11 Questions about the functions of money

2. Can some of the functions be explained by others?

First idea: The medium of exchange function explains the store of value function.
(I store value as money because I want to exchange it for something else in the future.)

Second idea: The medium of exchange function explains the unit of account function.
(Because things are exchanged using money, the value of things is measured in money.)

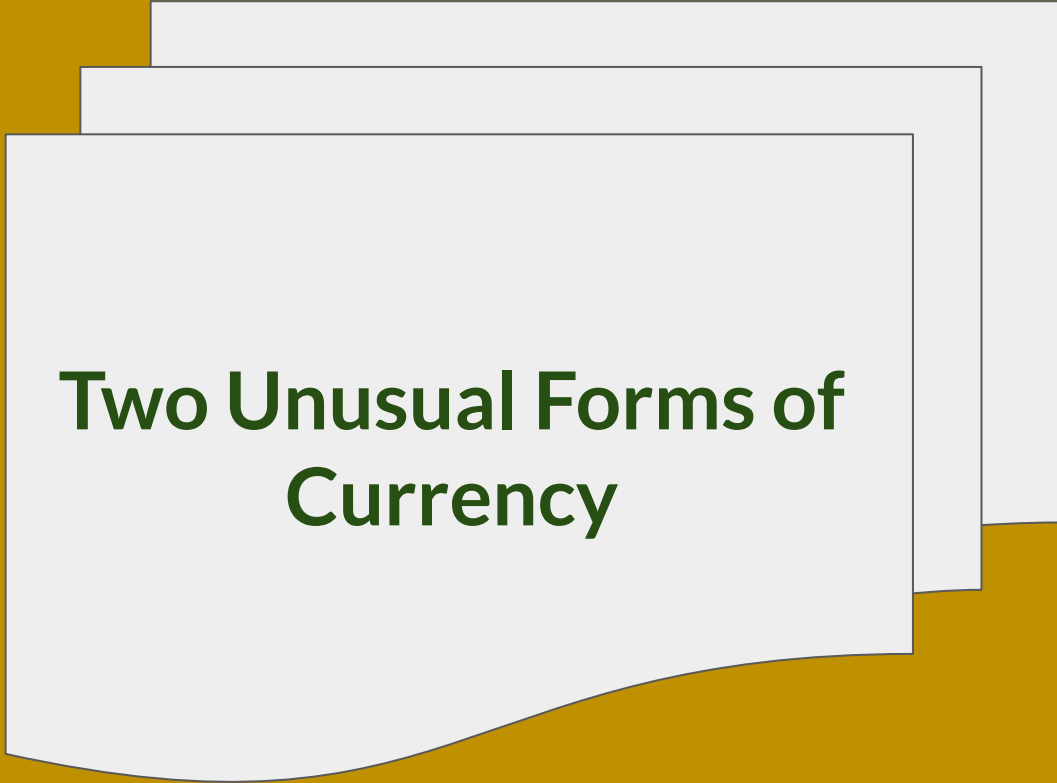
Third idea: The unit of account function explains the medium of exchange function.
(Because we measure the value of things in money, we use it for exchanging things.)

12 Two Theories

Commodity Theory of Money. Money is a type of commodity. Its primary function is as a medium of exchange. The other functions of money are explained by this primary function.

Credit Theory of Money. Money is a type of social relation between creditors and debtors. Its primary function is as a unit of account. The other functions of money are explained by this primary function.

We will ask whether the commodity theory or the credit theory better explains the nature of money.



Two Unusual Forms of Currency

I Menger on the Origins of Money

15 Double Coincidence of Wants

I have Good A and want to acquire Good B. If there is no money and goods are only exchanged directly (barter), then:

- I must find someone who has exactly Good B and wants to acquire Good A
- It is difficult to determine a price for the exact exchange ratio A/B , especially if little A/B trade occurs
- Perhaps Good A or Good B is not easily divisible, transportable, storable, etc.
- Problems become exponentially more difficult with the number of goods being traded

16 The Origins of Money

- Different marketability of various goods—e.g., varying levels of supply and demand
- Individual incentive to acquire goods with higher marketability
- The most marketable goods develop into commonly accepted means of exchange = money
- Important characteristic: fungibility, i.e., interchangeability
 - goods that are as homogeneous, qualitatively equivalent, easily transportable, divisible, etc., as possible = typically precious metals
- Self-reinforcing process

Similar version of this story in Smith, Jevons, etc. and contemporary economics textbooks

Discussion (10 mins.)

What makes the 'barter origin story' appealing?

What good features does it have as a scientific explanation?

18 Appeal of the Barter Origin Story

- Intuitive story based on clear foundational assumptions
 - “Invisible hand” explanation
 - No collective coordination or collective intentionality required
- Self-reinforcing process based on individual incentive mechanisms
- Implicit message: the market creates efficient money on its own, no state involvement necessary
- Elegant explanation of why money fulfills all three classical functions of money

Your Comments and Questions

Is digital central bank money still a “naturally” developed medium of exchange or an expression of technocratic control?

In Menger's theory, the most marketable good is always used as the highest medium of exchange. However, this would have to be based on rationality and complete market information, which I am not sure existed at the time. So how was the most marketable good determined back then? This is not dealt with in detail in Menger's text.

Can Menger's commodity-based theory fully account for the stability and widespread acceptance of today's purely fiat currencies, which have no backing to a physical good?

Can a theory developed in a pre-digital age still explain the emergence of purely digital currencies today?

The question on what the origin of money is might be anthropologically interesting but both answers don't diminish the importance of the question of how the stability of value is kept.

II

Graeber on the Origin of Money

21 Graeber: Missing Historical Evidence

Central claim: many economists tell a story like Menger about the origins of money; but this story is pure fantasy.

1. There is no verified historical example where money emerged from barter (commonly cited examples are often based on incorrect information)
2. Historically documented forms of barter do not resemble the typical story
 - a. Nambikwara: primarily exchange between strangers, often hostile, highly ceremonialised
 - b. Gunwinggu: more peaceful version, also involving sex
 - c. Pukhtun: barter only with distant strangers
 - d. In general, barter is often temporally delayed, and an immediate return of goods is not envisioned
3. Where money did emerge, it often does not appear to have originated from barter (example: Mesopotamian temple economy)

22 Summary

“In fact, our standard account of monetary history is precisely backwards. We did not begin with barter, discover money, and then eventually develop credit systems. It happened precisely the other way around. What we now call virtual money came first. Coins came much later, and their use spread only unevenly, never completely replacing credit systems. Barter, in turn, appears to be largely a kind of accidental byproduct of the use of coinage or paper money: historically, it has mainly been what people who are used to cash transactions do when for one reason or another they have no access to currency.” (Graeber, *Debt*, 40)

Your Comments and Questions

Does this kind of credit-based system only work in small, tight-knit communities where people know each other? In large, anonymous societies like ours, can informal trust really hold things together without laws or institutions?

What makes this text so powerful is not just its rewriting of history, but its criticism of the ideological function of the barter myth. Graeber says that this story makes people think that humans are selfish, always looking out for themselves ... On the other hand, his portrayal of non-market societies, where generosity, trust and informal reciprocity are the norm, feels both radical and deeply human.

Has the creation of money deprived people of a sense of neighborly duty? Has money created a rift between what a good is worth in a monetary sense compared to its real worth (usefulness, emotional value, etc.)?

... if credit came first, why have societies repeatedly reverted to gold in times of crisis? It seems like during times of crisis, trust erodes and thus commodities become the natural arbiter of exchange.

Questions

1. What might a defender of Menger's origin story say in response to Graeber's critique?
2. Can the "money = medium of exchange" concept still be defended even if money did not originate from barter?

25 A Functionalist Response

What might a defender of Menger's origin story say in response to Graeber's critique?

Actual history: Money did, in fact, emerge as the origin story claims.

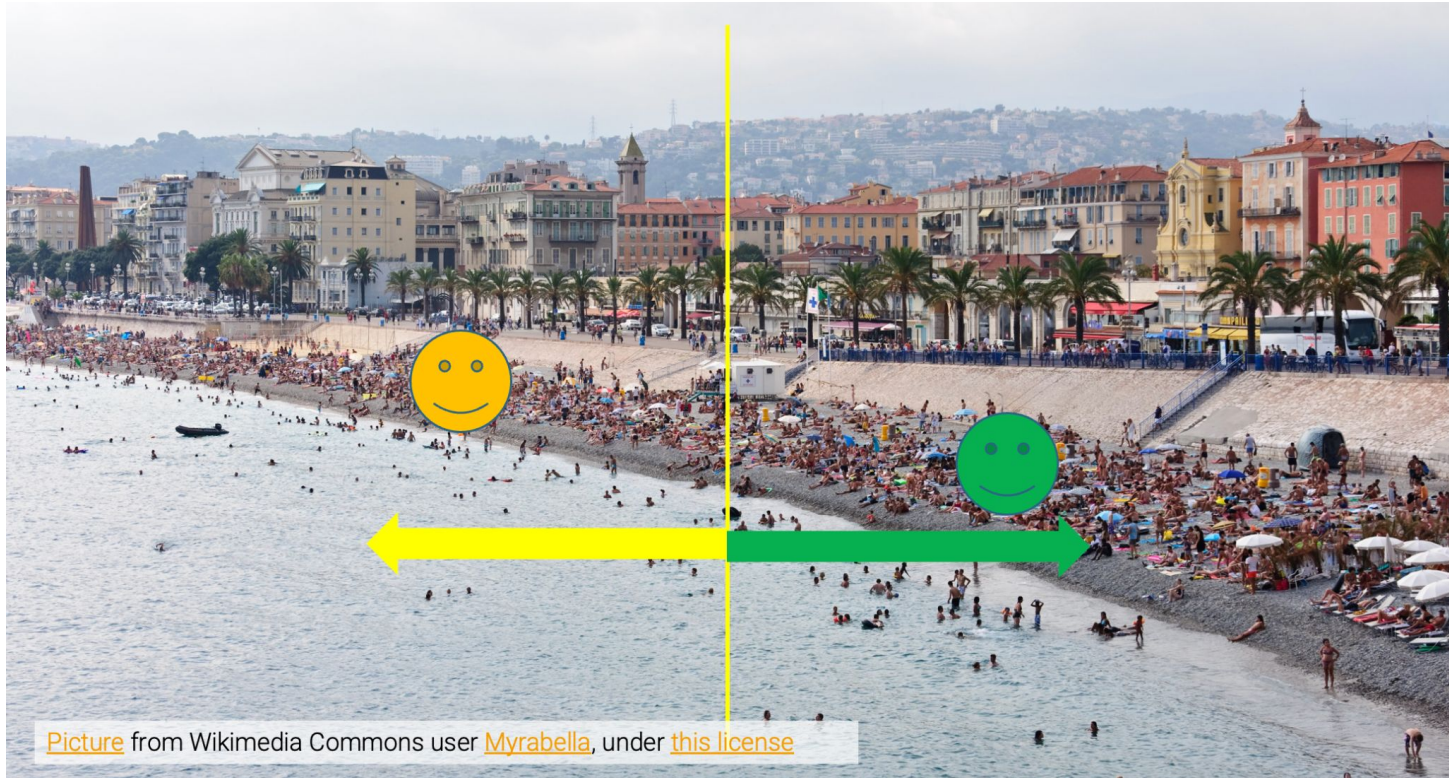
Consider what once happened...

Identification of an essential function: The origin story explains why money is efficient and useful, and why it continues to circulate.

Imagine if we didn't have money...

The defender of the barter 'textbook' story can insist that they were telling a functionalist story, not one about actual history.

26 Analogy: Hotelling model



27 Does Historical Accuracy Matter?

“No monetary theory may refuted by demonstrating the falsity of any claims by its author regarding the early history of money, nor can any be proven correct by demonstrating the accuracy of such claims by its author.” (Schumpeter, *Treatise on Money*)

Discussion. What is the relationship between the origin and the nature of money? Are these completely independent questions? Why (or why not)?

III

Commodity Theory and Medium-of-Exchange Theory

29 Extending the Commodity Theory

The **Commodity Theory** seems to entail that money is necessarily a (physical) commodity. But contemporary money is not a commodity in this sense. Can we modify the theory to allow for this?

The Medium-of-Exchange Theory. “something is money among a group of interacting agents if, and only if, it is typically acquired in order to realise the reduction in transaction costs that accrues in virtue of such agents coordinating on acquiring the same thing when deciding what thing to acquire in order to exchange” (Smit et al., 331)

This is a **functionalist theory**: money is whatever people use for exchange. This is more capacious than the commodity theory. People could use **non-physical items** for exchange.

30 Functionalism

Functionalism: something is a thing D if and only if it fulfills a function F .

Examples: a greeting is a form of how one greets.

a hammer is something with which one hammers.

Advantage of functionalism: we can more easily explain the multitude of different forms a thing takes (different types of greetings, hammers, money, ...).

What disadvantages might functionalism have?

31 Abstract Objects

What is a chess game?

- Attempt: a chess game is the physical process of two players shuffling around pieces
 - But: chess games can also happen online; in your head; entirely on paper
 - The chess game persists after the physical shuffling is over
 - Chess games can be represented abstractly (1. e4 c6, 2. d4 d5, ...)
- Claim: a chess game is an **abstract entity**.
 - It might be produced or instantiated through physical actions, but this does not change its abstractness
- Another analogy: if A and B are married, they might have a marriage certificate. The marriage certificate *represents* their marriage, but *it is not* their marriage. If the marriage certificate burns, they are still married.

32 Medium-of-Exchange Theory

- Claim 1: Money is abstract (even if represented by physical items)
- Claim 2: Money is whatever serves as medium of exchange

The Medium-of-Exchange Theory agrees with the **commodity theory** on claim 2, but disagrees on claim 1.

The Medium-of-Exchange Theory agrees with the **credit theory** on claim 1, but disagrees on claim 2.

IV

The Credit Theory of Money and Chartalism

34 Mitchell-Innes, “What is Money?”

- Money is credit (and only credit is money); it is based on the “law of debt”
- “Debt” refers to the same relationship as “credit,” just from a different perspective
- Money is a social relationship between debtor and creditor → money is an abstraction (“The eye has never seen, nor the hand touched a dollar.”)
- Debt is sometimes represented by physical objects, but is not identical to those objects
 - Analogy: a marriage certificate confirms or *symbolizes* a marriage, but a marriage *is not* the certificate

35 A Simple Interaction

1. A demands a good from B.
2. B gives A a good.
3. A promises B future repayment = A is in debt to B, B becomes A's creditor.

Money is created in step 3!

What are the differences in this story to the commodity theory?

How does this story work in more complex webs of relationships?

36 The Generalised Story

“... in practice it is not necessary for a debtor to acquire credits on the same persons to whom he is debtor. We are all both buyers and sellers, so that we are all at the same time both debtors and creditors of each other, and by the wonderfully efficient machinery of the banks to which we sell our credits, and which thus become the clearing houses of commerce, the debts and credits of the whole community are centralised and set off against each other. In practice, therefore, any good credit will pay any debt.” (Mitchell-Innes, “The Credit Theory of Money”, p. 152)

If money becomes a generalised debt (not owed to anyone in particular) does the theory not become more similar to the commodity theory?

Your Comments and Questions

If all payments are based on the recognition of debt, what happens when this recognition fails, e.g., in financial crises? And how is credit legitimized in political contexts where the state is not only a buyer but also an arbitrator?

What happens if the world's wealthiest individuals, like Elon Musk, use their purchasing power to create widely accepted private currencies?

if money is purely a social construct of debt, what ensures the stability of the standard itself which prevents a total collapse of faith in the system of credits?

Mitchell-Innes' credit theory of money seems more applicable to explain our modern Fiat system where the majority of money is abstract paper currency and debts and credits on central bank ledgers. However, his theory would struggle to explain phenomenon like the recent resurgence of interest in commodity money like gold, silver and bitcoin.

Discussion

1. How can we explain coins/paper money within the credit theory?
2. In everyday life, we don't perceive money as debt. Is this a problem for the credit theory?
3. What are the arguments for (or against) the credit theory of money?

39 Chartalism

G.F. Knapp: “Money is a creation of the legal system”

Core idea: the state plays a central role in making something into money

Why is the state central?

- State interest in a uniform, homogeneous unit of account
- State demand for tax payments (which must be made in state money)
- State expenditures (the state pays in its own money)
- State military power/wars (soldiers must be paid)

Discussion. What is the connection between chartalism and the credit theory of money?

What is the role of the state in the credit theory?

V

Evaluating the Theories

41 Four Theories

Commodity Theory of Money. Money is a type of commodity. Its primary function is as a medium of exchange.

Medium-of-Exchange Theory. Money is abstract. Its primary function is as a medium of exchange.

Credit Theory of Money. Money is a type of social relation between creditors and debtors. Its primary function is as a unit of account.

Chartalism. Money is created by the state. Its primary function is as a unit of account (for taxes).

Exercise, part I (15 mins.)

How do we decide between these theories?

How do we 'test' them?

What are criteria to decide between them?

43 Possible Criteria

Historical Correctness. The theory explains (or at least: is compatible with) the origins and historical forms of money.

Alignment with Participant Perception. The theory aligns with how people who use money think of and perceive money.

Extensional Adequacy. The theory can explain that all the things we call money (contemporary and historical) are in fact money.

Functional Adequacy. The theory is compatible with how the contemporary monetary system works.

Exercise, part II (15 mins.)

Discuss how the four theories of money fulfil the criteria for a good theory of money.

2

Money in Social Ontology

46 Social Objects

Examples: traffic light, university, grade, marriage, name, border, soccer champion, ...

- All these objects are “socially constructed”: without people and social interaction, these objects would not exist
 - Atoms might be arranged in a certain way like a traffic light; but without social meaning, that does not make it a traffic light (i.e., a signal for traffic)
- “Socially constructed” does **not** mean arbitrary or purely subjective
 - There are verifiable facts about what the traffic light shows, what grade you received, who is married to whom, ...
- Some constructed objects are concrete, others abstract
 - Where are grades, marriages, or legal obligations located? Nowhere, even if they are symbolized or represented by certain objects

47 Basic Concepts in Searle

1. Objective vs. Subjective
2. Functions
3. Constitutive Rules
4. Collective Intentionality

I

Objective and Subjective

49 “Objective” and “Subjective”

Ontological distinction: Property of objects

An **object** is subjective if its existence depends on a subject.

An object is objective if this is not the case.

Epistemic distinction: Property of judgments

A **judgment** is subjective if the truth or falsity of the judgment depends on the attitudes, feelings, etc., of the judge or the listener.

Objective judgments are independent of our attitudes.

Exercise (5 mins.)

Give examples of judgments which fit each quadrant.

	ontologically subjective	ontologically objective
epistemically subjective	?	?
epistemically objective	?	?

51 Examples

	ontologically subjective	ontologically objective
epistemically subjective	My pain has helped me find myself.	Mount Everest is a very impressive mountain.
epistemically objective	I feel pain in the lower back area.	Mount Everest is 8,848 meters high.

52 Social Properties

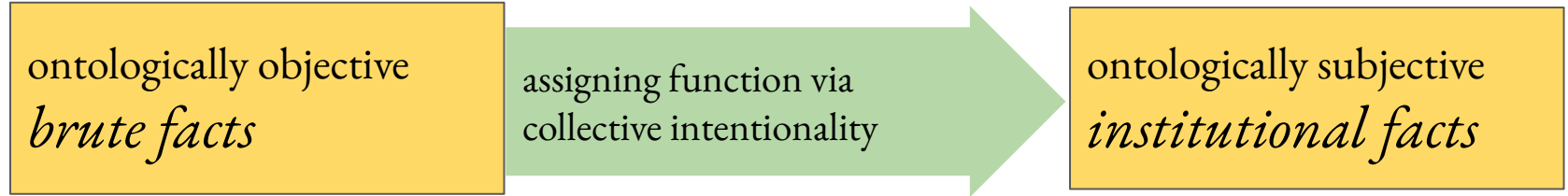
Social reality is always observer-relative: it is based on certain attitudes, opinions, etc., of observers. A rough test: could it exist if humans never existed?

→ Social reality is **always ontologically subjective**.

→ However, we can make **epistemically objective** judgments about it!

For example, 'this is a screwdriver' is ontologically subjective but epistemically objective.

53 Overview



Brute facts are independent from humans; physics and evolutionary biology explain the brute facts.

The brute facts are 'logically prior' to institutional facts (34-5).

Note: brute facts can also be spoken language or even thoughts (35).

II

Functions

55 Assigning a Function

'The function of X is Y'

- There are ontologically objective objects to which we assign (or 'impose') functions
- We can assign functions individually as well as collectively
- Functions can be assigned to natural, pre-existing objects (like rivers) just as much as artificially created one
- Functions are **always** observer-relative

Can you give examples?

56 Two Types of Functions

Nonagentive Functions. A function is assigned as part of a theoretical explanation of the world

Example. The function of the heart is to pump blood

Agentive Functions. A function is assigned with a view to some practical interest

Example. The function of the hammer is to drive nails into wood.

Example. I draw a circle to represent the quarterback on a football chart.

- Functions might be assigned unconsciously
- Functions might be assigned by others (e.g., this button has a function that the car manufacturer assigned)

57 Two Types of Agentive Function

Non-Status Function: There is a connection between the structure of an object and the function assigned to it.

Examples: hammer; chair; wine; wall as boundary

Individuals can assign functions to objects in this way; but this does not yet necessarily create an institutional fact

Status Function. There is **no** connection between the structure of an object and the function assigned to it.

Examples: Driver's license; ruined building; traffic light; the words 'I marry you'; wall as symbolic boundary

Status functions *must* rely on collective intentionality

Questions (5 mins.)

1. Give an example of a nonagentive rule.
2. Give an example of a nonstatus agentive rule.
3. Give an example of a status agentive rule.
4. Why must status agentive rules rely on collective intentions?

III

Constitutive Rules

60 Two Types of Rules

Regulative Rule. Drive on the right side of the road.

A regulative rule tells us how an already existing activity (driving) should be undertaken, or how already existing objects ought to be used.

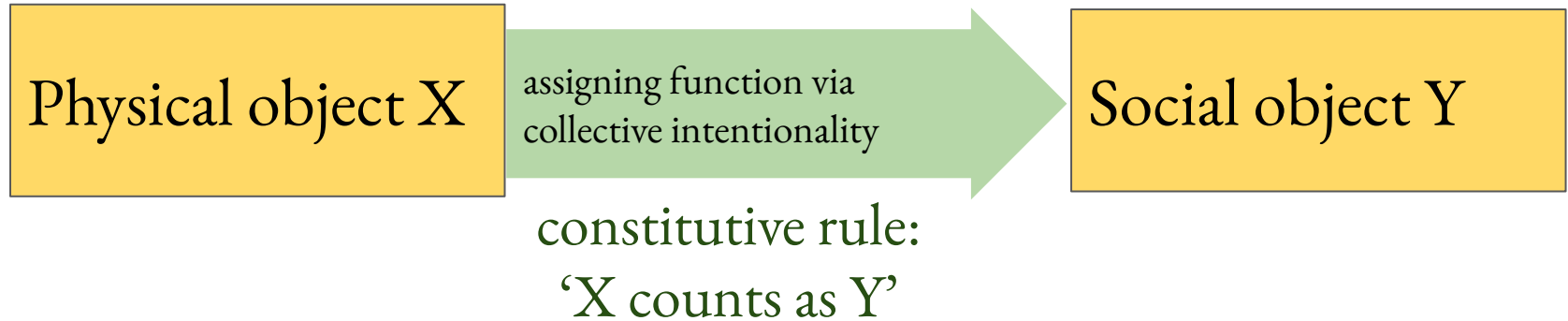
Constitutive Rule. The bishop (in chess) moves in a diagonal line.

A constitutive rule first creates an activity that did not previously exist. **The rules create the game!**

Convention. The queen (in chess) is bigger than a bishop.

An expected regularity, but not one which is followed with necessity.

61 Overview



Physical objects are assigned some institutional function through a constitutive rule that we collectively intend.

Exercise (5 mins.)

Which of the following are regulative rules, constitutive rules, or conventions?

1. Politeness involves saying 'thank you'.
2. An academic paper cites its sources.
3. If you make a cross here, then you have cast a vote for the X party candidate.
4. People wear black at funerals.
5. '👍' expresses approval.

Questions

1. Why do regulative rules not suffice to create institutional facts?
2. Give an example of an object X, a constitutive rule, and the object Y it becomes.

64 Examples

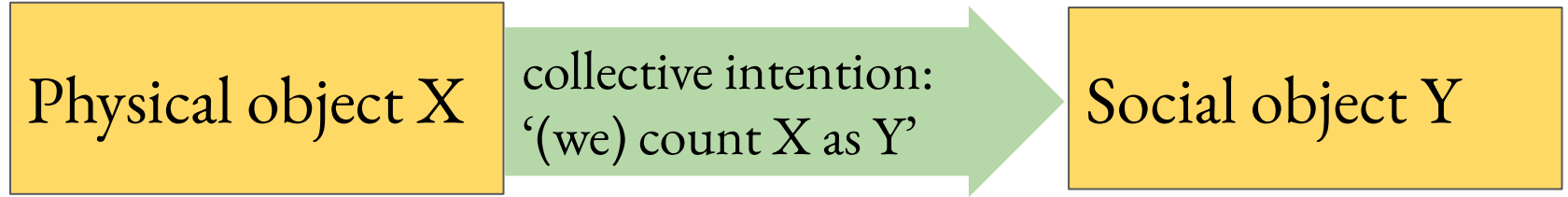
King (Y) is more than a man in certain clothing (X)

Money (Y) is more than a piece of paper or a piece of metal (X)

The demand that you stop (Y) is more than the sequence of sounds 'S-T-O-P' (X)

IV
Collective
Intentionality

66 Overview



67 Collective Intentionality

Individual Intention. I intend to cross the road.

Plural Intention. Everyone at the traffic light intends to cross the road—independently from each other, and not together.

Collective Intention. We stand at a traffic light. Each of us intends that *we* cross the road *together*.

Questions

Which of the following involve individual, plural, or collective intention?

1. sing in a choir
2. represent Germany at the Olympics
3. play chess
4. take an exam
5. take the train to Amsterdam

Questions

Why are collective intentions important for institutional facts? Why are individual or plural intentions not enough?

How are collective intentions formed? What is required for a collective intention?

Your Comments and Questions

If social facts are constituted solely by collective recognition, how can their stability be explained in asymmetrical contexts, such as state mandated fixed term deposits or unequal credit relationships?

The idea is that money only exists if we all agree on what it means. But it feels more like something we're born into, not something we've chosen.

(1) If institutions only exist through collective recognition, what explains their resilience in the face of disagreement ... Specifically, to what extent does Searle ... overlook the role of power and inequality in shaping social realities like money? (2) Can social realities truly be based on shared belief or are they sustained by habit, authority or coercion instead?

... history shows governments back their currency with muscle Is that still “collective acceptance”, or enforced obedience?

The point that I still don't understand is how institutions or social practices become epistemically objective.

V

The Example of Money

Exercise (25 mins.)

How can we apply Searle's categories to the example of money?

1. What are the physical objects (X)?
2. What are the social objects (Y)?
3. What is the agentive, status function assigned to money?
4. Does this explanation work? What might be objected to it?

73 Money's Function

- Money's function must be agentic: we aim to use money, not use it in theoretical explanation
- Money's function must be non-status: the (physical) structure of money is not connected to its function
- But what exactly is money's non-status agentic function?
 - Probably, Searle could use any of the existing theories of money at this point
 - He seems to buy into the barter origin story of money, so he seems to tend towards a medium-of-exchange story
 - He might also endorse a pluralist theory according to which money has several functions

74 Collective Intentionality

Individual Intention: I consider these pieces of paper money.

It is pretty clear that individual intention is not sufficient to make something money.

Plural Intention: I, John, Carla, Anna, Tim, ..., each considers these pieces of paper money, independently from each other.

Collective Intention: *We all* consider these pieces of paper, *together*, to be money.

What is the difference between plural and collective intention here? Why would plural intention not be enough?

75 Menger vs Searle

- Searle's theory requires there to be a type of collective intention
- Menger's theory—and the commodity theory in general—does not require there to be collective intention; it is enough if there are individual intentions to use an object for trade
- Perhaps we do not need (collective) intentions to explain money, but merely individual incentives, beliefs, knowledge, etc.

Emma Tieffenbach, “Searle and Menger on Money”, *Philosophy of the Social Sciences* 40 (2): 191-212 (2010)

76 Searle's Theory and Digital Money

Searle: “X count as Y”. Can this theory be applied to digital money (e.g., bank deposits)?
(cf. Smit et al. 2011, 17-20)

Problem. What is X when we talk of digital money?

Answer 1. X = Data on the bank's server. But: the money is not identical with those data.

Answer 2. X = the abstract, socially recognised purchasing power. → Is this compatible with Searle's position?

3

Money Creation

78 Monetary System

Monetary system = the institutional/social structure of how money is organized

Some questions: Who creates money? Who controls money? Should money be organized centrally or decentrally? How does money circulate internationally? etc.

There have been various forms of monetary systems throughout history. No monetary system is “natural.” We can inquire into both the economic and moral characteristics of the different systems.

I Money Quantities

80 Monetary Aggregates

M1: Cash in circulation plus demand deposits

Example: €100 in your pocket

Example: €100 in an account at Sparkasse Bayreuth

M2: M1 plus deposits with medium-term maturities/notice periods

Example: €100 savings deposit (with a three-month notice period)

M3: M2 plus other money-like forms such as money market funds

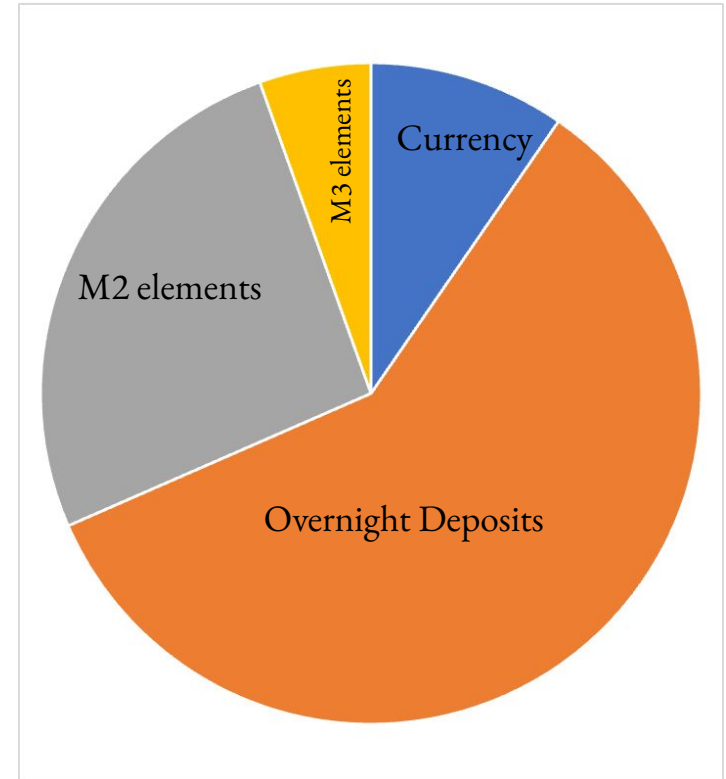
81 ECB Definitions

Liabilities	M1	M2	M3
Currency in circulation	X	X	X
Overnight deposits	X	X	X
Deposits with an agreed maturity of up to 2 years		X	X
Deposits redeemable at notice of up to 3 months		X	X
Repurchase agreements			X
MMF shares/units			X
Debt securities issued by MFIs with a maturity of up to 2 years			X

https://www.ecb.europa.eu/stats/money_credit_banking/monetary_aggregates/html/index.en.html

82 Monetary Aggregates in Euro Area (2023)

Billion Euro	End-of-month level
	Mar 2023
COMPONENTS OF M3	
1. M3	16066
1.1. M2	15188
1.1.1. M1	10997
Currency in circulation	1544
Overnight deposits	9453
1.1.2. Other short-term deposits (M2 - M1)	4191
Deposits with an agreed maturity of up to two years	1643
Deposits redeemable at notice of up to three months	2548
1.2. Marketable instruments (M3 - M2)	878
Repurchase agreements	103
Money market fund shares	682
Debt securities issued with a maturity of up to two years	93



II

**How do banks create
money?**

84 How does a bank work?



- A baker makes bread rolls, a bank makes loans
- Banks make profits through the interest rate spread
 - Investors receive a low interest rate (e.g., 3%), borrowers pay a higher interest rate (e.g., 5%)
 - The spread (2%) is the bank's profit

Discussion. What (other) socially desirable functions do banks fulfill?

85 How does a bank create money?

Assets	Liabilities
100€ Gold Bar	100€ Equity

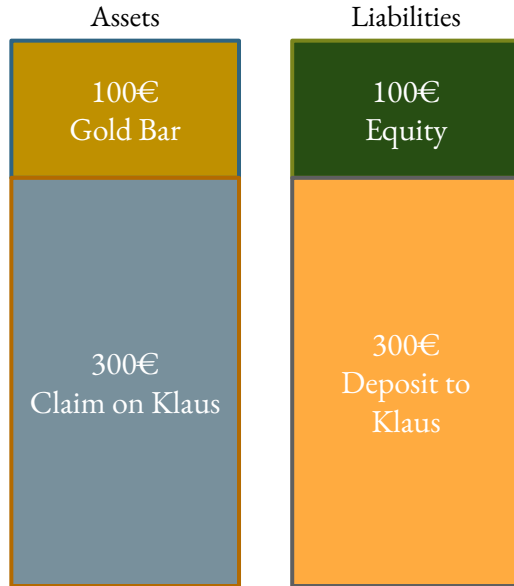
Step 1.

Peter opens Peterbank with a gold bar worth €100.

This creates assets (property) of €100 for the bank, and €100 as equity.

(Equity appears on the right side because balance sheets always need to be even!)

86 How does a bank create money?



Step 2.

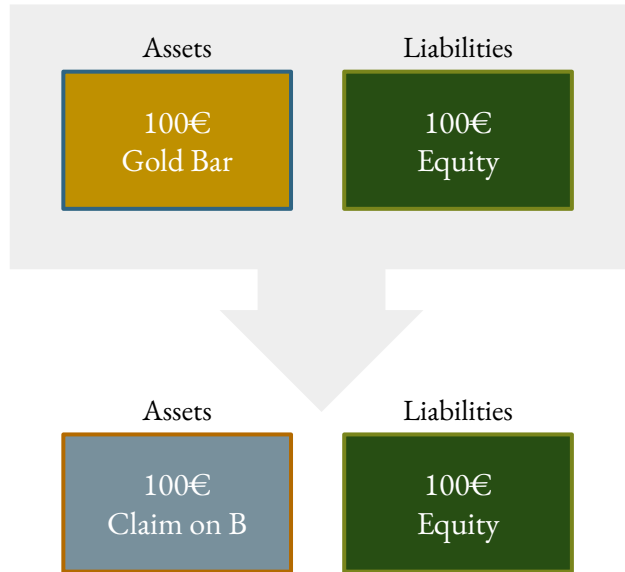
Peterbank grants a loan of €300 to Klaus:

On the asset side, the bank acquires a claim to future payment from Klaus.

On the liability side, a liability appears—the crediting of €300 to Klaus' account.

Klaus receives a virtual amount (bank money), which is accepted by other financial institutions. This is where money is created.

87 Why can individuals not create money?



Why can not everyone create money?

A private person or non-bank company can lend money, but it must do so by transferring some of its assets. This does not increase the balance sheet.

Example. A possesses a gold bar worth 100€. He lends money to B, by giving B the gold bar. This transfers the gold bar to B; on the asset side of A's balance sheet, the gold bar is replaced by a claim on B.

III

Normative Questions

Discussion (20 mins.)

Should we take away the privilege of private banks to create money? Why or why not?

(Background: Wolf; Pettifor)

90 Do banks create money out of thin air?

In one sense, banks **do** create money ‘out of thin air’: they increase the quantity of money in circulation.

In another sense, banks **do not** create money ‘out of thin air’: they are bound by economic constraints.

What are those constraints? Why could a bank not expand its balance sheet indefinitely?

91 Objections to Private Money Creation

- The power to create money gives banks **enormous power**; this power should rest with the government, not private agents
- Banks gain **economic privileges** which translate to profits to bank employees and shareholders; but these profits are not earned
- (Already) wealthy individuals can take on larger amounts of debt—especially when interest rates are low—this **increases inequality**
- Banks can use money from central banks to cheaply buy securities, rather than passing on interest rate cuts to customers (‘leaky pipeline’)
- **Too big too fail**: Due to their size and economic importance, large banks can count on an implicit “bailout” guarantee, and therefore take on enormous risks; profits go to banks, losses are socialized

4

Alternative Currencies

93 Possible Examples

- Reward systems (Air miles, loyalty points, payback points)
- Internal currencies (e.g., within a video game: V-Bucks, Robux; casino chips)
- Regional moneys
- Cryptocurrencies
 - Stablecoins (USDC, USDT)
 - “Memecoins” (Dogecoin)
 - NFTs (non-fungible tokens)
- Time-based currencies

Are all of these examples of money? If they are money, do they change anything about our understanding of the ontology of money? Do we have moral reasons to support alternative currencies? Would it be legitimate to prohibit alternative currencies?

I

Alternative Currencies

95 Larue et al.: Classifying Alternative Currencies (AC)

Classifying Alternative Currencies

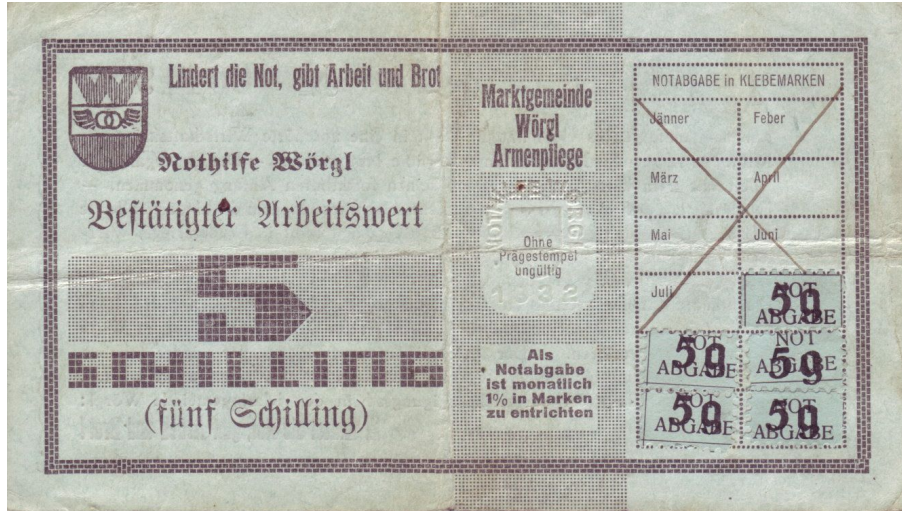
- Profit-based versus not Profit-Based versus Central/State-backed
- Connected to the market, the community, or the state
- (As a supplement to official currencies or as a replacement)

Almost all ACs are designed for a normative purpose (302)

96 Some Proposals

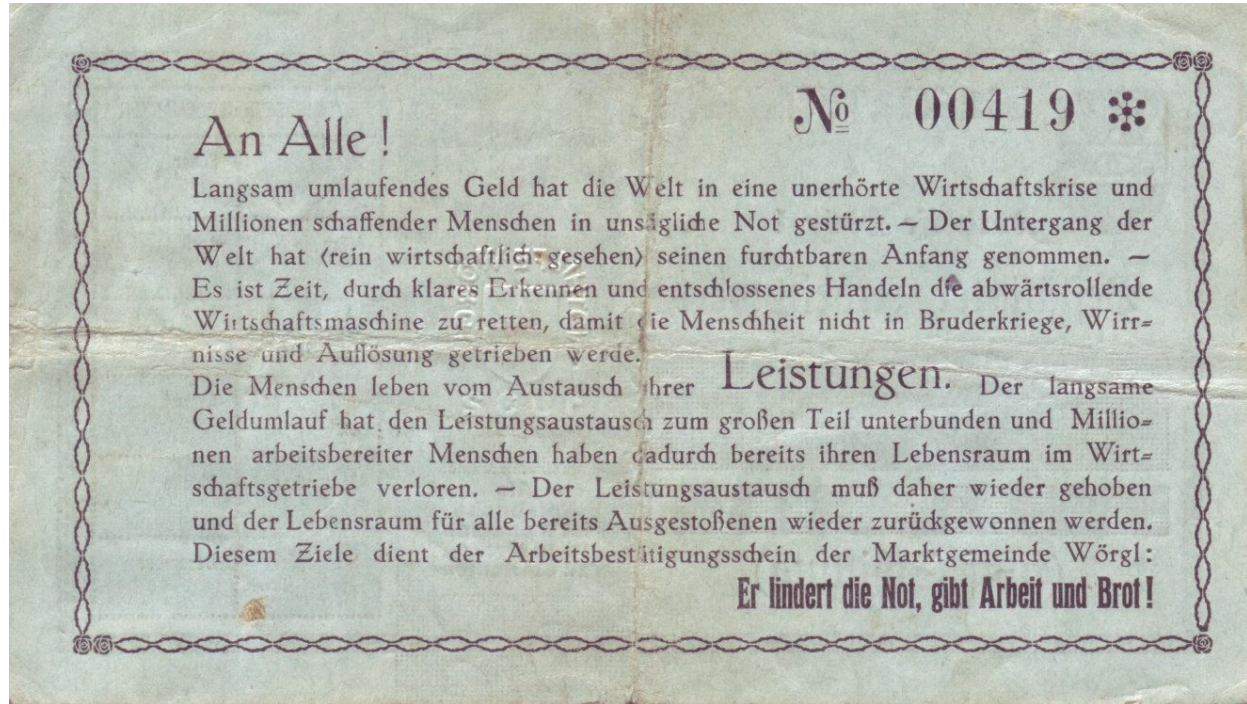
- **Depreciating money** (*Schwundgeld*): Money that loses value over time to incentivize users to spend it
- **Time-based currency**: Money measured in (invested or used) labor time
- **Sovereign money** (*Vollgeld*): Money fully backed by central bank money or other reserves (= abolition of private money creation)
- **Local/Regional currency**: Money that can only be spent in a specific region or is accepted only at certain locations

97 Wörgler Schwundgeld



- Regional money in Wörgl, Austria; lasted two years (1932-3)
- Schwundgeld requires holders to periodically pay a fee or affix a stamp to retain its value
- The value shrinks over time, typically via a small percentage fee (e.g., 1% per month)
- The system rewards circulation and follows a broadly **Keynesian idea**

98 Wörgler Schwundgeld: Motivation



99 Time-based Currency

- You earn credits by offering services (e.g., tutoring, gardening)
- One hour of your work = one credit, regardless of the market value of the service
- You can spend your credits to receive services from others in the network
- The currency implements a version of the **labour theory of value**



Regional Money

Full-Reserve Money

101 Functionalism vs. Collective Acceptance

Functionalism. Something is money if it plays the standard functions of money (medium of exchange, unit of account, store of value)

But: many ACs are explicitly designed not to fulfil some of the functions of money!

Collective Acceptance. Something is money if it is collectively accepted as money.

Discussion. Does focus on alternative currencies help us to decide between the two theories?

II

Normative Standards for Alternative Currencies

Group Discussion (20 mins.)

Form groups depending on the proposed forms of AC (NOT crypto!) Discuss:

1. What moral goals does this AC pursue, by its design and intentions?
2. Are these goals morally desirable?
3. Can we expect the proposed AC to actually achieve these goals?
4. What downsides might this AC have?

Your Comments and Questions

Which forms of monetary diversity promote justice, and which merely reproduce new forms of exclusion under the guise of ethics?

I would be interested in how ACs can create equal societies since its criticism is the current system is creating inequality.

Can an AC ... acquire the institutional status of "money" within a small, voluntary context when that context is nested within a larger, coercive one ...? Or is the AC's value forever necessarily parasitic on, and ultimately measured in, the state currency it claims to be an alternative to?

The reading made me think: Is money ever actually neutral?

With decentralized currencies, in crises, quick and strong measures can hardly be taken adequately. However, this also results in changed incentive structures, as actors cannot rely on being bought out eventually. This could positively effect financial stability in a way.

5

Central Banks

106 Introduction

- Two ways to steer the economy: fiscal policy and monetary policy
- But: monetary policy is entrusted to a (quasi-)independent institution—a central bank (or central banking system)—which is run technocratically
- Why?
 - **Economic “why”**: What economic advantages are promised by central bank independence?
 - **Political “why”**: Why do politicians voluntarily give up part of their power? Why do citizens accept central bank independence?
 - **Normative “why”**: Can central bank independence be defended on the basis of normative principles of legitimacy?
- But first: what’s the alternative?
 - Option 1: do not have an independent institution, but a democratically controlled one
 - Option 2: have no central bank!

I Free Banking

108 Free Banking in the United States

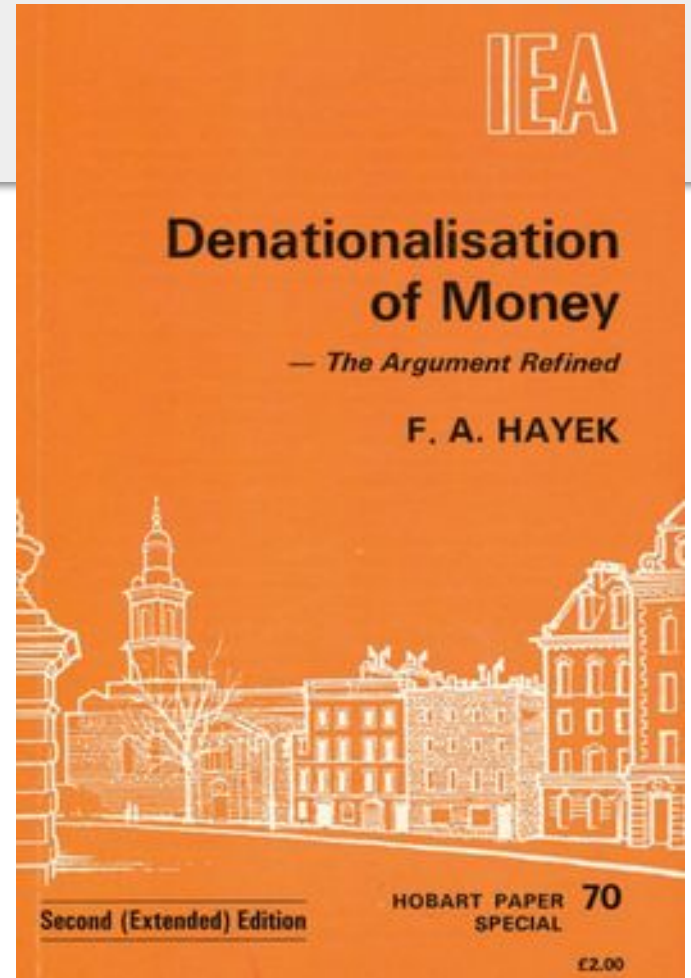
- 1837–1862: “Free Banking Era” in several states
 - Chartered private banks can create money themselves; little institutional oversight
 - Many banks were tiny, had no branches, and were highly local
 - Each bank creates its own bank notes
 - Nominal redeemability in gold or silver
 - Competing banknotes circulate, often accepted only with a discount
- Similar system in Scotland, although with more regulatory control

109 Problems of the Free Banking System

- **Incentives for Fraud.** Because there are so many different banks and bank notes, counterfeiting becomes easier
- **Incentives for ‘Wildcat Banking’.** There is an incentive to engage in excessive lending, or to form an outright fraudulent bank
- **Redemption Costs.** Bank notes from banks far away are difficult to redeem, given travel and transportation costs
- **Transaction/Information Costs.** Customers, banks and businesses must carefully check that banks and bank notes are reliable; discount rates must be applied
- **Macroeconomic Instability/Lack of Central Control.** During economic turnouts, many banks will go bankrupt; risk of failure cascades

110 Hayek's Proposal

- Private institutions should be allowed to create their own currency (like in the Free Banking era)
- There would be market competition between different types of currency
- Competition would lead to greater price stability
- End legal tender laws: no one must accept government money



Questions

1. Should the state have a right to a currency monopoly? Why or why not?
2. What would the advantages or disadvantages of free currency competition be?

II

The Function of Central Banks

113 Declared Aims of Central Banks

ECB: Price Stability

ECB mission

The European Central Bank and the national central banks together constitute the Eurosystem, the central banking system of the euro area. The main objective of the Eurosystem is to maintain price stability: safeguarding the value of the euro.

The European Central Bank is responsible for the prudential supervision of credit institutions located in the euro area and participating non-euro area Member States, within the Single Supervisory Mechanism, which also comprises the national competent authorities. It thereby contributes to the safety and soundness of the banking system and the stability of the financial system within the EU and each participating Member State.

<https://www.ecb.europa.eu/ecb/orga/escb/ecb-mission/html/index.en.html>

Fed (USA): Price Stability & Employment

The Federal Reserve System is the central bank of the United States. It performs five general functions to promote the effective operation of the U.S. economy and, more generally, the public interest. The Federal Reserve

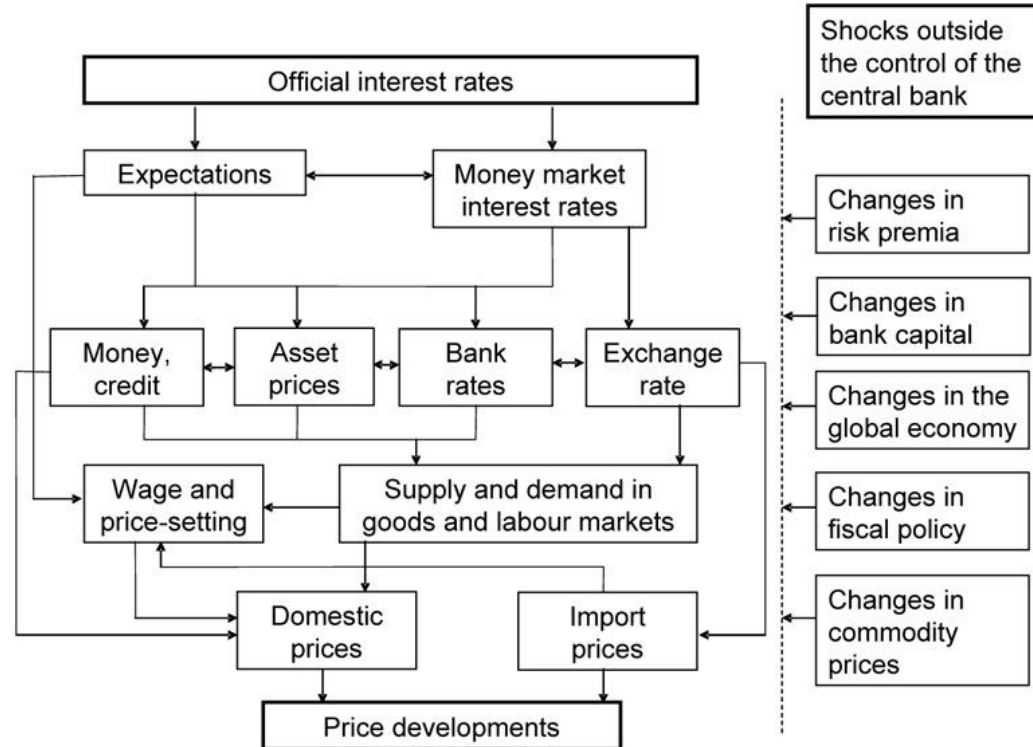
- **conducts the nation's monetary policy** to promote maximum employment and stable prices in the U.S. economy;
- **promotes the stability of the financial system** and seeks to minimize and contain systemic risks through active monitoring and engagement in the U.S. and abroad;
- **promotes the safety and soundness of individual financial institutions** and monitors their impact on the financial system as a whole;
- **fosters payment and settlement system safety and efficiency** through services to the banking industry and the U.S. government that facilitate U.S.-dollar transactions and payments; and
- **promotes consumer protection and community development** through consumer-focused supervision and examination, research and analysis of emerging consumer issues and trends, community economic development activities, and the administration of consumer laws and regulations.

<https://www.federalreserve.gov/aboutthefed/files/the-fed-explained.pdf#page=8>

114 How do central banks control money creation?

- Banks are legally required to hold part of their assets as reserves with the central bank (**minimum reserve requirement**)
 - If the reserve ratio is 1%, a bank needs €1 in reserves for €100 in loans; if the ratio rises to 20%, the bank now needs €20 in reserves
 - If the central bank raises the reserve ratio, banks can issue fewer loans → less new money → **however, this is a rarely used instrument today**
- The central bank charges an interest rate for these lending operations (**main refinancing rate**)
 - The central bank can raise or lower the key rate → this makes financing more expensive or cheaper for banks → loans are issued at higher or lower interest rates → fewer or more loans are granted

115 Transmission Mechanisms



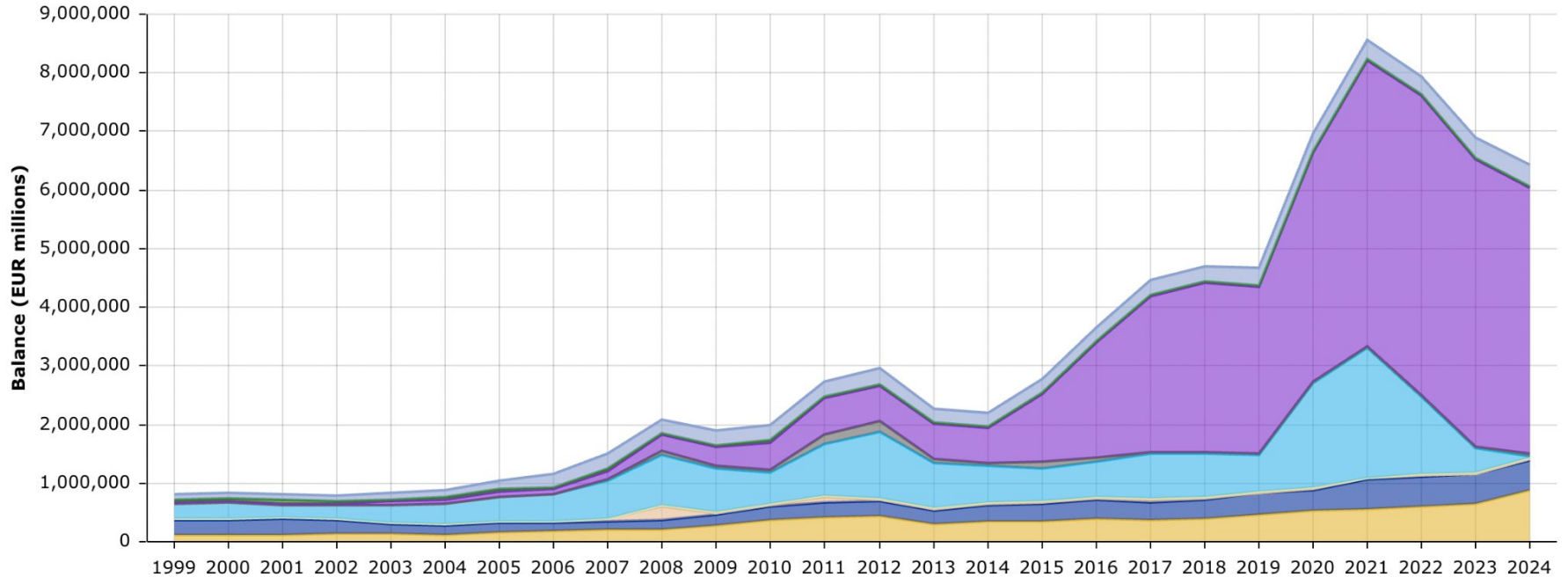
<https://www.ecb.europa.eu/mopo/intro/transmission/html/index.en.html>

Activity

Find the ECB balance sheet

Try to understand it. What are the major elements?

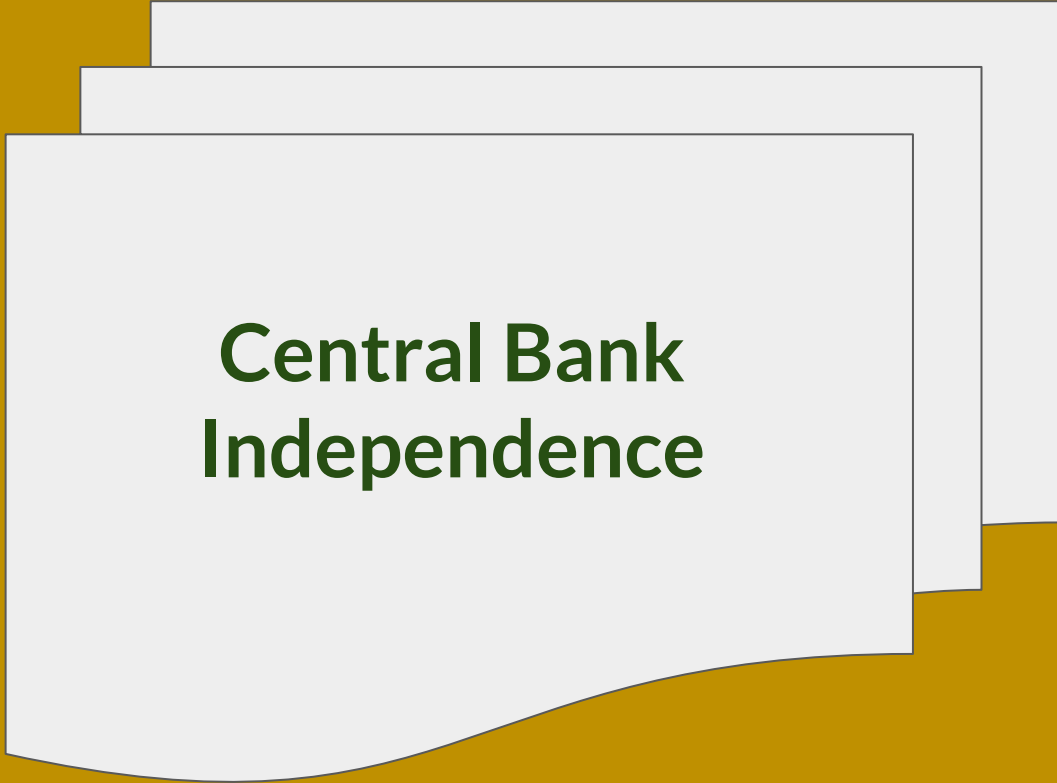
117 ECB: Balance Sheet Size



<https://www.ecb.europa.eu/press/annual-reports-financial-statements/annual/balance/html/index.en.html>

III

Central Bank Independence



Central Bank Independence

120 Forms of Independence (Herger)

- **Functional independence:** Central banks are not bound by government instructions when formulating monetary policy
- **Instrumental independence:** Central banks can choose and develop the instruments to achieve their monetary policy mandate
- **Financial independence:** Central banks fund themselves through their own profits and can decide how profits are distributed
- **Institutional independence:** Central banks are legally independent institutions
- **Personal independence:** Fixed and lengthy terms for central bank presidents; appointment based on professional criteria

IV

**The Legitimacy of
Central Banks**

122 Forms of Legitimacy

- Normative vs. descriptive legitimacy:
 - Normative: the (moral) right to rule
 - Descriptive: the extent to which citizens perceive the state as justified
- Input legitimacy:
 - To what extent is a social institution and its actions derived from the will of the people?
 - More generally: what morally valuable participation and procedural structures does it realize?
- Output legitimacy:
 - To what extent do the outcomes of a social institution meet the expectations of the people?
 - More generally: what morally valuable results does a social institution produce?

The typical argument for central bank independence is based on output legitimacy.

123 Claveau/Dietsch/Fontan

Three key legitimacy issues concerning central banks:

- **Distributive Effects.** Monetary policy has distributive consequences, which central banks neither acknowledge nor take into account
- **Central Banking and Finance.** Central bank policy is generally closely aligned with the interests of the financial sector; central banks have not meaningfully controlled the financial sector
- **Central Banks as Experts.** Central banks are closely linked to academic research, which can distort both knowledge production and political oversight

Your Comments and Questions

the too-big-to-fail argument seems to be widely accepted even outside of central banking circles. Did the central banks have no other choice than to rescue the banks exactly the way they did?

Should ... climate change and distributive justice be elevated to central objectives within monetary policymaking? Or ... is the independence of central banks just a illusion as it is either more dependent on political or financial institutions and whatever financial system we would decided for, this problem cannot be fixed?

As much as I would like to live in life with equality, I would rather central banks worry about the stability of the economy, and politicians about redistribution of resources.

Can an institution tasked with managing the inherent contradictions of a capitalist economy ever truly serve the people, or is its primary allegiance necessarily to the stability of the system itself?

V

**Central Banks and
Democracy**

126 Stiglitz's Main Claims (201-2)

1. **Monetary policy matters**, and the successful conduct of macropolicy in the postwar period has led to far greater stability of the economy. ...
2. ... the strategies of opportunistic disinflation or pre-emptive strikes are based on a set of hypotheses about the economy for which there is little empirical support. I will argue ... for an alternative, which I call **cautious expansionism**.
3. There is a rationale for a degree of independence of the central bank, even in a democratic society. But **the central bank must be accountable**, and sensitive, to democratic processes; there must be more democracy in the manner in which the decision makers are chosen and more representativeness in the governance structure.

127 *Cautious Expansionism: Orthodoxy* (210)

The orthodox argument assumes:

1. Inflation has high costs
2. Once inflation starts to rise, it has a tendency to spiral out of control
3. Increases in inflation are costly to reverse

Stiglitz argues that all three assumptions are overstated (210-215).

Under conditions of uncertainty, central banks should cautiously expand the monetary supply, as this can lower unemployment.

128 *Central Bank Accountability*

1. Monetary policy issues are not purely technocratic but involve value questions, such as questions concerning trade-offs between different economic aims.
2. Decisions concerning trade-offs should reflect the values “of those that comprise society” (218)
3. This gives us a prima facie reason to democratise central banks, or at least to make them more accountable.

Your Comments and Questions

... it remains unclear in the text what democratic control could look like in concrete terms. For example, how could parliaments be more closely involved?

Stiglitz seems to assume that a more democratic and representative central bank would naturally adopt the 'correct' expansionist policies that he advocates, or at least lend more representation for it. But what if this isn't true?

I'd be interested to know the current economic consensus on inflation persistence, due to the age of the paper. The 2021–2023 inflation spike was the first one I followed closely, and, at least to me, seemed quite sticky.

130 van 't Klooster

- Delegating power is fundamentally compatible with democracy
 - But: delegation requires a strong moral justification
 - The loss of political autonomy must be compensated by good monetary policy (that is: compensate lack of input legitimacy with output legitimacy)
- Central banks have fundamentally changed in both goals and means
 - New means (QE, helicopter money) have much deeper impact
 - There are fundamental disagreements about goals as well as means
 - The expansion of goals and means by central banks has not been sufficiently justified by them

Thus: Without institutional changes, the legitimacy of modern central banks is questionable

Exercise (20 mins. + 20 mins.)

Form groups defending the following views:

1. CBs should be abolished and replaced by competition between private money issuers.
2. CBs should be democratised and private banks forbidden to create money.
3. CBs should be kept independent, but they should be much more restricted in what they can do (e.g., no QE, no lender of last resort).
4. CBs should be kept the way they are.

6

Monetary Policy and Inflation

133 Why care about inflation?

- Argument for **central bank independence**: independent central banks can better keep inflation low (→ if inflation is less important, this argument weakens)
- Argument for **restrictive monetary policy**: an “overheating” economy must be cooled to avoid inflation → justifies social costs like unemployment (→ if inflation is less important, it’s harder to justify these costs)
- Argument for **Bitcoin/cryptocurrencies**: conventional currencies are vulnerable to inflation, but Bitcoin is not (→ if inflation is less important, cryptocurrencies are less attractive)

I

Inflation: Basics

135 Inflation

Inflation = an increase in the general price level (i.e., the prices of goods and services)

- Not just a change in relative prices
- Usually measured by the price of a representative basket of goods
- Definitionally the same: money loses purchasing power

Inflation is **NOT definitionally** an increase in the money supply, because it is an open empirical question whether an increase in the money supply leads to inflation!

(It might empirically be true that an increase in the money supply always leads to inflation [monetarism]--although this is controversial)

136 Quantity Theory of Money (QTM)

$$MV = PY$$

M money supply

P price level

V velocity of money

Y real economic output

The **quantity equation** is analytically true. But QTM further assumes that (1) V is exogenous, and (2) Y is independently fixed, (3) changes in M do not affect V and Y.

It would then follow that changes in M directly lead to changes in P.

137 Causes of Inflation

- Monetary policy: significant, long-term increase in the money supply
 - Monetarism (inflation is always caused by an increase in the money supply) claims this is the major cause
 - By contrast, Modern Monetary Theory claims that the state can, up to a certain limit, increase the money supply without concern
- Rising overall demand
 - Overall greater wealth
- Declining total supply
 - Supply bottlenecks, external shocks (e.g., oil price shock)
- Increasing market power
 - “Greedflation” as a controversial explanation

II

The Effects of Inflation

139 Hume's Thought Experiment

Thought experiment: all euro prices/numbers are magically doubled overnight (including salaries, adjustment of exchange rates, adjustment of all contracts, tax brackets, etc.)

Does anything change? No. Purely nominal money figures should be completely neutral.

140 Money Illusion

Money illusion is the tendency to think about money in nominal terms (face value) rather than real terms (purchasing power). Examples:

- People feel good about increased wages even if their wages ‘just keep up’ with inflation
- Many long-term contracts are not indexed to inflation, even though rational actors would do so
- People think goods and services have become more expensive, but do not adjust (to the full degree) for inflation
- People think ‘inflation is bad because it increases the cost of living’

141 Real-World Effects

In reality, not all money prices/numbers change simultaneously. Different money flows change at different speeds.

- Prices of goods usually adjust quickly, but various prices adjust at different speeds
- Salaries adjust in the medium term
- Social benefits/payments adjust only slowly
- Tax brackets change very slowly and require political will
- The debt amount fixed in (debt) contracts usually does not change
- The total amount of money held in (bank) accounts does not change at all



The Effects of Inflation and the Optimal Inflation Rate

Discussion (20 mins.)

Is there a moral argument to oppose inflation? What might such an argument be?

144 Schedule

Sunday, 6 July

10-11.30 Inflation + Unorthodox monetary policy

Presentations on QE, CBDC, MMT

11.30-13 Cryptocurrencies

Presentations on Nature of Bitcoin, Bitcoin and Inflation

LUNCH BREAK

14-15 Cryptocurrencies: Debate

15-15.30 Social meaning of money

Presentation on Zelizer's Work

15.30-16.30 Closing, Feedback

145 Arguments against Inflation

1. Inflation is wrong because it lowers the standard of living
2. Inflation is wrong because it lowers aggregate welfare
3. Inflation is wrong because it increases distributive inequality
4. Inflation is wrong because it happens within a system which violates our rights
5. Inflation is wrong because it is a form of taxation
 - a. Inflation is wrong because it is a form of secret taxation
 - b. Inflation is wrong because it is a form of arbitrary taxation
6. Inflation is wrong because it is a form of deceit.
7. Inflation is wrong because it undermines money's claim to be exchangeable for goods and services of a certain (real) value.

III

Consequentialist Arguments Against Inflation

147 Standard-of-Living Arguments

(1) Inflation is wrong because it lowers the standard of living.

- Most common lay objection against inflation (Shiller 1996)
- Contradicts the **(long-run) neutrality of money**: if inflation is purely due to monetary reasons, then wages will eventually adjust to prices, returning the economy (roughly) to its original level of output

148 Welfare Arguments

(2) Inflation is wrong because it diminishes aggregate welfare.

Opportunity costs: The cost of inflation is the opportunity cost of holding money. (Bailey 1956, Friedman 1969, Lucas 2000)

- Empirical estimates differ widely
 - *Low* estimates: 10% inflation p.a. costs 0.4% of GNP (Cooley & Hansen 1989); similar Lucas (1981) at 0.3%, Fischer (1981) at 0.5%; even smaller: Gomme (1993), Attanasio et al. (2002)
 - *Medium* estimates: 4% inflation p.a. costs >1% of GNP (Dotsey & Ireland 1996); also Di Tella et al. (2001)
 - *High* estimates: 10% inflation p.a. costs 4% of GNP (Lagos & Wright 2005); also Wen (2015)

149 Welfare Arguments (cont.)

(2) Inflation is wrong because it diminishes aggregate welfare.

Distortion costs: The costs of inflation are welfare losses due to misallocated resources.

- One main intuition: inflation upsets the informational value of prices, which in turn leads individuals to make inefficient choices
- Various attempts to model the distorting effects in (e.g.) DSGE models, but high dependency on model assumptions (Nakamura et al. 2018)

150 Distributive Arguments

(3) Inflation is wrong because it increases distributive injustice.

Theoretically: different causal channels, acting in different directions (Fischer and Modigliani 1978)

- Saving-redistribution channel: inflation favours debtors over creditors
- Interest-sensitivity channel: different assets are differently sensitive to inflation
- Household heterogeneity channel: different households have varying preferences and access to financial markets and inflation-hedging assets
- Earnings heterogeneity channel: different types of income will exhibit different responses to inflation

151 Distributive Arguments (cont.)

(3) Inflation is wrong because it increases distributive injustice.

Empirically: inflation is probably linked to inequality, although evidence is mixed

- Self-reporting: the poor are more worried about inflation (Easterly and Fischer 2001)
- Inflation might increase inequality (e.g., Albanesi 2007; Erosa and Ventura 2002)
- Young middle-class households benefit from inflation (Doepke and Schneider 2006)
- There might be short-term benefits to the poor (Romer and Romer 1998)
- The relationship might be non-linear, and sometimes negative (e.g., Monnin 2014; Coibion et al. 2012)

152 Summary: Consequentialist Arguments

- *Some* consensus about the negative effects of inflation, but big degree of uncertainty about the effect size
- No *principled* argument against inflation: there are likely to be lots of exceptions and contexts where inflation has justifiable effects
- Are we measuring the right/all the effects? Even a perfect model would only measure *losses in consumption*—but what about psychological and cognitive costs?

IV

Deontological
Arguments against
Inflation

154 The Background-Injustice Argument

(4) Inflation is wrong because it happens within a monetary system which violates our rights. (Hülsmann 2008)

- For example, the state forces us to use government currency, and prohibits starting our own currency—both of which violates our rights
- Counterfactual claim: we would not use inflationary currency in a fully free monetary system

155 The Background-Injustice Argument (cont.)

(4) Inflation is wrong because it happens within a monetary system which violates our rights. (Hülsmann 2008)

- Requires strong background assumptions about extent of rights
- (Merely) evidentiary standard: not inflation itself is wrong, but inflation is evidence of wrongness

156 Unjust-Enrichment Arguments

(5) Inflation is wrong because it is a form of unjust enrichment.

Main idea: inflation is a form of redistribution from citizens to the central bank/state/other political “cronies”.

But this argument overgenerates: it makes *any* redistribution wrongful

157 Unjust-Enrichment Arguments

(5a) Inflation is wrong because it is a form of *secret* taxation.

- Empirical problem: modern central banks operate in pretty transparent ways
- Normative problem: lots of taxation is psychologically difficult to notice; unclear why inflation would be particularly noteworthy

158 Unjust-Enrichment Arguments

(5b) Inflation is wrong because it is a form of *arbitrary* taxation.

- Main idea: “[inflation] is not the result of merit, effort, or productiveness, but of luck, speculation, or political favoritism” (Hazlitt 1965, 130–31; cf. Keynes)
- Empirical problem: inflation does not seem worse in this respect than other types of taxation
- Normative problem: no taxation fully tracks normatively relevant categories

159 Deceit Arguments

(6) Inflation is wrong because it is a form of deceit. (Block, Rothbard, North)

- Basic idea: money is a kind of **promise to redeemability**. Inflation breaks this promise.
- But: central banks have made no (explicit) promises to redeem money for to some amount of gold or commodity (cf. Murphy 2006, 464; Davidson 2013, 76; Hülsmann 2008, 161-2)

160 Claim Arguments

(7) Inflation is wrong because it undermines money's claim to be exchangeable for goods and services of a certain (real) value. (Rand)

Analogy: students who earn credit points take those points to be a partial claim for completing their degree (e.g., “one CP completes 1/180th of my degree”).

Diminishing the weight of points undermines this claim.

- Disanalogy: credit points exist within a clearly institutionally defined relationship
- Again: Most central banks make/have made no promises about money's value
- Legal systems generally operate on nominalistic principles (Fox 2011)

161 Problems for Libertarian Arguments

- Many arguments rest on implausibly strong moral background assumptions
- Money is neither a promise nor a claim, nor does it constitute a contract, nor does its loss in value directly violate (property) rights
 - Promises/contracts must be actively made (if they are explicit), or happen against a well-understood conventional context (if they are implicit) – neither is the case with money
 - **Still:** there is an intuitive notion that money-users have some kind of claim on, or comparable moral relationship to, the central bank

7

Unorthodox Monetary Policy

163 Contrasting Forms of Monetary Policy

“Classical” modus operandi (interest rate policy)	“Unorthodox” modus operandi (quantitative easing, asset purchasing)
Central banks interact only/primarily with commercial banks	Central banks act directly on securities markets
Central banks hold only small amounts of securities, mostly short-term	Central banks own large amounts of securities, often long-term
Stability of the financial system and government financing implicitly assumed	Central banks actively support financial system stability and government financing
Price stability as the central mandate of central banks	
Central banks do not interact directly with citizens	



Helicopter Money and Quantitative Easing



Central Bank Digital Currency (CBDC)

The image features three overlapping white rectangular cards with a thin black border, set against a solid gold background. The top card is partially obscured by the middle one, and the middle one is partially obscured by the bottom one. The bottom card has a wavy bottom edge. The text 'Modern Monetary Theory (MMT)' is centered on the bottom card in a bold, dark green font.

Modern Monetary Theory (MMT)

8

Cryptocurrencies

I How does Bitcoin work?

169 Bitcoin: Basic Features

- There is a fixed supply of Bitcoin: maximum 21 million
- Bitcoins belong to specific addresses (not names or persons)
- Bitcoins are transferred between addresses, which are accessed by private passwords
- New addresses can be created anonymously, by anyone with internet access

170 Transactions

To transfer Bitcoin from Address A to Address B, the following is needed:

1. The sending address
2. The receiving address
3. The amount being transferred
4. A **digital signature** that authorizes the transfer
 - Created using a signature function
 - **Only** the owner of the private password (linked to the sender's address) can create the signature
 - Anyone can **verify** that the signature was created by the legitimate owner
 - (Analogy: like a handwritten signature — only you can sign, but others can recognize your signature.)

171 The Bitcoin Network

A transfer attempt, consisting of the data (1) to (4), is sent to the Bitcoin network – a decentralized network. Every participant in the network can verify that

1. the addresses are valid
2. that the sending address possesses the amount of Bitcoin to be transferred
3. that the transfer was authorised by the sending address (via the signature function)

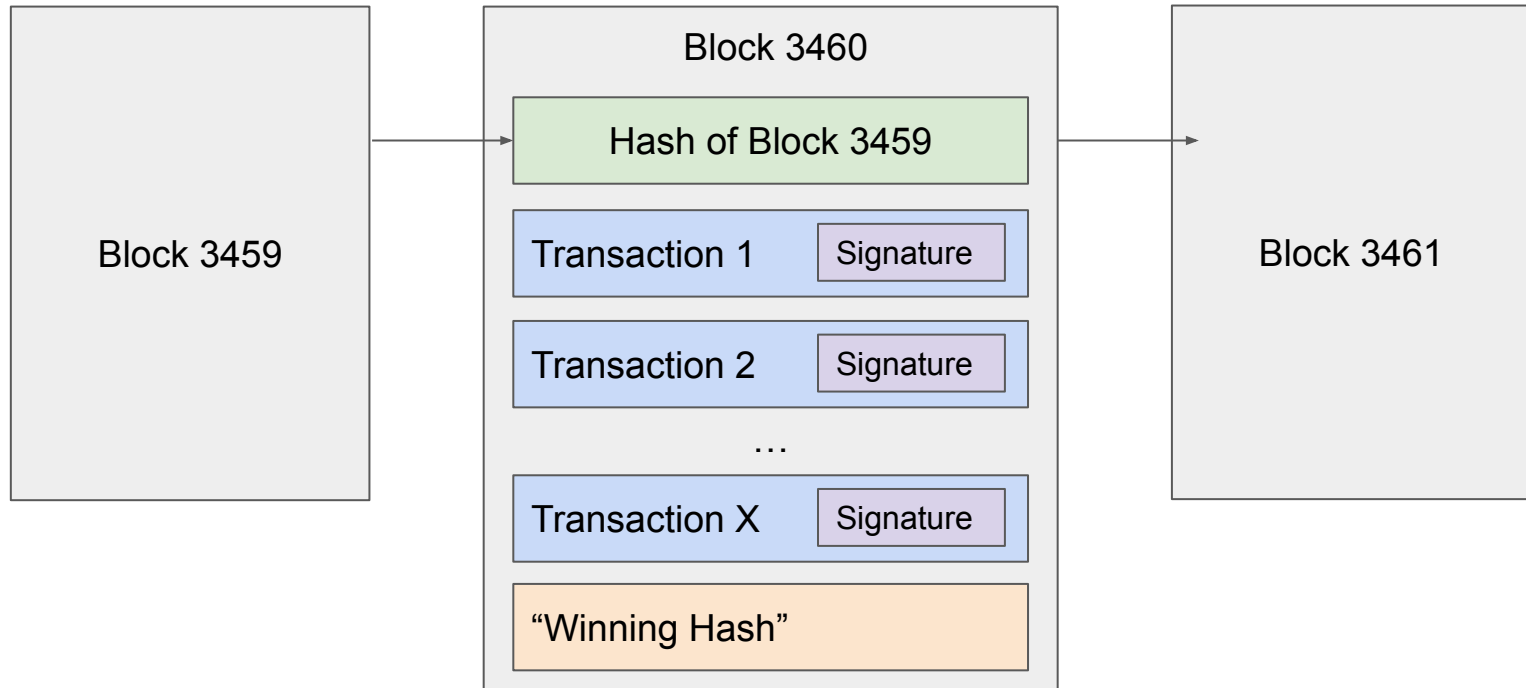
But how is the transfer finalized? And how is it ensured that all participants follow the rules of Bitcoin?

172 Blockchain

The blockchain is a chain of data blocks. Each data block is about 1 MB in size and contains an update on who transfers Bitcoin to whom.

The various data blocks are linked together. Each data block refers to the directly preceding data block.

173 Blockchain



174 Mining

Every participating computer in the Bitcoin network can try to create a new block. To do so, a puzzle must be solved: a **winning hash** must be found that solves the puzzle.

1. The winning hash can only be guessed
2. Guessing it requires a high amount of computational effort (trillions of attempts)
3. Once the winning hash is found, it is easy for all participants to verify its correctness

Approximately every 10 minutes, a winning hash is found, and the blockchain receives an update.

175 Mining: Details

- Millions of dedicated computers participate in mining; only the winner is rewarded
- The difficulty of the puzzle increases with the number of miners, so that the speed remains roughly constant (one new block every 10 minutes).
- The current hashrate (= rate of calculations) is about 9×10^{20} H/s; about 3.79×10^{23} guesses are needed to find the winning hash
- How is mining rewarded?
 - Each new block is rewarded with newly (out of nowhere) created Bitcoin – however, this reward will eventually run out, and the total number of Bitcoin will be limited to 21 million.
 - Sending addresses pay a small fee to the winning miner; more or less fees can be offered.

Exercise

Find a blockchain monitor, like

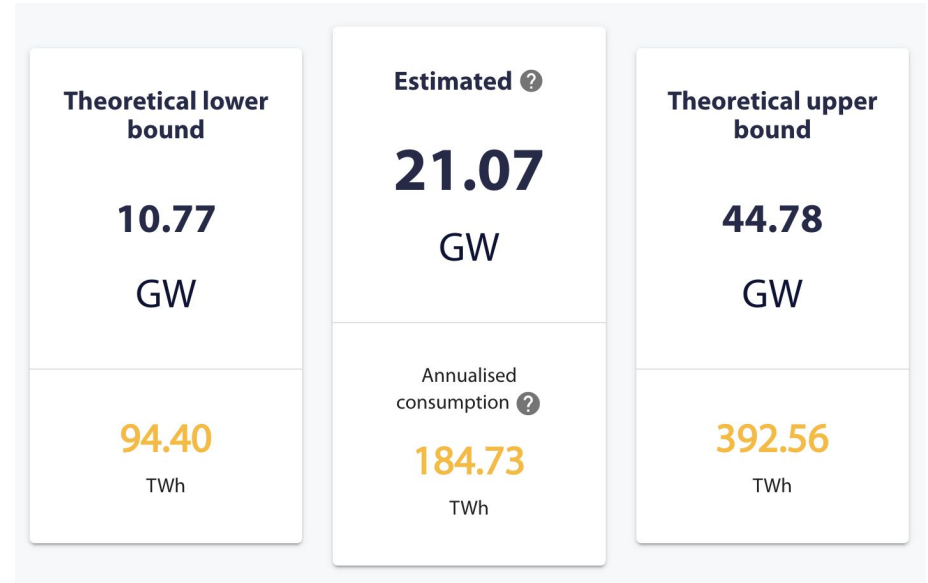
<https://www.blockchain.com/explorer/>

Try to understand what's going on!

177 Mining and Energy Usage

It is difficult to estimate the energy usage of Bitcoin mining and its environmental impact, because we do not know precisely what hardware miners use, and which energy sources.

Comparison: Germany uses about 500 TWh p.a., the Netherlands about 115 TWh p.a.



<https://ccaf.io/cbnsi/cbeci>

178 ‘Trust but Verify’

- All blocks are publicly accessible to everyone – meaning all transactions (from the very beginning!) and the “balance” of all addresses can be verified
- Each new block references the previous block; thus, it can be verified that there are no gaps
- Every single transaction is secured by a signature that only the owner of the relevant private password can create
- A new block requires proof of the winning number, which can only be found with great effort and therefore cannot be “faked”
- There is open competition among independent miners to find this winning number; no single entity controls all new blocks.
- If a new block is faulty or forged, the Bitcoin protocol contains a rule that reverts to the last valid block



Is Bitcoin Money?

II

Other Cryptocurrencies

181 Cryptocurrencies

- A large number of different cryptocurrencies emerged following Bitcoin.
- They function similarly, though not always in exactly the same way.
- Creating new cryptocurrencies is easy and unregulated.
- There has been enormous growth over the past fifteen years

182 Proof of Work vs Proof of Stake

	Proof of Work (PoW)	Proof of Stake (PoS)
Consensus Mechanism	Solving complex math problems (mining)	Validating transactions based on coin holdings
Security Basis	Computational power	Financial stake (coins held or staked)
Energy Usage	High (energy-intensive mining)	Low (no mining required)
Examples	Bitcoin, Litecoin, Dogecoin	Ethereum (post-merge), Cardano, Solana
51% Attack Risk	Needs 51% of total hash power	Needs 51% of total staked coins
Rewards	Mining rewards + transaction fees	Staking rewards + transaction fees

183 Further Features of the Cryptocurrency Environment

Memecoins. Cryptocurrencies inspired by internet memes or jokes. *Example: Dogecoin*

Stablecoins. Cryptocurrencies designed to maintain a stable value, typically pegged to the U.S. dollar. *Example: Tether (USDT)*

Non-Fungible Tokens (NFTs). Digital assets stored on a blockchain that represent ownership of items like art, music, videos, or virtual real estate. *Example: Bored Ape Yacht Club, CryptoPunks*

Rugpull. A type of scam where developers abandon a project and run off with investors' funds, usually after generating hype and raising money.

III

Normative Evaluation of Bitcoin

Is Bitcoin Money?

1. Bitcoin is not generally used as a medium of exchange or as a unit of account. Is Bitcoin more like a speculative asset than money?
2. Does Bitcoin (and other cryptocurrencies) realise the dream of free currency competition?

186 Bailey et al.: Moral Dimensions of Cryptocurrencies

- **Monetary policy:** What implicit monetary policy is programmed into the cryptocurrency? (e.g., Bitcoin: fixed total supply)
- **Privacy:** How much information does the cryptocurrency reveal by design?
- **Censorship-resistance:** Who can participate in the network – everyone or only a few? How easy is it to block, prevent, falsify, or reverse transactions?
- **Consensus:** Does the cryptocurrency's mechanism rely on consensus? Whose consensus?

187 Properties of Bitcoin

- **Free accessibility:** anyone with internet access can create a Bitcoin address and send or receive Bitcoin; the same applies, in principle, to mining.
- **Decentralization:** there is no central authority controlling Bitcoin; the system is based on agreement on the Bitcoin protocol and mutual verification.
- **Security:** only the holder of the private password can send Bitcoin from an address.
- **Censorship resistance:** there is no authority that can destroy, confiscate, steal, block, or reverse Bitcoin payments.
- **Pseudo-anonymity:** no personal information is needed to own Bitcoin – however, all transactions and balances of all addresses are permanently visible.
- **Finiteness:** there is a fixed total supply of Bitcoin that will ever exist; no person or institution can increase this amount.

188 Financial Privacy

Privacy: the ability to keep areas of one's life hidden from the view of others

Financial privacy: the ability to keep financial decisions and holdings hidden from the view of others

Bitcoin guarantees only pseudonymity by design; however, if used cleverly, a high level of financial privacy can be achieved.

Other cryptocurrencies (e.g., Monero) build financial secrecy into their design.

→ Is financial privacy desirable? How desirable is it compared to other goals?

189 Censorship Resistance

- In classical banking systems, there are multiple authorities that can block or prohibit certain transactions:
 - Banks can prohibit specific payments (e.g., to certain countries or above certain amounts)
 - Governments can instruct banks to block certain transactions
 - Payment processors (e.g., Visa, Mastercard, PayPal) can restrict or ban certain recipients
- Examples from Bailey et al.:
 - Drug trade, e.g., marijuana
 - Other illegal or grey-area transactions, e.g., online gambling, pornography, sex work
 - Transfers especially to/from abroad
 - Political resistance movements

→ Transactions in most cryptocurrencies are permissionless – they do not require approval from any central authority. Is that morally valuable?

9

Usury and Interest

191 Interest and Usury

Ban of Interest: *Any* form of interest — i.e., profit earned from lending money — is morally forbidden (and perhaps so morally corrupt that the state should ban it).

Ban of Excessive Interest: Interest rates that exceed a certain (percentage) threshold are morally forbidden (and perhaps so morally corrupt that the state should ban them).

Many religions have historically endorsed a ban on interest, even if not always enforced in practice. Over time, this ban often softened into a prohibition only on excessive interest — especially within Christianity.

192 Critiques of Interest (Visser/Macintosh 1998)

- **Interest is unearned:** It is not based on labor or active involvement by the lender.
- **Interest is driven by greed:** It reflects a desire to gain money purely for its own sake.
- **Interest exploits the poor:** It empowers the wealthy to oppress the poor (in the extreme: debt bondage).
- **Interest amplifies inequality:** It increases the wealth of capital owners, worsening economic and social disparities.
- **Interest creates economic instability:** High credit volumes lead to boom-bust cycles.

193 Islamic Banking: Two Instruments

Murabahah

- The bank purchases a good that the buyer wants.
- The bank then sells the good to the buyer at a marked-up price.
- The buyer commits to repayment in installments.
→ Common in Islamic finance: “asset-based loan instead of money loan”

Mudaraba

- The bank acts as a silent partner in an investment project.
- Profits are shared according to a pre-agreed ratio.
→ Seen by some Islamic scholars as the ideal model, but rarely practiced in reality.

10

The Social Meaning of Money



The Social Meaning of Money

11

Open Questions

Your Comments and Questions

- Can communities create their own money?
- How does the monetary system give rise to international power inequality? Do we need an international monetary order?
- Can a society exist without money? Can it rely on gift relationships instead?
- Does inflation lead to moral decay?
- Where does money develop from here?
- What speaks for/against currency competition?
- How can we reconcile technocracy and democracy?

Your Questions

Return to the questions you wrote down at the beginning of the course.

1. Which questions have been answered?
What have you learned?
2. What are open questions you still have?
3. What additional questions do you now have? What do you want to research next?

12

Feedback