Money and Networks

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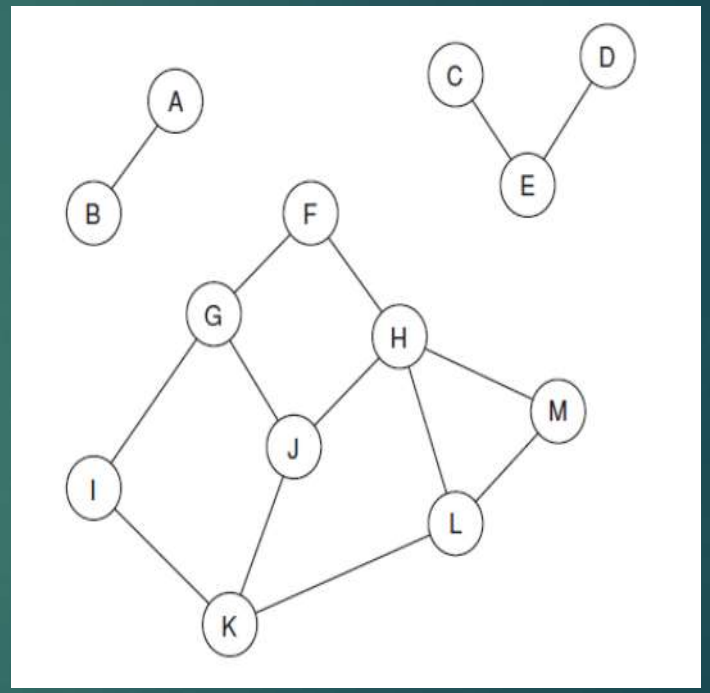
Networks and Graphs

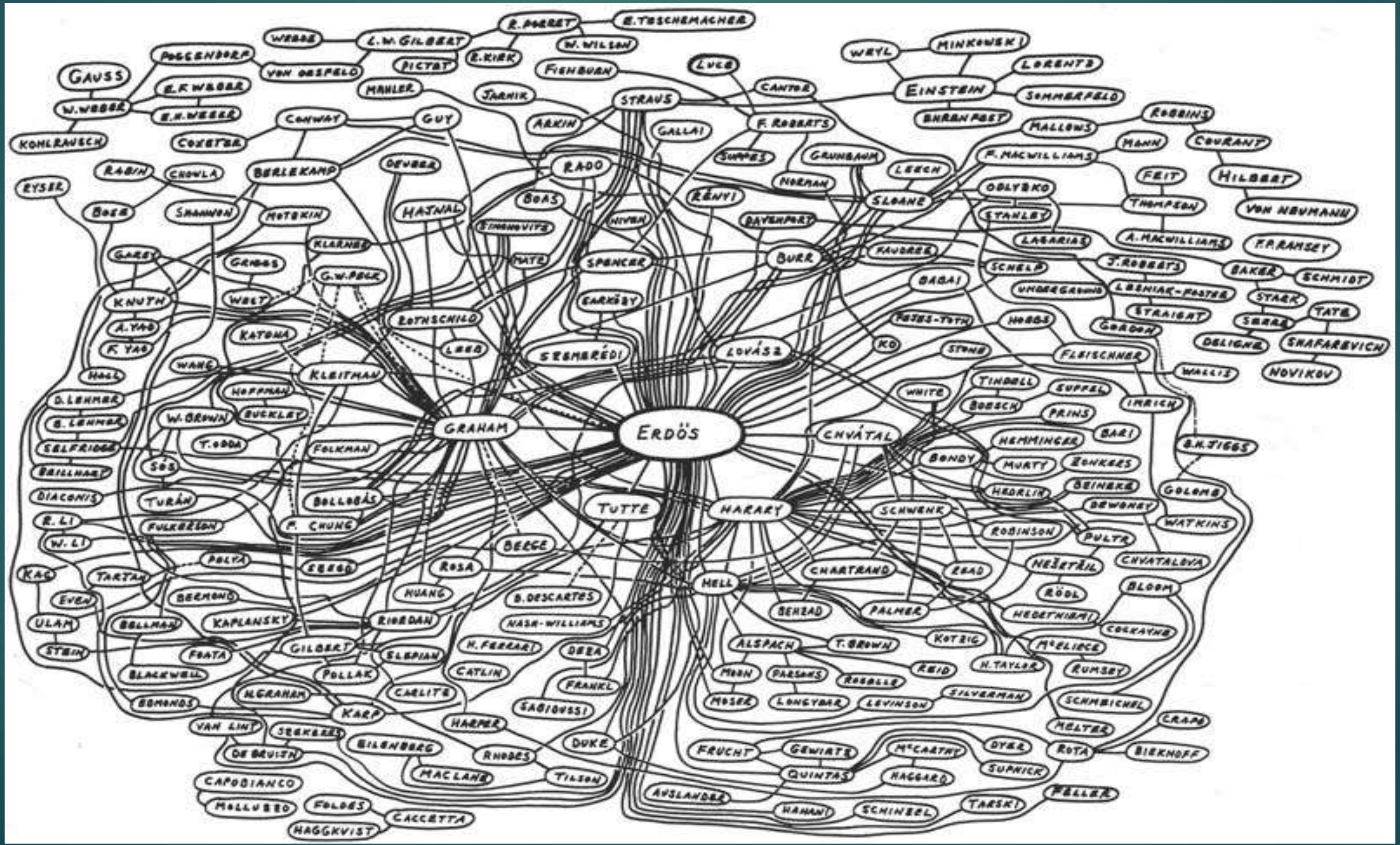
- Network - set of nodes and edges
- Graph - visual (graphic) representation of a network
- Material Networks (food chains), Energy Networks (Electricity Grid), Information Networks (Internet)
- Social networks (people and their relations)
- Economic networks consist of nodes (entities, *private*: physical and legal and *public*: the state) and edges



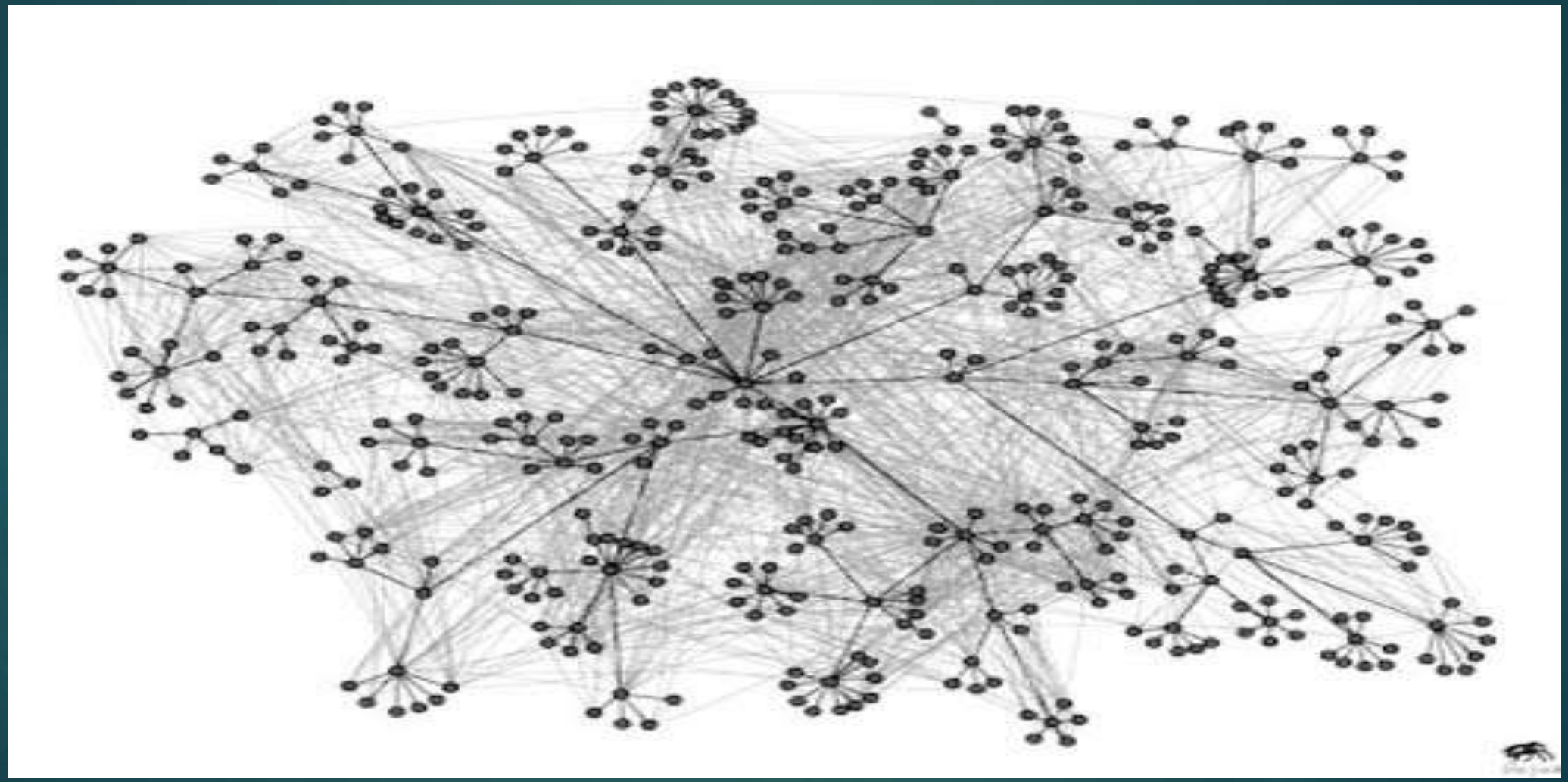
Network Theory

- Network Theory is based on views of two prominent Hungarian mathematicians: Paul Erdős and Alfréd Rényi started working together in 1948. They developed a mathematical framework of functioning of any interlinked group of entities (nodes) and links between them (edges).
- Later development of the Theory (Stanley Milgram, Mark Granovetter, Duncan Watts, Steven Strogatz….) enabled us to understand material networks, energy networks and information networks, giving us a powerful tool for comprehending Nature and Society (Albert-László Barabási)
- Ecosystems are networks: material, energy and information

Paul Erdös and (a fragment) of his collaboration in making papers in mathematics



Complex Network: Market



What is Money?

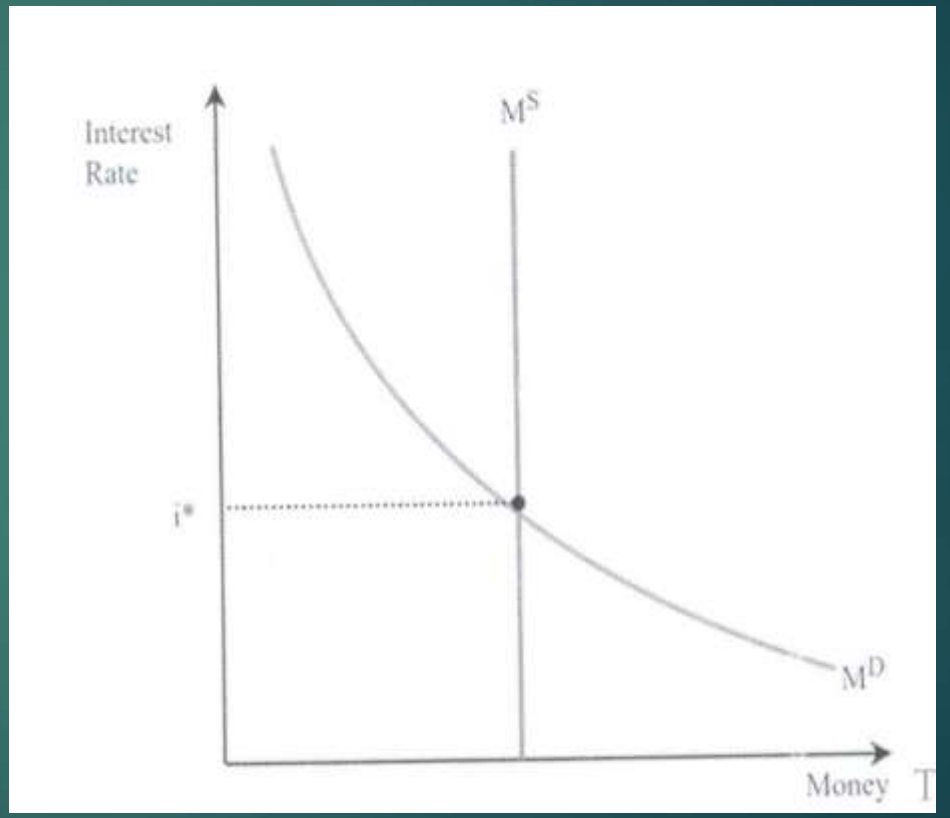
- Money is a **networking instrument**: "material" for making edges, links between nodes in economic networks.
- Money is a catalyst for a socio-economic communication (G. Jacobs)
- Money is a construct of social organization: linking producers and consumers, savers and investors (patient and impatient agents)
- Money is an information on debt, or a claim on the output, what we owe to each other: IOY
- Networking function of money, edges are not permanent (dynamics of money creation and dissipation)
- Nodes with more money can make more links with other economic agents. Less money - less potential to create edges.

Quality and Quantity of Money

- Quality of money in a *commodity standard* is determined by the quality of commodity that serves as money (gold).
- Quality of money in *fiat money standard* is determined by our willingness to accept it as money.
- Chartialism: legal tender to pay taxes, tax debt has always been the main basis for the money creation
- Value of Money has always been founded on the productive capacity of economy (number of nodes and needs for linkage) never on the quality of money
- Quantity of money: PROBLEM OF MONEY SUPPLY!!!!
- Exogenous money Supply, classic Monetarism
- Endogenous money Supply, Post-Keynesian Theory

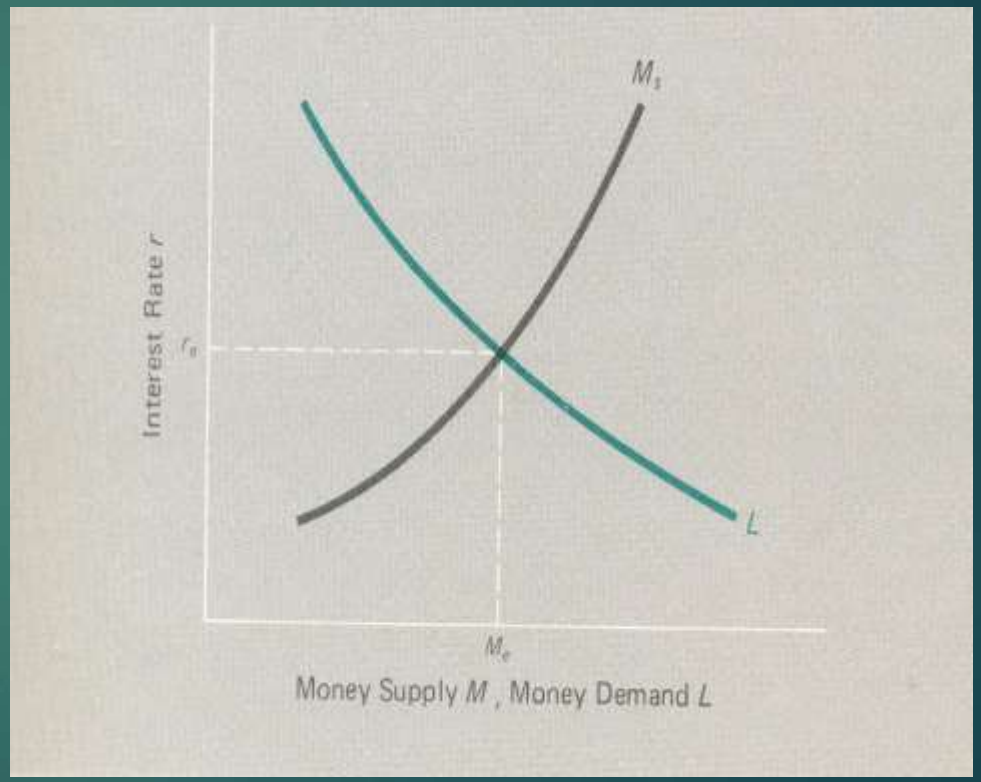
Exogenous Money

- Money supply is determined by the Central Bank.
- Regulating High Power Money (cash + dem. reserves) via Money Multiplier, CB creates M1, or money supply
- Monetarist rule, quantity theory of money M•V=P•Yr
- In order to have stabile prices, MS growth must follow real GDP growth, but do we now it in advance?
- Problem: MS is not only in CB competence (banks and fractional reserves, credit multiplication, non-bank loans)



Endogenous Money

- Behavior of agents can change MS
- High interest rates affect banks to offer more credit money (less excess reserves).
- Accomodationists: MS is exclusively credit driven, CB setting interest rates is forced to accommodate any increase in demand for reserves caused by bank lending
- Structrualists: MS is determined by demand for credit, but MS also depends on asset and liability management practices of banks
- Non-neutral money



Money Controversy

- MS is crucial for price stability. Whether there are only price (nominal) effects, or there are real effects too, excessive monetary expansion MAY cause general price instability.
- Therefore any attempt of alternative currency introduction (energy currency, earth currency, carbon money, river hours, local money, etc.) may end in price hikes. However, as long as **altMS** is negligible compared to **oficMS** effects on prices will be minimal, and can be practically neglected.
- Why is it so? Problem is in a dual nature of money.
- Money has two basic but contrasted functions: *unit of account* and *medium of exchange*

Contrasted functions

- *Unit of account*: way of expressing the value of everything (PRICES).
- Not necessarily connected with real transactions.
- It exists as a notion of value and wealth.
- It serves as an IDEA, but it can be easily compromised and destabilized in a real world.
- Therefore the amount of money production (in accord with a networking need) is crucial for meeting the demand for money and all other goods.

- *Medium of exchange*: way of making edges between nodes. It enables economic activity between nodes, it enables transfer of wealth in space and in time (store of value).
- It cannot exist without real transactions.
- It increases the need for social and economic networking, (network density).
- It can be produced in amounts that may enable credit and investments, but if the investments are unsuccessful it may create financial instability (H. Minsky).

Private Monies

- F. A. Hayek (1978) put forward a proposal for issuing private monies, fluctuating and competing against each other. "Let the market decide".
- Leland Yeager (1984) Separation of the unit of account from medium of exchange. Government should define money unit, like it defines units of weight and length. UoA free of being supply/demand determined. The definition of UoA in terms of a bundle of stabile commodities (**problem!**). MoE quantity defined by demand side, produced by private institutions, banks and mutual funds. People would make payments writing checks denominated in UoA on their holdings of shares of stock in banks and mutual funds. These shares would have market defined flexible prices.
- No Central Bank – No lender of last resort; growing uncertainty in risk averse society may end in a gold rush! Demand for gold will crowd out demand for productive assets (Meltzer critique).

The Chicago Plan Revisited

- Benes and Kumhof (2012) analyzed ideas of I. Fisher (1936) of separation of monetary and credit functions of banking system, requiring 100% reserve backing for deposits.
- Advantages: (1) Much better control of a major source of business cycle fluctuations, sudden increases and contractions of bank credit and of the supply of bank-created money.
- (2) Complete elimination of bank runs.
- (3) Dramatic reduction of the (net) public debt.
- (4) Dramatic reduction of private debt, as money creation no longer requires simultaneous debt creation.
- (5) Large longer-term output gains because lower debt and higher non-inflationary seniorage revenues would lead to large reductions in real interest rates, distortionary taxes, and credit monitoring costs.
- (6) liquidity traps would become a history, because broad money would be directly under government control while the interest rate controlled by policy would not face a zero level.

Problems and Questions

- How to determine networking needs (quantity of money)? Are we, the "nodes in the network", competent for that?
- How to demonopolize CB? Is the CB a natural monopoly?
- How to efficiently control MS? If we want to make money for the people and by the people, how can it be done?
- How to separate money from credit? Is the Chicago Plan an option?
- Is a 100% reserve-backed bank deposits a good option?
- What about new bank credits only from earnings or borrowing from non-banks?
- How to limit financial speculations (Ponzi schemes) without hindering market functions?
- How to determine interest rates? Is a no-interest economy possible, or is it just a utopia?
- How to tackle inequality problem (distribution) with monetary tools? Is it possible at all?

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