Macroeconomics

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Ugo Zannini

uzannini@luiss.it

https://luiss.webex.com/meet/uzannini

Our three social challenges

1. Structural inequities.
2. Environmental degradation.
3. The sweeping effects of climate change.

- They mirror the shortage of *public goods* (justice and equal opportunities, safe and productive environment).

- The provision of public goods requires an adequate *monetary system*, because it shapes possibilities and incentives of economic actors.

Global wealth report – Credit Suisse (credit-suisse.com)

87.8% of P went from 16.1% to 15% of W. Italy: 80% of P has 30% of W.

Figure 1: The global wealth pyramid end-2019

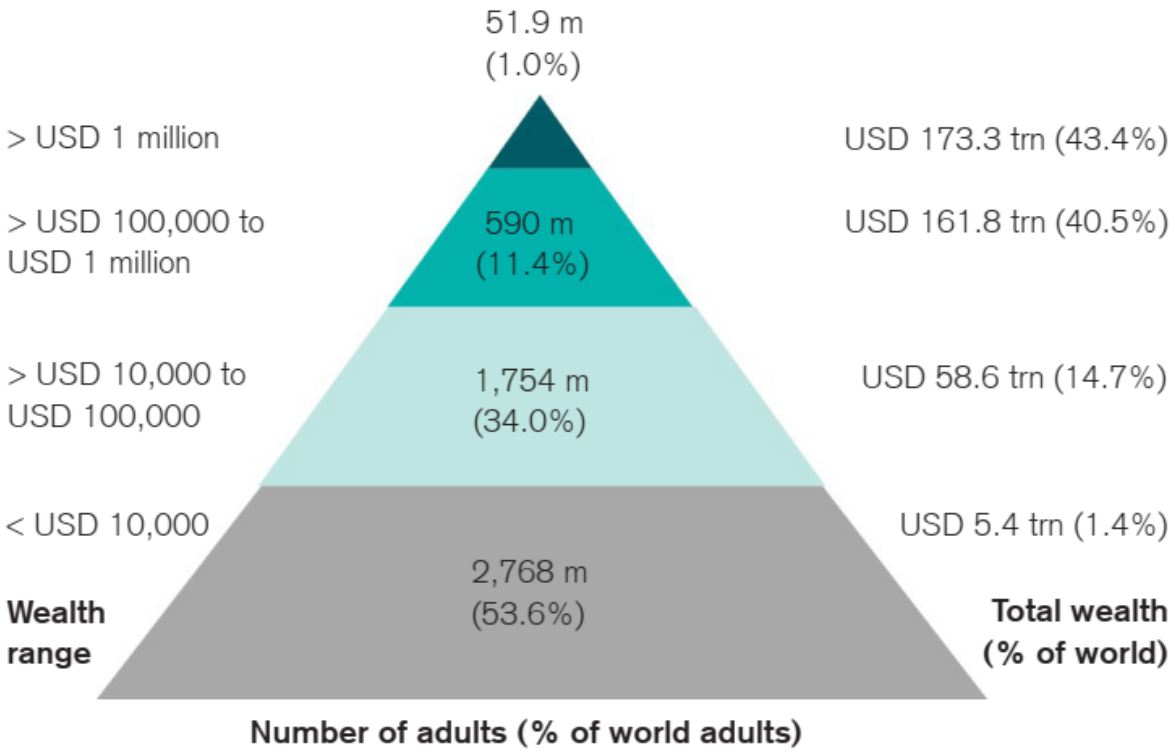
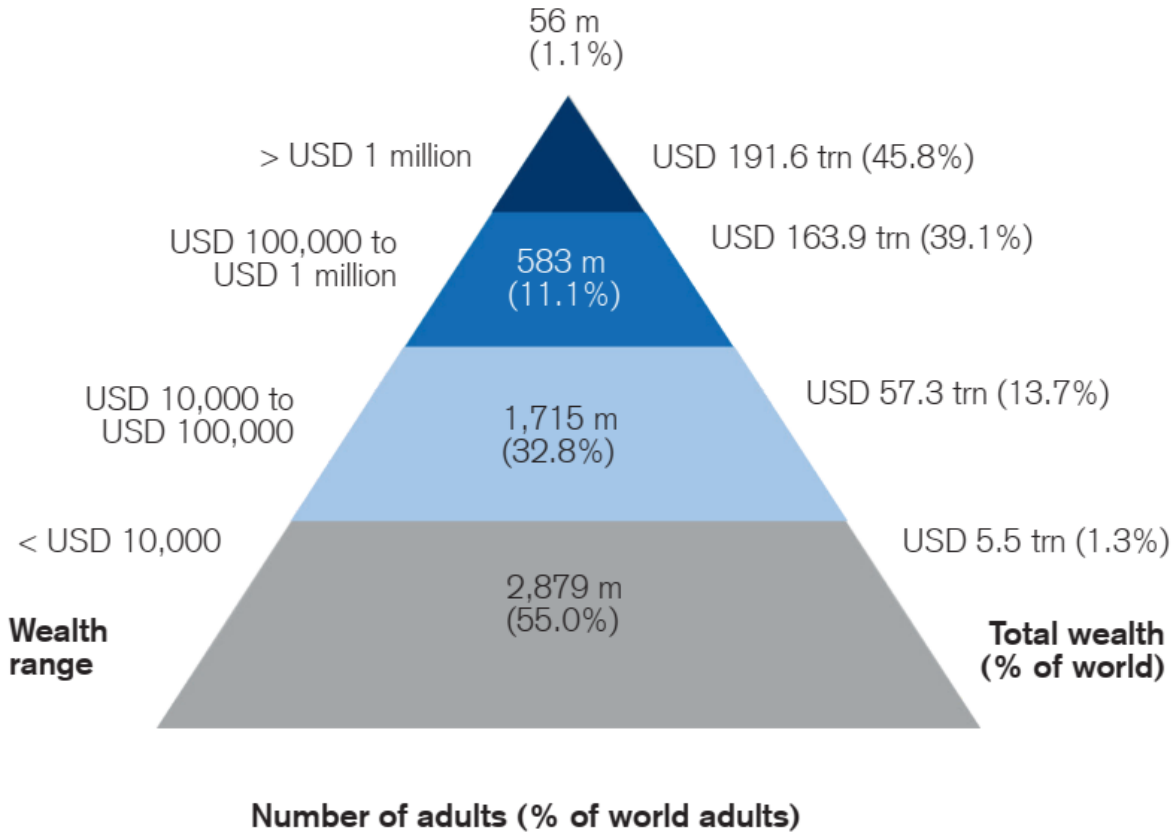


Figure 1: The global wealth pyramid 2020



The Supply of Money

1. Monetary Economy: money and financial assets
2. Some Data: debt and monetary aggregates
3. Debt Money and Equity Money
4. Money Supply in the Euro Area
    a. Commercial Bank Money
    b. Central Bank Money
        i. Reserves
        ii. Banknotes
        iii. Coins
    c. Government Debt and Tax Liability
    d. Conclusion

1. Monetary Economy

- A monetary economy lies between a Barter Economy and a Pure Credit Economy.

- Barter Economy: quid pro quo exchange of goods and services. Limit: impossible complexity and/or specialization in production and consumption.

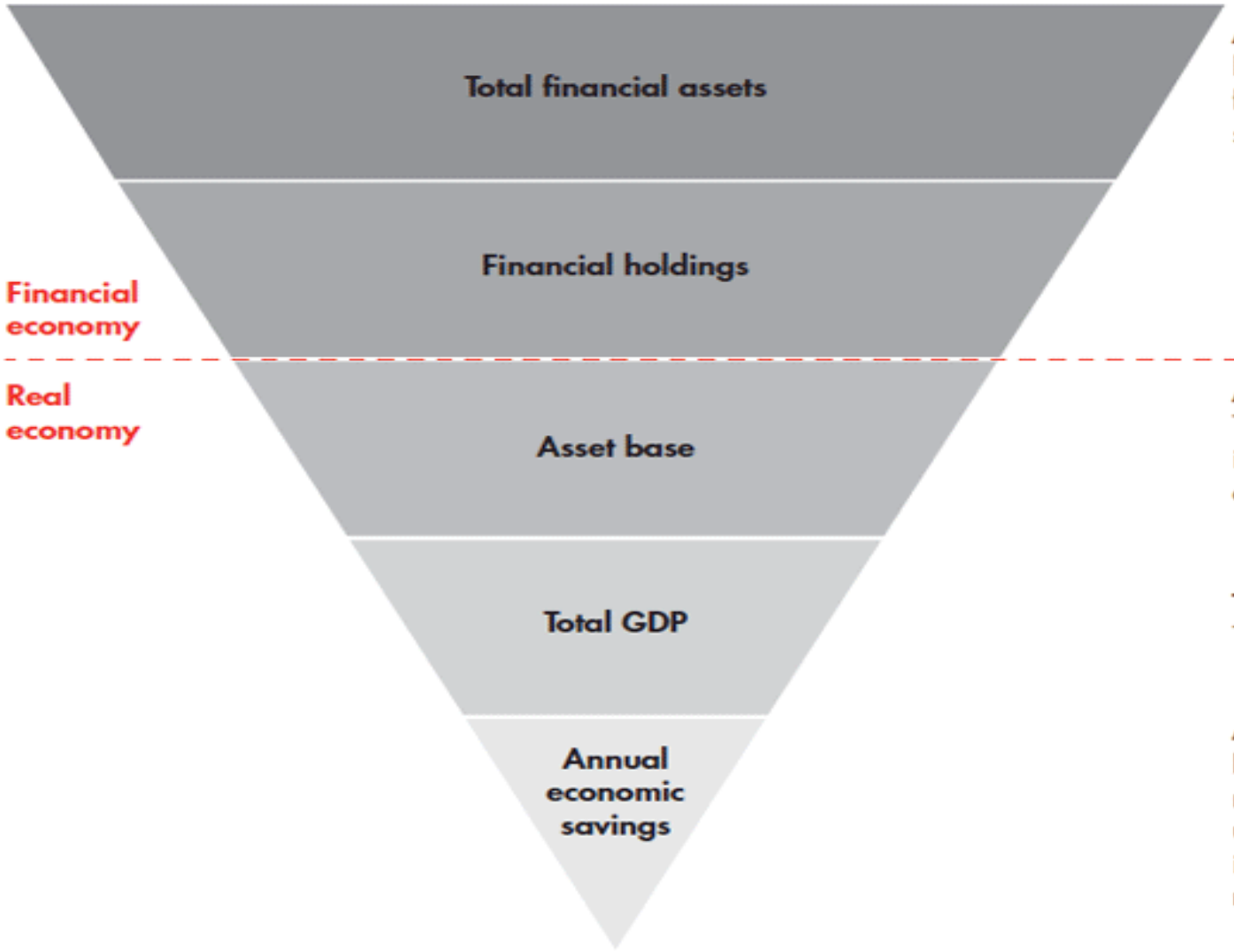
- Pure Credit Economy: each person makes promises in a social accounting scheme. Requirements: perfect monitoring of all credit/debit positions of all agents, plus a form of punishment for excessive debt.

1. Monetary Economy

- Monetary Economy: (many) transactions involve a medium of exchange.
- Money: any command over *general* purchasing power which is accepted as medium of exchange and legal tender on the spot (means of payment).
- Financial asset (e.g.: bond, equity): a promise of money.

1. Monetary Economy

https://www.bain.com/insights/a-world-awash-in-money/



All financial assets of all sectors
Includes financial holdings of direct owners, as well as financial assets controlled by and held on the balance sheet of banks and other financial intermediaries

Financial assets of all sectors excluding the financial sector
Securities, mutual funds and other financial instruments in the hands of households, corporations, governments and other direct owners

Accumulated tangible and nontangible assets of all sectors
The sum total of all factories, farms, infrastructure, intellectual property and the like—everything that might appear as a nonfinancial asset on a balance sheet

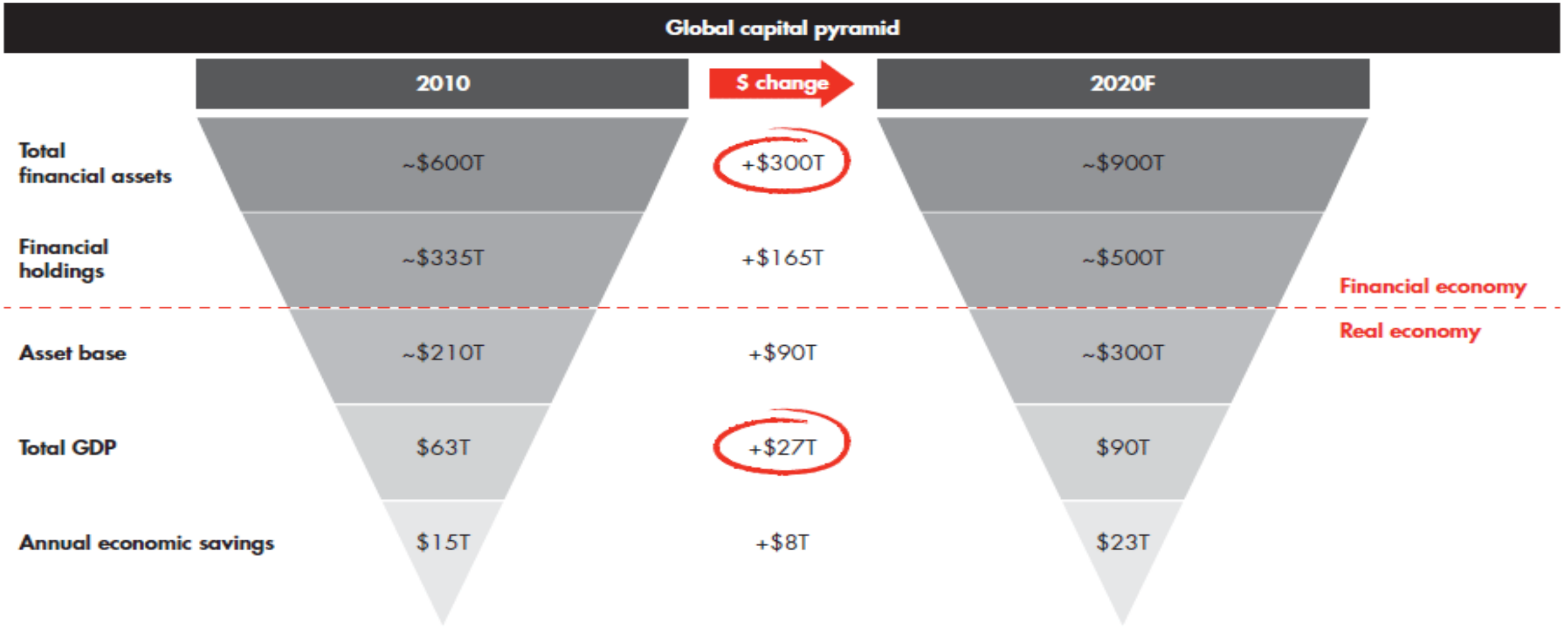
Total annual economic output
Total global GDP, or the real output of goods and services

Annual economic output not immediately consumed
Derived from gross world savings (the sum of gross national savings at the country level), this represents the underlying free GDP available for investments. It does not include depreciation, so some of this amount needs to be reinvested to maintain a constant asset base.

Source: Bain & Company

2. Data

Figure 1.1: A $27 trillion growth in global GDP will support a $300 trillion increase in total financial assets by 2020



Sources: National statistics; International Monetary Fund; OECD; Bain Macro Trends Group analysis, 2012

2. Data

- Global Debt as % of world GDP:
  - 2009: 213%
  - 2018: 225% (https://www.weforum.org/agenda/2018/06/the-anatomy-of-global-debt)
  - 2020: 356% ($281 trillion) (Global debt soars to 356% of GDP - Axios)

- Global Debt Database (IMF): https://www.imf.org/external/datamapper/datasets/GDD

2. Data: Euro area (Q1 ‘21)

ECB, Statistical Data Warehouse: https://sdw.ecb.europa.eu/

- GDP 2020 = €11.4 trillions
- Debt-to-GDP ratio: 256%
  - Households: 72%
  - Non-Financial Firms: 84%
  - Government: 100%

- Currency and Deposits = €35T
- S-T Debt (€1.7T) + L-T Debt (€19T) = €20.7T
- Listed Equity (€9T) + Unlisted Equity (€22.3T) + Other Equity (€6.1T) = €37.5T
- Loans = €27T
- Insurance and pension = €10T
- Other accounts payable = €9T
- Total Financial Liabilities = €156T (GDPx13.5)
- Financial Net Worth: -0.2T

2. Data: Euro area (Q3 '20)

- M1 = € 10.8 T : *A "narrow" monetary aggregate that comprises currency in circulation and overnight deposits.*

- M2 = € 14.3 T : *An "intermediate" monetary aggregate that comprises M1 plus deposits with an agreed maturity of up to two years and deposits redeemable at notice of up to three months.*

- M3 = credit to euro area residents (no gov) = € 15 T : *A "broad" monetary aggregate that comprises M2 plus repurchase agreements, money market fund shares and units as well as debt securities with a maturity of up to two years.*

2. Data: Euro area (Q1 '21)

ECB balance sheet = € 8.2 T, 72% of GDP

Selected Assets = € 6.8 T

- Lending to credit institutions = € 2.2 T
- Securities from QE = € 4.6 T

Selected Liabilities = € 6.8 T

- Banknotes in circulation = € 1.5 T
- Deposits = € 5.3 T

banks in EA (€4.45T)+ other EA residents (€0.85T)

3. Debt Money and Non-Debt Money

- *[W]e can draw the line between "money" and "debts" at whatever point is most convenient for handling a particular problem.* J. M. Keynes (1936).

- "Money is debt" is always true if we refer to debt as both real and financial obligation.
- When money represents a real obligation, however, it does not need to be also a financial obligation.
- From a financial point of view, money can also be a non-debt (equity) asset.
- Example: equity money as a real obligation.

3. Debt Money and Equity Money

- Debt money: the issuer creates and lends money, waiting for reimbursement (principal + interest). At least one agent in the economy holds the money as an asset, and another agent (the borrower) has the offsetting obligation, i.e. a financial debt. When the borrower reimburses the loan, the monetary asset disappears.

- Equity money: the issuer creates and spend money. No economic agent in the economy has a financial debt. The society has a real debt toward the holder of the monetary asset, given its purchasing power.

3. Debt Money and Equity Money

- Characteristics of Debt Money:
  - creation/allocation of purchasing power according to the "financial profit" rule;
  - creation of a structural financial deficit, as the interest is not created at the lending time → "the problem of profits".

- Characteristics of Equity Money:
  - creation/allocation of purchasing power according to other goals than financial profit;
  - no structural financial deficit;
  - it does not need to be inflationary, as explained by M. Woodford and A. Turner here: https://voxeu.org/article/helicopter-money-policy-option

3. Debt Money and Equity Money

- This is the abstract of Prof. Bolton's Presidential Address of "The American Finance Association" in 2015: "Debt and Money: Financial Constraints and Sovereign Finance".

<<Economic analyses of corporate finance, money, and sovereign debt are largely considered separately. I introduce a novel corporate finance framing of sovereign finance based on the analogy between fiat liabilities for sovereigns and equity for corporations. The analysis focuses on financial constraints at the country level, making explicit the trade-offs involved in relying on domestic versus foreign-currency debt to finance investments or government expenditures. This framing provides new insights into issues ranging from the costs and benefits of inflation, optimal foreign exchange reserves, and sovereign debt restructuring.>>

- His "fiat liability" corresponds to our "equity money".

4. Money Supply in the Euro Area

a. Commercial Bank Money

b. Central Bank Money
   i. Reserves
   ii. Banknotes
   iii. Coins

c. Government Debt and Tax Liability

4.a Commercial Bank Money

- Creation
- Circulation
- Destruction
- Capital Market & Illiquidity from Credit Crunch
- Limits to Creation: Demand of Credit and Capital Requirement (and Reserves?)

4.a Commercial Bank Money: creation

- When a bank grants a loan to an agent, the bank increases both its asset and liability sides of the balance sheet by registering the loan as its credit and borrower's deposit. The same deposit shows up on the agent's asset side, with the corresponding debt on his or her liability side.
- Call x_i^u the liability x issued by i and in possession of u, "i owes u". As in Figure 1, Agent 1 (A1) and Bank 1 (B1) create a double book-keeping entry in their balance sheets through the emission of liability b_A1 and d_B1.

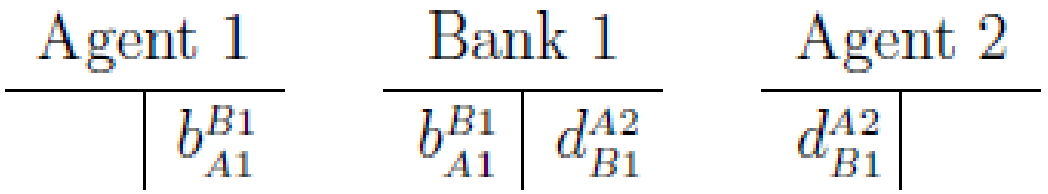
Figure 1: Creation of bank money

Agent 1	
d_{B1}^{A1}	b_{A1}^{B1}

Bank 1	
b_{A1}^{B1}	d_{B1}^{A1}

4.a Commercial Bank Money: circulation

Figure 2: Circulation of bank money



- After receiving d_{B1}, Agent 2 (Agent 1) has a positive (negative) net financial position.

➢ The amount of money in the hand of Agent 2 is backed by the debt of the Agent 1, the initial borrower.

- Assume Agent 1 goes bankrupt (Agent 1 has no money at the repayment date of b_{A1}). Thus, the bank's asset side shrinks because b_{A1} is worth zero, and so the value of Agent 2's deposit.

4.a Commercial Bank Money: destruction

- When Agent 2 uses the deposit to buy something from Agent 1, then Agent 1 holds an asset and a liability position in the bank's balance sheet.
- To repay the loan, Agent 1 uses their deposit.
- Balance sheets of Agent 1 and Bank 1 shrink to zero.
- NOTE: this was a loan with zero interest: the problem of profits.

4.a Co. B. M.: Capital Market & Credit Crunch

- Suppose that in Figure 2 Agent 2 uses d_{A2}^{B1} to finance Agent 3, i.e. to buy its liability b_{A3}, as in Figure 4. This operation can be generically seen as capital market financing.

Figure 4: Bank money and capital market

Agent 1		Bank 1		Agent 2		Agent 3	
	b_{A1}^{B1}	b_{A1}^{B1}	d_{B1}^{A3}	b_{A3}^{A2}		d_{B1}^{A3}	b_{A3}^{A2}

4.a Co. B. M.: Capital Market & Credit Crunch

- Suppose that Agent 3 transfers d_{A3}^{B1} to Agent 1, as in Figure 5.

Figure 5: Bank money and capital market - 1

Agent 1		Bank 1		Agent 2		Agent 3	
d_{B1}^{A1}	b_{A1}^{B1}	b_{A1}^{B1}	d_{B1}^{A1}	b_{A3}^{A2}			b_{A3}^{A2}

- If Agent 1 repays the debt with the bank, and Bank 1 does not extends new credit to the economy (credit crunch), then the system experiences a liquidity crisis, because there are no more units of account to settle the debt between Agent 2 and Agent 3, as in Figure 6.

Figure 6: Bank money and capital market - credit crunch

Agent 2		Agent 3	
b_{A3}^{A2}			b_{A3}^{A2}

4.a Co. B. M.: Capital Market & Credit Crunch

- If the banking system does not issue new money, i.e. credit, the deficit of means of payment increases the default probability on b_{A3}. If the liability is equity, its value decreases.
- This is a sharp example. In reality, it is sufficient that another deposit circulates among agents in such a way that all liabilities are paid off.
- Still, this is exactly what happens in a credit crunch. A shortage of units of account makes more difficult for debtors to get them and reimburse their debts, because 1) banks do not roll over loans and at maturity money is destroyed and 2) agents with money try to keep it (money hoarding).

4.a Co. B. M.: Capital Market & Credit Crunch

- The longer the chain of direct finance for a unit of money, the higher the probability of liquidity and solvency problems when banks destroy that unit of money. In the Euro Area, €35T of deposits finance €121T of liabilities (total - deposits), that is €3.5 of liability for each euro of money.

- Outside the banking system, but based on bank money, equity and debt positions are created through capital markets. Hence, capital markets leverage on bank money. The longer the chains of direct finance, the higher the illiquidity problems during a contraction of the money supply by the banking system.

4.a Commercial Bank Money: limits

- Limits to the expansion of bank credit:

1. The demand for loans.
2. Loan's profitability.
3. Capital ratios. (Where does bank's equity come from?)
4. Monetary policy affecting 1-2-3
5. Reserves?

- See Bundesbank (2017) on the course webpage or here https://www.bundesbank.de/resource/blob/654284/df66c4444d065a7f519e2ab0c476df58/mL/2017-04-money-creation-process-data.pdf

4.a Commercial Bank Money

- Banks' liabilities circulating as medium of exchange are debt money.

- At the issuing time, the interest payment is not created. The consequences are a combination of (Messori M., and Zazzaro A., 2005):
  - rising nominal debt level;
  - bankruptcy.

4.b.i. Reserves

1. A rationale for the existence of reserves: banking sector's means of payment.

2. The emission of reserves.

3. Summary.

4.b.i. Reserves: a rationale

- Reserves as interbank means of payment
- Suppose that Agent 1 originally transferred its deposit to Agent 2 with current account at Bank 2. The transfer of a liability involves different incentives, and thus works differently, from that of an asset.
- Would you accept a liability for free, as Bank 2 in Figure 7? Presumably not.

Figure 7: Circulation of bank money - banking system

Agent 1		Bank 1		Bank 2		Agent 2	
	b_{A1}^{B1}	b_{A1}^{B1}			d_{B1}^{A2}	d_{B1}^{A2}	

4.b.i. Reserves: a rationale

- In accepting the liability d_{B1} by Bank 1, Bank 2 must receive a claim on Bank 1's asset. Thus, the transfer of d_{B1} involves a credit/debt relation as the one we would observe in Figure 8, where h_{B1}^{B2} is the liability issued by Bank 1 in favour of Bank 2.

Figure 8: Circulation of bank money - banking system - credit/debit

Agent 1		Bank 1		Bank 2		Agent 2	
	b_{A1}^{B1}	b_{A1}^{B1}	h_{B1}^{B2}	h_{B1}^{B2}	d_{B1}^{A2}	d_{B1}^{A2}	

4.b.i. Reserves: a rationale

- Bank 1 could create more and more purchasing power to unreliable borrowers, with Bank 1's liability flowing to other banks.
- In order to discipline Bank 1 and to avoid accumulation of its liabilities, the banking sector uses central bank reserves to settle debts. Thus, using a partial accounting equilibrium, assume the existence of reserves on the asset side of Bank 1 and on the liability side of the central bank, as in Figure 9.

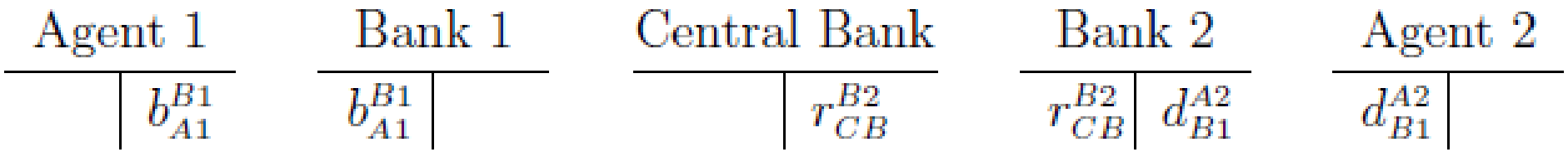
Figure 9: Circulation of bank money - banking system - reserves

Agent 1		Bank 1		Central Bank		Bank 2		Agent 2	
	b_{A1}^{B1}	b_{A1}^{B1}	h_{B1}^{B2}		r_{CB}^{B1}	h_{B1}^{B2}	d_{B1}^{A2}	d_{B1}^{A2}	
		r_{CB}^{B1}							

4.b.i. Reserves: a rationale

- Bank 1 uses reserves r_{CB}^{B1} to settle its debt h_{B1}^{B2} with Bank 2, that now has the claim r_{CB}^{B2} on the central bank, as shown in Figure 10.

Figure 10: Circulation of bank money - banking system - settlement



- Moving from partial to general accounting equilibrium, we need to understand reserve creation process.

4.b.i. Reserves: emission

- Understanding how reserves are issued can help to figure out if they are debt money or equity money.

- Reserve management instruments: OMOs, standing facilities, APPs.

- We are interested in the underlying transactions:
  - Reverse transaction (mainly on conventional basis);
  - Outright purchase of financial assets (mainly on unconventional basis).

4.b.i. Reserves: emission: reverse transaction

- A reverse transaction is defined by the ECB as "an operation whereby the central bank buys or sells assets under a repurchase agreement or conducts credit operations against collateral".

- With a reverse transaction, the central bank lends newly created reserves against eligible assets. The collateral remains in the bank's balance sheet.

- The reverse transaction applies to regular and irregular refinancing operations, as the "targeted longer-term refinancing operations", or TLTROs.

4.b.i. Reserves: emission: reverse transaction

- The initial stage of a reverse transaction is represented in Figure 11, where r_{CB}^{B1} is the amount of reserves borrowed by Bank 1 and h_{B1}^{CB} is the corresponding debt to the central bank, with b_{A1}^{B1} used as collateral.

Figure 11: Reserves - reverse transaction - stage 1

Agent 1		Bank 1		Central Bank		Bank 2		Agent 2	
	b_{A1}^{B1}	b_{A1}^{B1}	h_{B1}^{B2}	h_{B1}^{CB}	r_{CB}^{B1}	h_{B1}^{B2}	d_{B1}^{A2}	d_{B1}^{A2}	
		r_{CB}^{B1}	h_{B1}^{CB}						

- The final stage requires that Bank 1 uses reserves to pay its debt h_{B1}^{CB} (plus the interest) to the central bank.

4.b.i. Reserves: emission: reverse transaction

- Now, suppose that Bank 1 in Figure 11 transfers r_{CB} to Bank 2 to settle its debt h_{B1}^{B2}. The result is in Figure 12.

Figure 12: Reserves - reverse transaction - deficit

Agent 1		Bank 1		Central Bank		Bank 2		Agent 2	
	b_{A1}^{B1}	b_{A1}^{B1}	h_{B1}^{CB}	h_{B1}^{CB}	r_{CB}^{B2}	r_{CB}^{B2}	d_{B1}^{A2}	d_{B1}^{A2}	

- If a bank attracts more deposits than the amount issued through loans (Bank 2), then it has a surplus. If a bank loses deposits (Bank 1), it has a deficit.

4.b.i. Reserves: emission: reverse transaction

- When the transaction is reversed, the central bank receives the initial amount plus an interest.

- The interest is not created in the act of lending. Therefore, when the cost of money is positive, any standalone operation creates a financial deficit in terms on interest on reserves.

- The deficit can be overcame by the interest that the ECB pays on reserve accounts and deposit facility.

4.b.i. Reserves: emission: reverse transaction

- Since the 18th of September 2019 the interest rate on main refinancing operations (MROs) is 0%.
- Banks can keep reserves in a reserve account (minimum reserve requirement + excess reserves) and/or in the deposit facility.
- Required reserves (€0.15T) are remunerated at the MROs rate.
- Excess reserves (€2.9T) up to six times the minimum reserve requirements (€0.9T) are remunerated at 0%. Excess reserves above this threshold (€2T) are remunerated at the lower between 0% and the deposit facility rate.
- The deposit facility (€0.6T) is remunerate at -0.5%.

4.b.i. Reserves: emission: reverse transaction

- Technically, reserves from reverse transaction (RRT) are debt money for the banking sector.

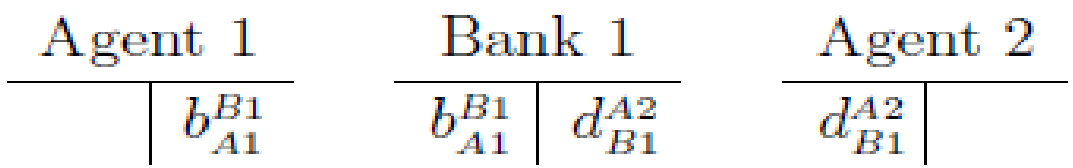
- However, banks do not usually default on their RRT because, as long as they have eligible assets to post as collateral, the operation is continuously rolled over.

- Hence, because RRT are rollover debt, they can be thought as equity money. In any case, however, RRT remains in the banking sector, and do not become equity money for the other sectors (households, firms, governments).

4.b.i. Reserves: emission: outright purchase

- An outright transaction is "a transaction whereby assets are bought or sold outright in the market (spot or forward)".
- The most important examples of structural operations conducted through outright purchases are APP and PEPP.
- The central bank can buy assets from the monetary sector (banks) and non-monetary sectors (households, firms, governments, insurance company, funds, …).
- Let's see the difference starting from Figure 2.

Figure 2: Circulation of bank money



4.b.i. Reserves: emission: outright purchase

- Suppose that, from Figure 2, the central bank purchases the asset b_{A1} from Bank 1 by way of newly created reserves.

Figure 16: Outright purchase

Agent 1		Bank 1		Central Bank		Agent 2	
	b_{A1}^{CB}	r_{CB}^{B1}	d_{B1}^{A2}	b_{A1}^{CB}	r_{CB}^{B1}	d_{B1}^{A2}	

- The CB has changed the composition of the bank's balance sheet, with *potential* effect on the supply of commercial bank money.

4.b.i. Reserves: emission: outright purchase

- When we consolidate the private sector's balance sheet, as in Figure 17, reserves are backed by Agent 1's debt.

Figure 17: Outright purchase - private sector

Private Sector		Central Bank	
r_{CB}^{B1}	b_{A1}^{CB}	b_{A1}^{CB}	r_{CB}^{B1}

- The reserve disappears when Agent 1 reimburses the loan.
- Therefore, reserves created with outright purchases of financial assets (ROP) from a monetary institution are backed by a non-monetary sector's liability, and do not immediately create new liquidity.

4.b.i. Reserves: emission: outright purchase

- What happens when the CB buys an asset from the non-monetary sector? Suppose that Agent 2 buys a bond issued by Agent 3, as in Figure 18 (identical to Figure 4).

Figure 18: Outright purchase - non-monetary institution

Agent 1		Bank 1		Agent 2		Agent 3	
	b_{A1}^{B1}	b_{A1}^{B1}	d_{B1}^{A3}	b_{A3}^{A2}		d_{B1}^{A3}	b_{A3}^{A2}

- A QE operation means that the CB buys b_{A3}^{A2} from Agent 2 with newly created reserves, as in Figure 19. In this case, the CB passes through Bank1: the new deposit d_{B1}^{A2} of Agent 2 in Bank 1 is financed with newly created reserves r_{CB}^{B1}.

Figure 19: Outright purchase - non-monetary institution - central bank

Agent 1		Bank 1		Central Bank		Agent 2		Agent 3	
	b_{A1}^{B1}	b_{A1}^{B1}	d_{B1}^{A3}	b_{A3}^{CB}	r_{CB}^{B1}	d_{B1}^{A2}		d_{B1}^{A3}	b_{A3}^{A2}
		r_{CB}^{B1}	d_{B1}^{A2}						

4.b.i. Reserves: emission: outright purchase

- If we consolidate the private sector's balance sheet, we get Figure 17 with b_{A3} instead of b_{A1}.

- Again, ROP are backed by non-monetary sector's liabilities. Hence, they are debt money.

- However, when the asset is purchased from the non-monetary sector, ROP *increase* the supply of debt money, converting a promise of money (the bond b_{A3}) into money (the deposit d_{B1}^{A2}).

4.b.i. Reserves: summary

- Reserves created with reverse transaction (RRT) are, technically, debt money for the monetary sector. However, given the continuous rollover, each single bank might not perceive RRT as effective liabilities. Thus, RRT seem equity money for the monetary sector.
- Reserves created with outright purchases (ROP) are, technically, debt money for the non-monetary sector.
- ROP can become equity money if the CB commits to perpetually roll over the liability of a given agent in the non-monetary sector. The commitment in favour of government debt is called debt monetization, and it is equivalent to issue equity money.

4.b.ii. Banknotes

- Paul Sheard, Executive Vice President and Chief Economist of S&P Global: *"Repeat After Me: Banks Cannot And Do Not "Lend Out" Reserves"*

- "Reserves is where banknotes come from. […] Reserves go down when banknotes increase. Banknotes increase when borrowers take the money they borrowed out of the bank and part or all of the money remains in cash, rather than being re-deposited in the banking system".

- https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/programs/senior.fellows/2019-20%20fellows/BanksCannotLendOutReservesAug2013_%20(002).pdf

4.b.ii. Banknotes

- Banknote issuance is an entirely demand-driven process. A bank may wish to borrow banknotes because its depositors prefer to convert part of their deposits into cash.

- As the means of payments within the banking sector are electronic reserves, banks would not need to borrow banknotes without the demand by the public.

- Reserves, then banknotes.

- The nature of banknotes is the same of reserves where they come from. Hence, banknotes are non-debt money if they come from debt monetization.

4.b.iii. Coins

- While the member states of the eurozone cannot issue banknotes, in fact they have the power to mint coins. However, as detailed in Deutsche Bundesbank (2018), the power is mainly operational since the value of coins in circulation must be approved by the ECB.
- The value of coins is recorded as an irredeemable debt in the balance sheet of the fiscal authorities, and it is included in the Maastricht debt accounting.
- In 2017 the Italian government issued €23M of coins, sustaining a cost of € 23M. In the euro area the value of euro coins was € 0.03 T, 0.25% of the M2 and of the GDP, and 0.31% of the consolidated government debts.
- Coins are non-debt money buy cannot be used for economic policy because their face value is equal to the production cost.

4.c Government Debt and Tax Liability

- Fiscal authorities are part of the non-monetary sector. Therefore, they can finance expenditures with revenues (taxes) and/or debt, like households, firms, and financial institutions other than banks.

- Taxes are collected out of existing money, and they are a liability of the private sector.

- Government debt can be considered non-debt money for the private sector only if the CB rolls over in perpetuity the purchase of government debt.

4.d. Conclusion

- Technically, a government has been made like any other agent in the non-monetary sector (households, firms, non-banks financial institutions).
- Commercial bank money is debt money.
- For the non-monetary sector, central bank money is non-debt money if reserves are issued through asset purchases from the non-monetary sector, with the commitment to perpetually roll over the operation. Only in this way the issuer does not perceive their debt as effective.
- Banknotes have the same nature of reserves where they come from.
- Coins are non-debt money, but their purchasing power is equal to their production costs. Hence, no economic policy goals.

Food for thoughts

- Fiat money
- Digital money
- Central bank independence
- Fiscal vs Monetary Dominance
- Japan