

Money and Macroeconomics (and Inflation)

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Outline

- Background
- Banks vs the shadow banking system
- Central banking
- PK open-economy monetary economics
- Some thoughts on inflation

SECTION I

A background to post-
Keynesian monetary
economics

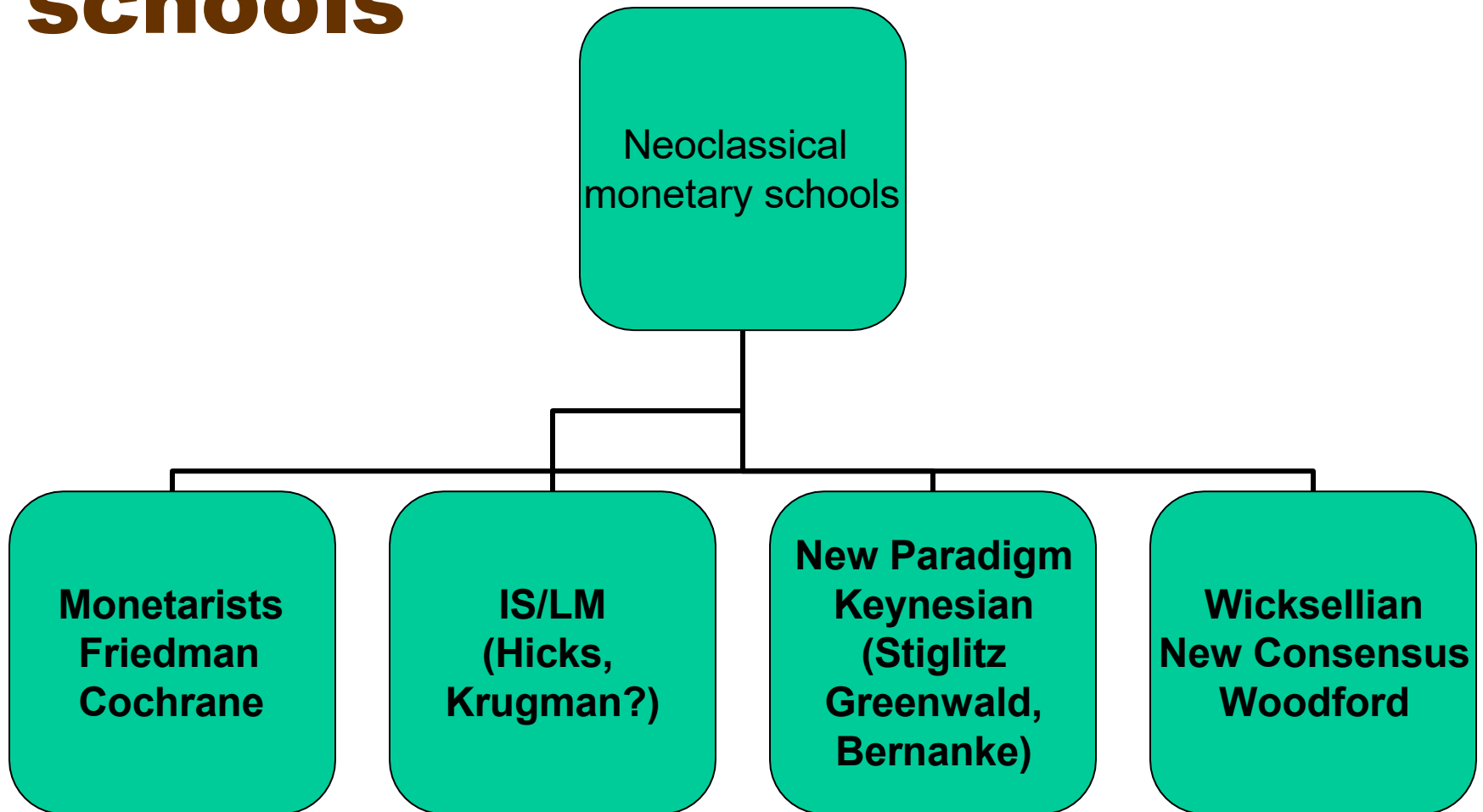
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Cambridge proverb

- Highbrow opinion is like a hunted hare; if you stand in the same place or nearly in the same place it can be relied upon to come round to you in circle. » (**D.H. Robertson 1956**)
- « Economic ideas move in circles: stand in one place long enough, and you will see discarded ideas come round again. » (**A.B. Cramp 1970**)
- Tooke, Thornton 1830's
- Wicksell 1900
- Radcliffe committee 1959
- Robinson 1956, Kahn 1958, Le Bourva 1959-1962, Kaldor 1970-1982,
- Davidson 1972, Weintraub 1978, Eichner 1985, Minsky 1986, B.J. Moore 1988, Rochon 1999

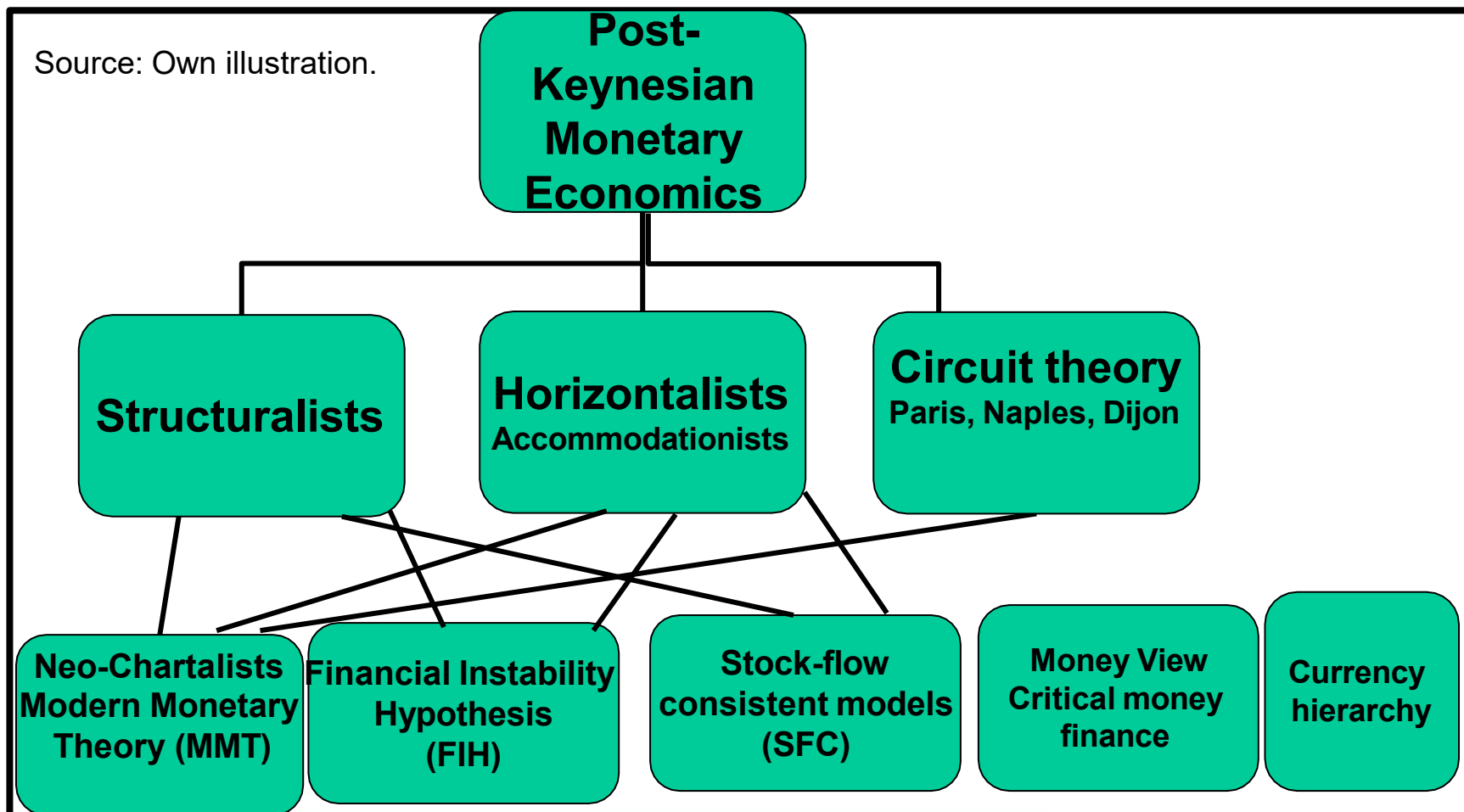
Neoclassical monetary sub-schools



Source: Own illustration.

Post-Keynesian monetary sub-schools

Source: Own illustration.



Horizontalists vs structuralists

- Short rate vs long interest rate
- Credit constraints (shape of credit supply)
- The shape of the supply of reserves
- **Which view has been vindicated?**

Main features, money and credit

Features	PK school	Neoclassical
Money	Has counterpart entries	Falls from an helicopter
Money is seen	As a flow and as a stock	A stock
Banks are	Creators of credit flows	Financial intermediaries
The supply of money is	Endogenous and demand-led	Exogenous
Main concern with	Debts, credits	Assets, money
Causality	Reversed: credits make deposits (credit divisor)	Reserves allow deposits (money multiplier)
Credit rationing due to	Lack of confidence, uncertainty	Asymetric information

Source: Based on Lavoie (2022).

What PKE is clearly against

- PKE reject the money creation process based on the money multiplier and the fractional-reserve banking system !

Even the Bank of England agrees!

- ‘One common misconception is that banks act simply as intermediaries, lending out the deposits that savers place with them. In this view deposits are typically “created” by the saving decisions of households and banks then “lend” out those existing deposits to borrowers
- Another common misconception is that the central bank determines the quantity of loans and deposits in the economy by controlling the quantity of central bank money – the so-called “money multiplier” approach’. (McLeay et al. 2014: 2)

Main features, interest rates

Features	PK School	Neoclassical
Interest rates	Are income distribution variables	Arise from market laws (loanable funds)
Liquidity preference	Determines the differential relative to base rate	Determines the interest rate
Base rates	Are set by the central bank	Are influenced by market forces
The natural rate	Takes multiple values or does not exist	Is unique, based on thrift and productivity

Source: Own illustration.

Distinctions are not as simple as before

- Central bankers and several mainstream economists now recognize that the money supply is endogenous.
- Central bankers and a number of mainstream economists recognize that the central bank sets (short-term) interest rates rather than the money supply.
- What post-Keynesian economists have been saying since the 1970s and 1980s is to a large extent part of the consensus view, 30 or 40 years later, with one exception – the natural rate of interest..

A crucial rejection of the natural rate

- Thus, as Mario Seccareccia (1994, p. 70) points out, we cannot just assert that ‘it is money-supply endogeneity which fundamentally distinguishes the neoclassical from the post-Keynesian conception of money, one would like to think that there is substantially more than the endogeneity/exogeneity issue that separates them’.
- As Smithin (1996, p. 93) puts it, ‘in the absence of a natural rate of interest, it can be argued that central bank control over short real rates will ultimately influence the entire structure of interest rates in the economy, including long rates....Eventually, the real economy must adjust to the policy-determined interest rate, rather than vice-versa. This is therefore the precise opposite to the natural rate doctrine’.

Main features, macro implications

Features	PK School	Neoclassical
Schumpeter's distinction	Monetary analysis (monetized production economy)	Real analysis (money neutrality, inessential veil)
Financial disturbances have	negative effects both in short and long run	Have effects only in the short run
Macro causality	Investment determines saving	Saving determines investment
Inflation	The growth in money stock aggregates is caused by the growth in output and prices	Price inflation is caused by an excess supply of money (or discrepancy between actual and natural interest rate)

Source: Own illustration.

SECTION II

Banks vs the shadow banking system

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BANKS

Three views of banking

- **The loanable funds view:** the *financial intermediation theory* of banking (Werner 2016), the *New view* of banking (Tobin 1963), *the intermediation of loanable funds* (Jakab and Kumhof 2015): banks are only financial intermediaries [they lend deposited gravel].
- **The deposit or money multiplier view,** the fractional-reserve banking view, the *Old view* of banking (Tobin 1963).
 - The New Keynesian credit channel (Bernanke, Gertler, Blinder) is a mixture of the last two (banks are special because they lend to those who cannot access savings on financial markets).
 - Krugman (2012a) first took a loanable funds approach in his debates with Steve Keen and MMT authors, then moved on to a money multiplier approach: “A key limiting factor in the size of bank balance sheets is the amount of monetary base the Fed creates” (Krugman, 2012b).

The post-Keynesian view of banking

- *The endogenous theory of money* (Ábel *et al.* 2016);
- Banks as *originators of inside money* (Bianco and Sardoni 2018);
- the *credit-creation* theory of banking (Werner 2015);
- the *financing through money creation* view of banking (Jakab and Kumhof 2015);
- the *bank-originated money and debt* view (Keen 2019);
- the *traditional banking theory* (Sissoko 2015).

The role of banks

- Banks are not merely financial intermediaries, that would lend deposits that they have been entrusted with.
- **Loans make deposits**
- Banks have the capacity to create new credit and new money (no need for gold, reserves at the central bank, previous savings or cash being deposited at a bank)
- They can add to the capacity of agents to purchase financial assets or goods and services.

Loans are created *ex nihilo*

- Loans are created *ex nihilo*, at the stroke of a pen, or by punching a key on the computer, ***as long as the borrower is credit-worthy***, that is, as long as the borrower can show some collateral.
- The main limit to this process is given by the amounts of loans which can be granted to credit-worthy borrowers. This depends on the willingness of borrowers to borrow, on the amount of collateral they can show, and on the willingness of banks to grant credit-worthy status to their customers.
- In a sense, loans are not truly created *ex nihilo*, since they generally require collateral.

Any other limit to credit creation?

- Compulsory bank reserves (deposits of banks at the central bank) ?
- Access to banknotes issued by central bank ?
- Liquidity ratios?
- The confidence/trust of other financial institutions (easier if everyone is moving in step)
- Bank equity (the own funds of the banks = retained earnings plus the proceeds of share issues) ?
- Capital adequacy ratios (Basel III ratios = own funds to risk-weighted assets) ?

BANKS VS NON-BANKS

Banks vs non-bank financial institutions

- **For the mainstream**, banks are banks because:
 - They are regulated;
 - They benefit from deposit insurance;
 - They have access to the central bank discount window
- **For PK authors**, banks are banks because:
 - They create their own initial finance
 - They are a direct part of the payment and settlement system
 - (means of payment, discharge of contracts)
 - Not subject to the laws of supply and demand

Initial finance vs final finance

Banks vs non-banks

- The difference is that when non-banks borrow, they need *financing* to start with. When banks need to borrow, this occurs after the fact; banks create their own financing as they make the loan.
- This is the distinction made by post-Keynesian circuitists, inspired in particular by Parguez (1975) and Graziani (1989), but also Davidson (1972), between ***initial finance*** and ***after-the-fact funding or final finance***.

SFC authors: Tobin vs Godley

- Both assume that there is an imperfect substitutability between financial assets.
- Tobin saw banks as essentially no different from other financial intermediaries; he relied on a variant of the (variable) money multiplier story. **Banks play no specific role.**
- By contrast, Godley had a vision of monetary matters based on **banks as creators of loans to facilitate production** or speculation, and on the post-Keynesian endogenous money supply view, where reserves are supplied on demand at the target interest rate set by the central bank, in the tradition of Kaldor (1982), Moore (1988), Graziani (1989).

LIQUIDITY CREATION AND SHADOW BANKS

Two views among post-Keynesians

- **Canonical view**
 - Bouguelli
 - Botta, Caverzasi & Tori
 - Bonnizi & Kaltenbrunner
 - Carolyn Sissoko
 - Jo Michell (2024)
 - Bertocco
 - Kregel
- **New structuralist view**
 - Money View (Perry Mehrling)
 - Critical macro finance or political economy finance (Gabor, Murau, Pforr, Vestergaard)
 - Endogenous finance (Palley)
 - Nersisyan & Dantas

Focus of the New structuralist view

- The role of non-bank financial institutions (NBFI)
- Market-based finance (instead of bank finance)
- The ability of NBFI to create credit and new forms of money (innovations)
- The role of dealers for financial stability
- The dangers of NBFI (borrow long, lend short)
- The dangers of securitization
- The dangers of repurchase agreements (repos)

Over-minimizing the role of non-banks in the past canonical view

- Alfred Eichner (1987): “It is only through a bank loan that the amount of funds circulating as checkable deposits can increase. If, instead, funds are borrowed from a nonbank financial intermediary, the latter will need to draw down its cash balance at some bank....**This is why the existence of nonbank financial intermediaries can usually be ignored** and the flow of funds model simplified by eliminating the nonbank financial sector”

Credit creation vs liquidity creation

- Nersisyan and Dantas (2017, 2018) argue that it would be a mistake to present non-bank financial institutions merely “as passive entities that intermediate between savers and lenders”.
- They argue that banks and non-banks show great similarities, **because non-banks, just like banks, have the power to change the level of economic activity.**
- **Non-bank financial institutions are “liquidity creators”,** the activities of which “affect the real economy”, and thus **“they can be a source of instability”**. They are more than intermediaries.

Liquidity creation II

- **Similar arguments are made by advocates of *critical macro-finance* or *political economy finance view*, who argue that the definition of money must be extended to include repos, and possibly the shares of money market funds and asset-backed commercial paper (Gabor, 2020; Murau and Pforr, 2020).**
- All these views are based on the hierarchy of money view (here at the domestic level).
- **They resurrect a neglected point made before by Palley (1996), under the guise of the *endogenous theory of finance*, when he contended that both versions of endogenous theory, the horizontalist and the structuralist ones, “are flawed because of their exclusive attention to the banking system” .**

Banks are still unique

- It is true that the variety of operations in which non-banks can engage in today “make murkier the distinction between *bona fide* banks and non-bank financial institutions” (Lavoie 2014).
- But Bouguelli (2018) argues that “making a sharp distinction between commercial banks and other financial institutions” provides a “framework that has the advantage of clarity”.
- To speak of ***true* liquidity versus *fictitious* liquidity illustrates the fact that banks and non-banks face different constraints** and play a different role in the overall financial system.

Banks are still unique II

- “While the commercial bank can buy the asset with its own liability, **the investment bank has to borrow the liability of a commercial bank (a deposit) in order to get hold of the securities**” (Bouguelli 2018).
- *Shadow bank* is thus a misnomer.
- Bonnizi and Kaltenbrunner (2020) concur with Bouguelli, arguing that **the special role of banks in determining credit conditions is being underplayed by advocates of critical macro-finance and of Mehrling’s money view**, who believe that shadow banking is now the centrally important channel of credit.

Shadow banks and financial fragility I

- Securitization is associated with the *originate-and-distribute* model of banking.
- This makes the chain from the initial borrower to the ultimate fund holder longer, more complex and more opaque.
- **It is also likely to make the system more fragile**, as the default risk of the borrower is being passed along by the originator to agents who may lack a proper understanding of the characteristics of the financial asset.

Shadow banks and financial fragility II

- See Gabor but also Sissoko
- Securitization and **repos** are likely to decrease lending standards.
- Repos protect the lender but weaken the borrower
- Repos are similar to former margin-call loans of the 1920s
- An initial decrease in the value of the collateral might lead to:
 - A collateral call
 - Collateral sales
 - Further decreases in the collateral value
 - Higher haircuts
 - A death spiral that will also affect the lender
 - Liquidity evaporates

What is the *raison d'être* of the shadow banking system I ?

- In Palley (1996), the increasing importance of non-bank financial institutions was due to regulatory arbitrage, **through the avoidance of compulsory reserve requirements.**
- **For Palley (1996), non-banks made possible the creation of more credit, by circumventing liquidity shortages,** in line with Minsky's endogenous money theory based on a variable velocity of money: .), “raising finance in capital markets ... is more expansionary [than bank loans] because it by-passes the monetary constraint imposed by reserve requirements”
- **Since reserves are endogenous, this cannot be the case.**

What is the raison d'être of the shadow banking system II

- Two standard explanations:
 - The rise in the demand for non-deposit liquid assets arising from the expansion of large institutional cash pools (pension funds, mutual funds, etc)
 - Regulatory arbitrage by banks due to capital adequacy ratios

What is the raison d'être of the shadow banking system III ?

- For many modern authors, including some post-Keynesians, **the shadow banking system makes possible the creation of more credit**, through regulatory arbitrage, **by avoiding constraining capital adequacy requirements**.
- **With the same equity capital, banks would make more loans.**
- There is **regulatory arbitrage**: but this does not mean that capital requirements restrict the creation of bank loans.

What is the *raison d'être* of the shadow banking system, PK view ?

- The post-Keynesian perspective ought to be that securitization allows banks to have a lower overall capital to asset ratio, **which increases their rate of return on equity**, and not that it allows banks to make more loans.
- It allows “the originating banks, as well as those purchasing the securitized loans, to extend leverage beyond previously recognized safe ratios, thus improving their returns on equity, while simultaneously fully abiding by the terms of the Basel capital adequacy ratios” (Lavoie 2012-13).

Are there limits to credit creation?

- **What if the equity capital ratio has reached its limit?**

Banks can:

- Raise the spreads between lending and deposit rates;
- Distribute less dividends;
- Reduce the size of stock-options provided to their top managers;
- Issue new shares;
- Provide loans to investors on the condition that they purchase newly-issued shares;
- Ask accountants to do window-dressing.

In the worse-case scenario, when banks make heavy losses and nobody wants to buy shares, the government or the central bank will have to step in and provide equity.

SOME BALANCE SHEETS TO BETTER UNDERSTAND

Creation ex nihilo by banks

Banks

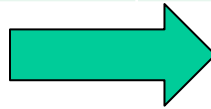
Assets

Loans +100

Liabilities

Deposits +100

Source: Based on Lavoie (2022).



Credit is crucial, not money, and the ex post role of NBFI counterparties

Banks		NBFI	
Assets	Liabilities	Assets	Liabilities
Loans 100	Deposits 80	CDs 20	MMF shares 20
	CDs 20		

Source: Based on Lavoie (2022).

Banks make loans but now a proportion of the deposits move into money market funds

Non-bank financial institutions do create credit when they lend funds to non-banks instead of banks...

	Banks		NBFI		Non-financial agents	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
1	Loan 100	Deposit 100			Deposit 100	Loan 100
2	Loan 100	Deposit 80 CD 20	CD 20	MMF 20	Deposit 80 MMF 20	Loan 100
3	Loan 100	Deposit 95 CD 5	CD 5 Security 15	MMF 20	Deposit 95 MMF 20	Loan 100 Security 15

Source: Based on Lavoie (2022).

The credits by NBFI are just as good as the credits by banks

- In a modern financial economy it is difficult to distinguish the effects of credits made by banks, created ex nihilo, and credits made by non-bank financial institutions, arising from previous savings.
- What really counts for economic activity is the decision of agents to spend or to invest (in the case of firms).
- This is why the flow of new credit in the Levy economic model helps to forecast economic activity.

Securitization with a conduit (special investment vehicle)

	Banks		NBFI (SIV)		Non-financial agents (NFA)	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
1	Mortgage 100	Deposit 100			Deposit 100	Mortgage 100
2	Mortgage 30 Loan to SIV 70	NFA Deposit 100	MBS 70	Loan 70	Deposit 100	Mortgage 100
3	Mortgage 30 Loan to SIV 10	NFA Deposit 40	MBS 70	ABCP 60 Loan 10	Deposit 40 ABCP 60	Mortgage 100

Source: Based on Lavoie (2022).

Banks are responsible for the 2008 mess!

- The consensus post-Keynesian position (see also Unger (2016) from the Bundesbank) on this issue, is or should be that “the largest part of the shadow banking system enters the credit intermediation process only after the loans to the ultimate borrowers and the means of payment to finance them have already been created”.

SECTION III

Central Banking

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THE DEFENSIVE ROLE OF CENTRAL BANKING + MMT

Monetary targeting vs interest-rate targeting

- Central banks now explicitly target interest rates.
- The procedures of several central banks are now more transparent (than they were and than those of other central banks), so the **horizontalist story is more obvious.**

Two different justifications for the current interest rate procedures ?

- **Post-Keynesians**

- Based on a **microeconomic** justification
- Tied to the inner functioning of the clearing and settlement system
- Linked to the day-by-day, hour-per-hour, operations of central banks

- **New Consensus**

- Based on the 1970 Poole article
- A **macroeconomic** justification
- If the IS curve is the most unstable, use monetary targeting
- If the LM curve is unstable (money demand is unstable), use interest rate targets

The microeconomic justification for interest rate targeting

- Central bank interventions are essentially « defensive ». **Their purpose is to compensate the flows of payments between the central bank and the banking sector.**
- These flows arise from: a) collected taxes and government expenditures; b) interventions on foreign exchange markets; c) outright or repo purchases or sales of government securities with private agents, or repurchase of securities arriving at maturity; d) provision of banknotes to private banks by the central bank.
- **Without these defensive interventions**, bank reserves or clearing balances would fluctuate enormously from day to day, or even within an hour. **The overnight rate would fluctuate wildly.**

Authors who support the microeconomic explanation

- **Several central bank economists**
 - Bindseil 2004, 2014 ECB, Clinton 1991 BofC, Lombra 1974, Whitesell 2003, Keister et al. 2008 Fed, Bank of England 2014
- **Some post-Keynesian authors (but not all)**
 - Eichner 1985, **and all MMT authors** (Mosler 1997-98, Wray 1998, etc)
- **Institutionalists**
 - Fullwiler 2003 et 2006

This was understood a long time ago by some PK economists

- “The Fed’s purchases or sales of government securities are intended primarily to offset the flows into or out of the domestic monetary-financial system” (Eichner, 1987, p. 849).
- “Fed actions with regards to quantities of reserves are necessarily defensive. The only discretion the Fed has is in interest rate determination” Wray (1998, p. 115).

There is no relationship between open market operations and bank reserves

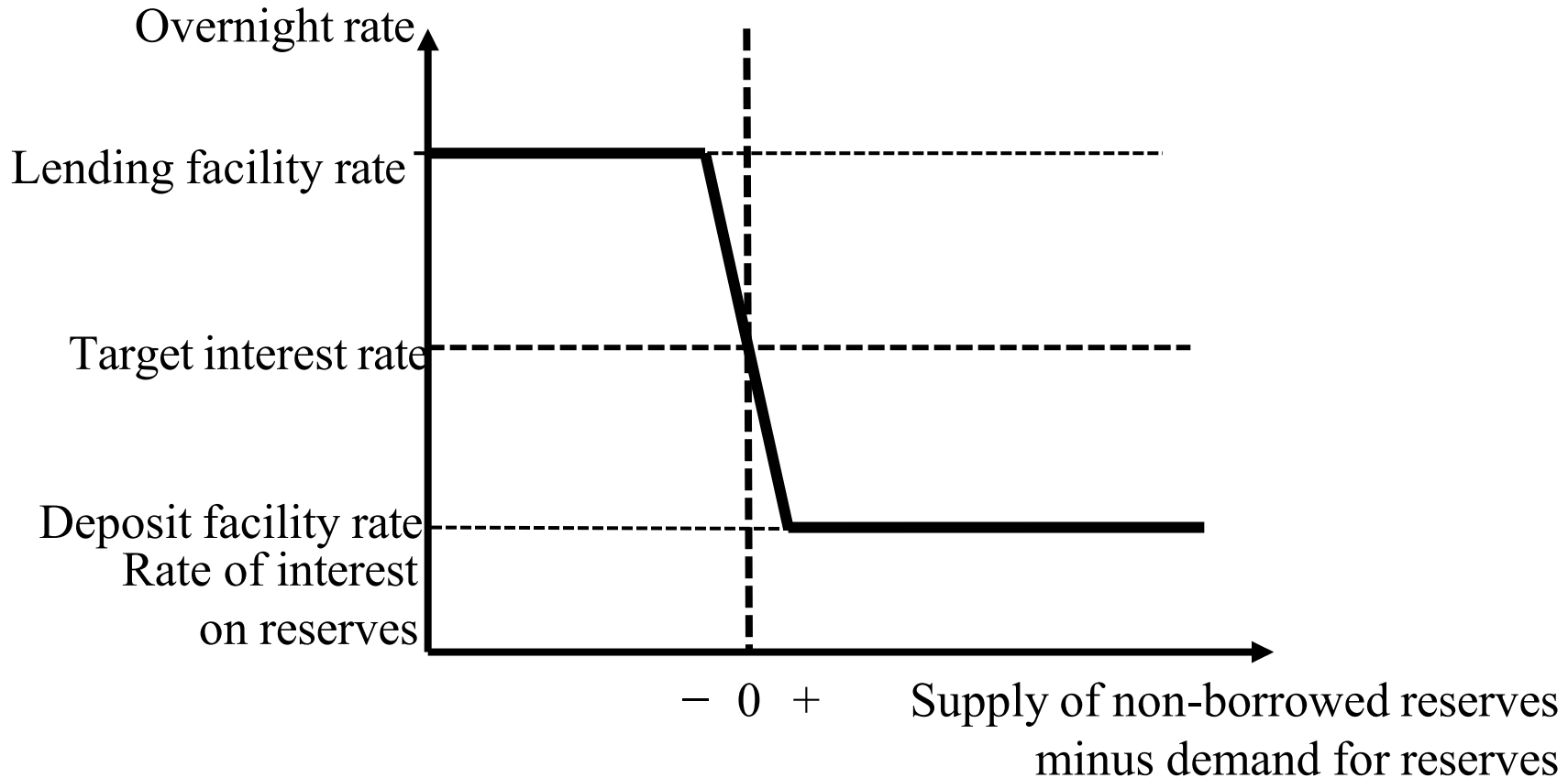
- **“No matter what additional variables were included in the estimated equation, or how the equation was specified (e.g., first differences, growth rates, etc.), it proved impossible to obtain an R^2 greater than zero when regressing the change in the commercial banking system’s nonborrowed reserves against the change in the Federal Reserve System’s holdings of government securities”(Eichner, 1985, pp. 100, 111).**

MONETARY POLICY IMPLEMENTATION TODAY

Four ways to control interest rates

- a symmetric corridor system;
- a no-interest on reserves system;
- a floor system;
- and a ceiling system

The symmetric corridor system (IOR: interest on reserves)

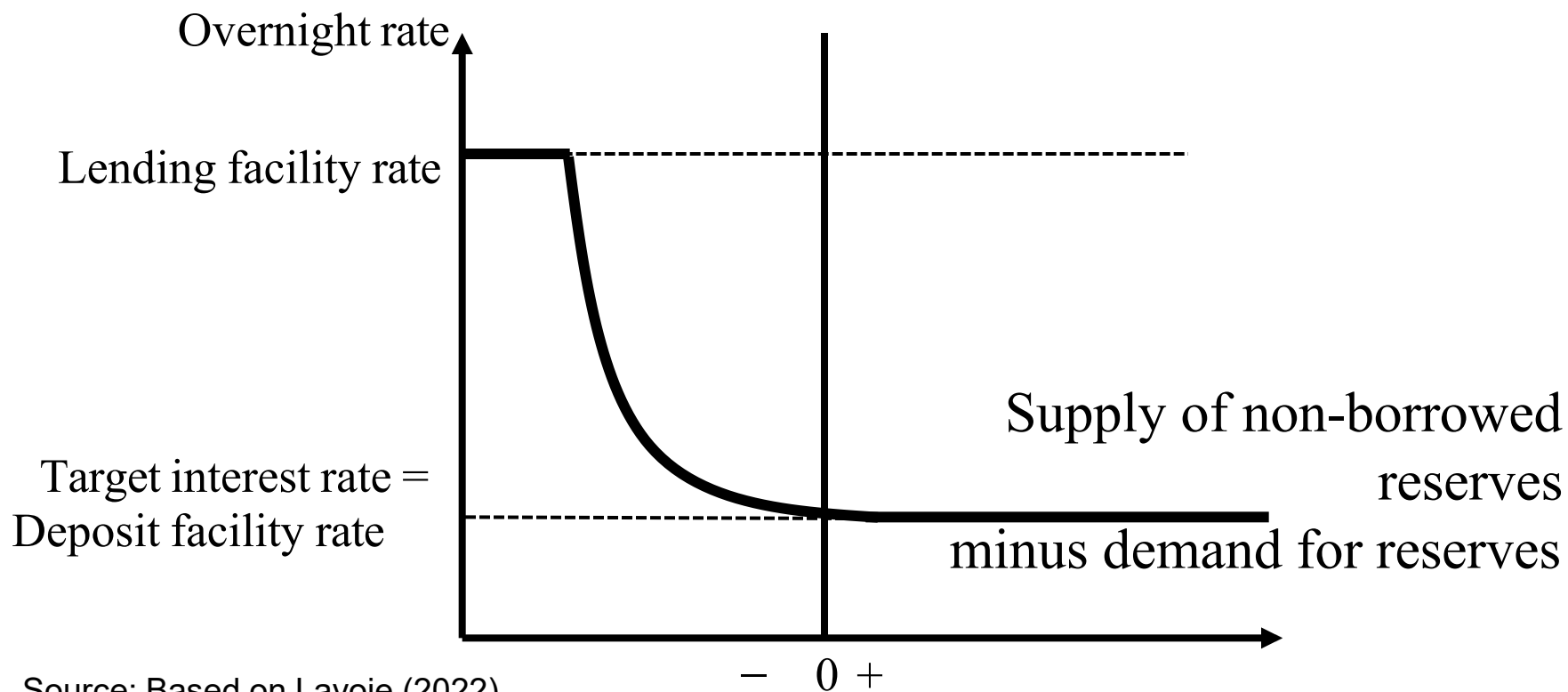


Source: Based on Lavoie (2022).

The decoupling principle

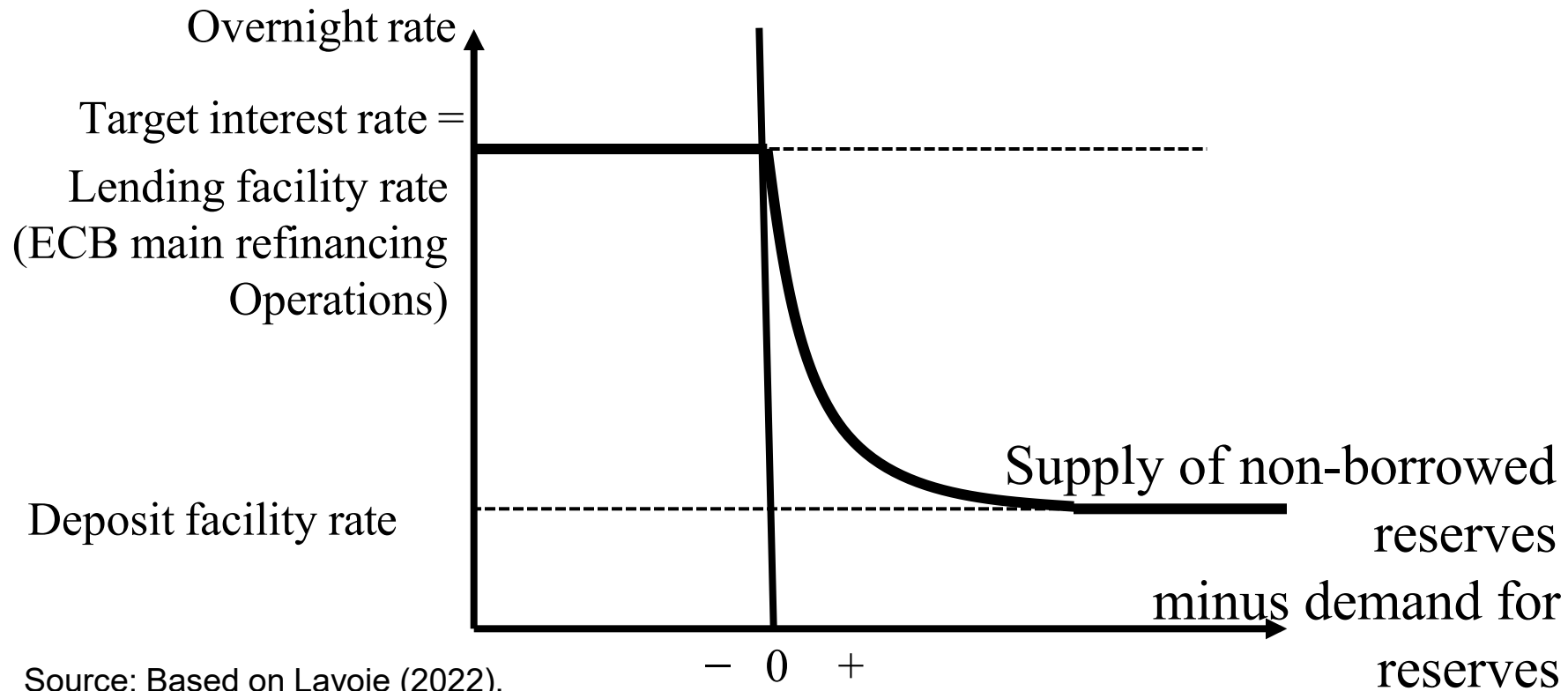
- ‘Changes to the monetary policy stance, that is, of the target short-term interest rate, may be made without any change in reserve market conditions by simply moving the standing facilities corridor in parallel with the target rate’ (Bindseil 2004a, p. 252).
- ‘Crucially, the interest rate can be set quite *independently* of the amount of bank reserves in the system. ***The same amount of bank reserves can coexist with very different levels of interest rates; conversely, the same interest rate can coexist with different amounts of reserves***’. (Borio and Disyatat 2010, p. 56)

The floor system (Japan 1996; New Zealand and Norway before 2009; USA between 1933 and 1951 and since November 2008; some EU countries)



Source: Based on Lavoie (2022).

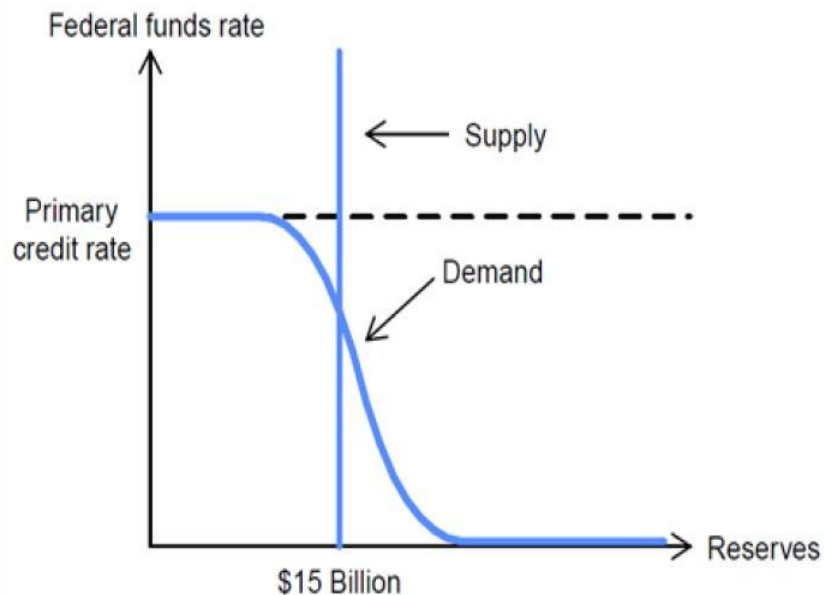
The ceiling system ('in the Bank') Most countries in the past....



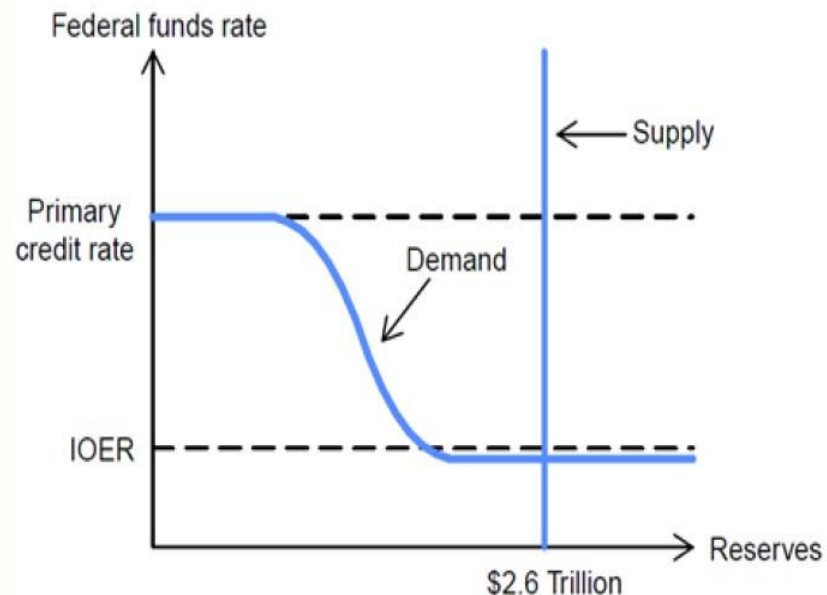
Source: Based on Lavoie (2022).

Banks' demand for and the Fed's supply of reserve balances

(a) Before the financial crisis

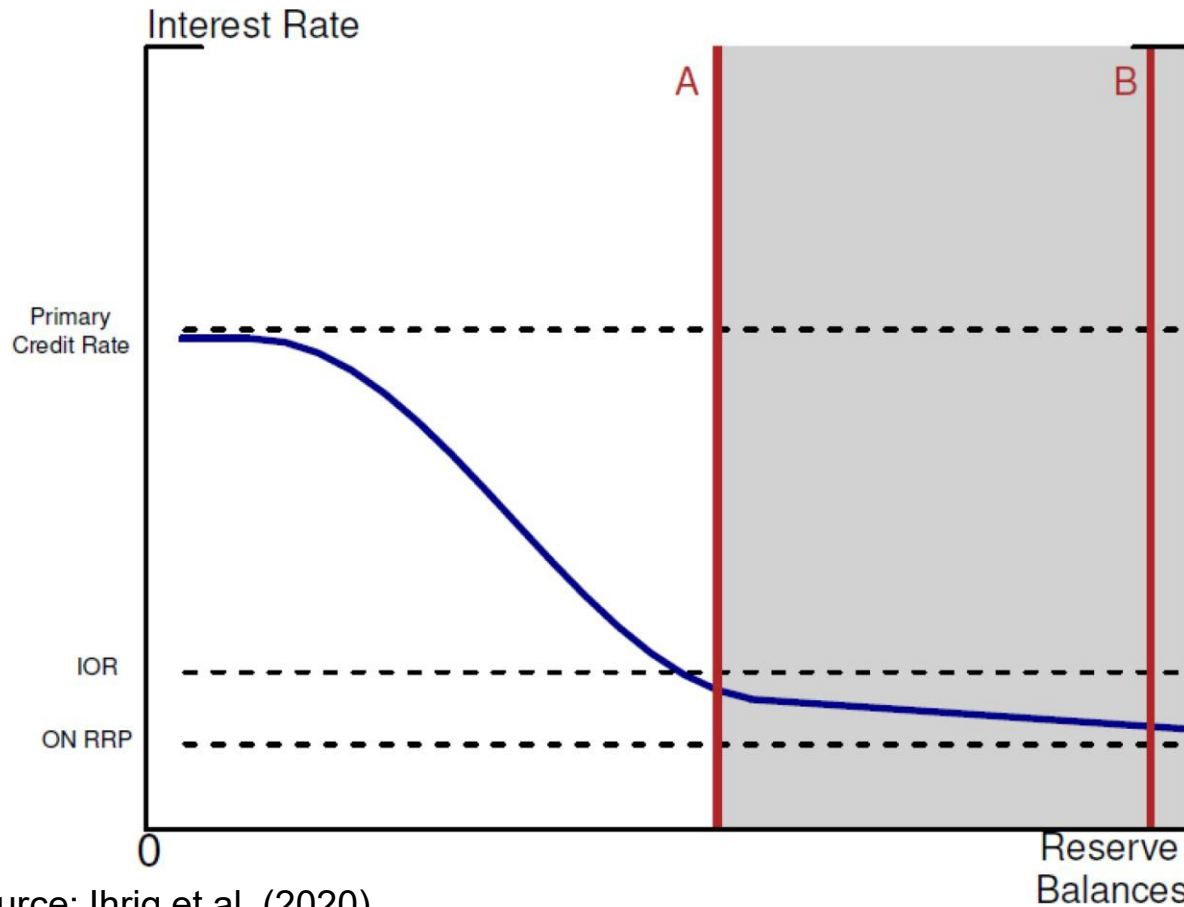


(b) Today



Monetary policy 101, Ihrig et al. (2015)

Fed's ample reserves case (Ihrig et al. 2020)



Implication of the floor system

- It is much easier to control the overnight interest rate.
- There can be (moderate) fluctuations in the supply of or in the demand for reserves, without any change in the equilibrium overnight interest rate.
- Also most banks will hold excess reserves, and hence won't be forced to borrow funds.
- As a consequence, many central banks, even after the end of QE, prefer to remain on the floor system.

SECTION IV

PK open-economy monetary economics

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The standard view of the impact of a balance of payment surplus on the balance sheet of the central bank

Assets

Foreign reserves

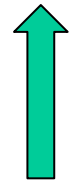


Claims on domestic government (Treasury bills)

Liabilities

Banknotes

Bank deposits (bank reserves)



Source: Own illustration.

Sterilization and compensation

- The effect on the stock of base money of a purchase (sale) of foreign currency can be undone by the sale (purchase) of government securities at the initiative of the central bank. **This is sterilization.**
- Or it can be undone by endogenous changes in other elements of the balance sheet of the central bank. This is the **compensation thesis.**
- Sterilization or compensation **is not a matter of choice, it is a necessity as long as the central bank wants to keep the interest rate at its target level**, especially within a (symmetric or asymmetric) corridor system.
- Of course, this is **easier to do with a balance-of-payment surplus.**

A PK, more realistic, balance sheet of central banks, with compensation

Assets

Foreign reserves

Claims on domestic government (Treasury bills)

Claims on domestic banks (advances)

Liabilities

Banknotes

Bank deposits (bank reserves)

Government deposits

Central bank bills

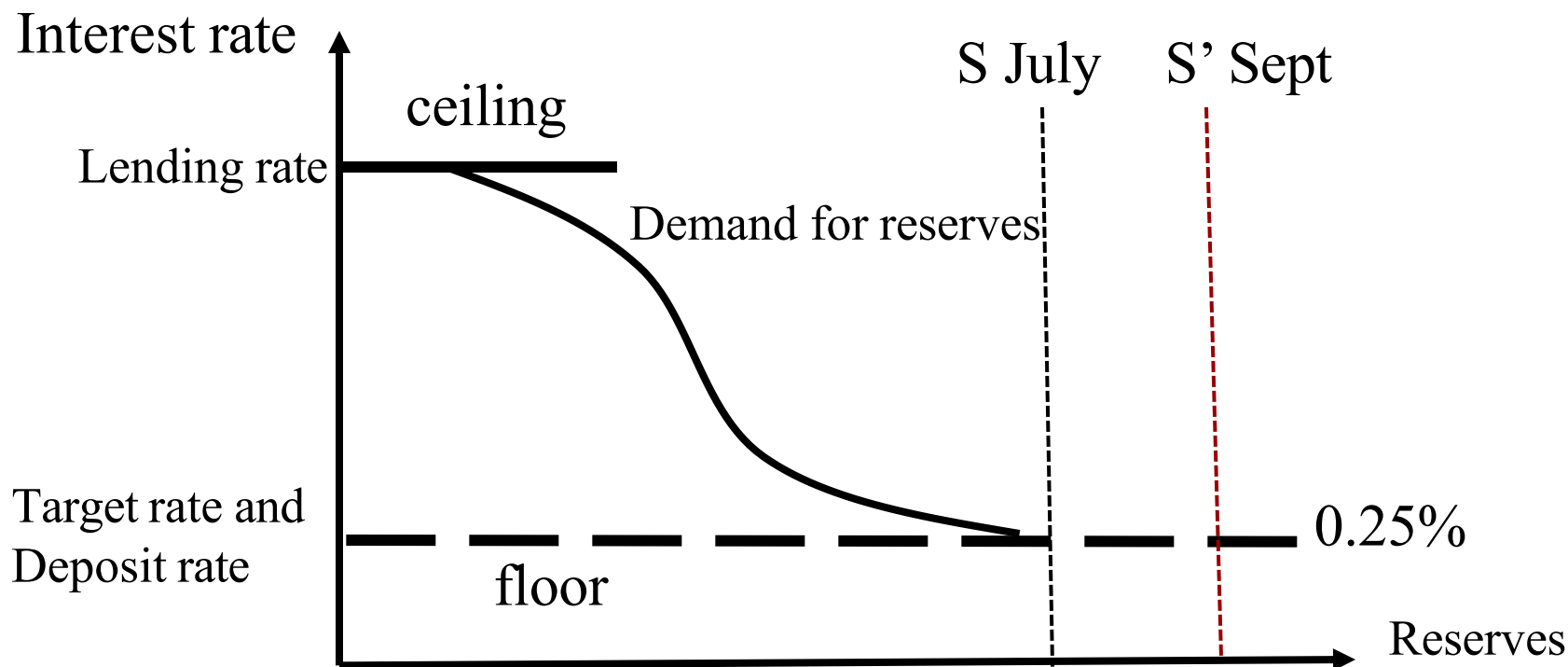


Source: Based on Lavoie (2022).

History shows that the rules of the game never held; there was always compensation.

- Bloomfield (1959, p. 49) in the period before the First World War – the heyday of the gold.
- Ragnar Nurkse (1944) for the 1922-1938 period.
- Pierre Berger (1972) Banque de France view
- Jacques Le Bourva (1962)

There is no need for sterilization (in a BOP surplus position) when there is a floor system (Switzerland July-September 2011, with target rate at 0 to 0.25% !)



Source: Based on Lavoie (2022).

Currency Hierarchy

- Barbara Fritz, Fernando de Paula, Daniela Prates
- (German Monetary Keynesians, Unicamp)
- All currencies are not equal
 - The key currency: US dollar;
 - Central currencies: Euro, Yen, Pound sterling, Canadian \$)
 - Renminbi and other peripheral currencies.
- Liquidity premium on currency and assets
- Impact: instability of exchange rates, higher interest rates, smaller fiscal policy space

Section V

Some thoughts on inflation

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PK inflation theory in a nutshell

- Three main possible causes of inflation
 - A) **Conflictual inflation** (over relative income shares)
 - A conflict between workers and firms (fairness A1) or with rentiers
 - Wage-wage inflation – keeping up one's rank in the wage hierarchy (relative fairness A2)
 - B) **Imported inflation** – arising from the rise in the prices of raw materials, the prices of which are determined by supply/demand on world markets, or arising from depreciation of the exchange rate (international income share conflict): ***A trilateral conflict exists between workers, industrialists, and raw materials producers*** (Sylos-Labini 1979)
 - C) **A mitigated role for aggregate demand** – as measured by the rate of growth, the share of investment, the rate of capacity utilization, the rate of unemployment, the change in the rate of unemployment, or the money supply

Rejection of the Monetarist view

- There may be a correlation between the level of prices and the stock of money (or between the rate of price inflation and the growth rate of money. BUT:

There is **reversed** causality, as one can guess from the endogenous money theory:

- The rise in prices causes the increase in the stock of money
- The key variable is the growth of credit

An important caveat...

There is reversed causality when looking at money aggregates and the prices of produced goods.

However, credit creation can lead to an inflation in the prices of financial assets, real estate prices, or futures prices.

This is part of the Minskyan financial instability hypothesis.

The PK view of inflation, with (imported) raw materials and intermediate goods

- With $j = UMC/UDLC$, that is the unit material cost relative to the unit direct labour cost, the pricing equation then becomes:
- $p = (1 + m)(UDLC + UMC) = (1 + m)(1 + j)UDLC =$
- $p = (1 + m)(1 + j)\left(\frac{w}{\lambda_d}\right)$

What if *UMC* rises faster than *UDLC* ...

- Omitting overhead labour, the profit share in value added rises with j :

$$ps = \frac{m(1+j)}{1+m(1+j)}$$

$$\frac{dps}{dj} = \frac{m}{D^2} > 0$$

A rise in the degree of monopoly or in raw material prices in relation to unit wage costs causes a fall in the relative share of wages in value added.
(Kalecki 1971, p. 63)

$$\frac{w}{p} = \frac{\lambda_d}{(1+m)(1+j)}$$

QUESTIONS ?

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