SAMENVATTING II

UITBREIDINGEN

WISKUNDIGE ANALYSE: MACRO-ECONOMISCHE PROBLEMEN

ACADEMIEJAAR '22 - '23

# INHOUD

GREAT FINANCIAL CRISIS

The GFC was a recession in 2007 that seemed deeper and more widely spread than before.

> **Note**: the recession during the pandemic was more severe, but also sporadic. The GFC stays one of the fundamental crises in modern history.

First the house market troubles, but the bank sector will collapse too.

US HOUSE PRICING

Er is een gigantische prijsstijging in de Amerikaanse huizenmarkt die niet te verklaren val tuit de gewoonlijke parameters.
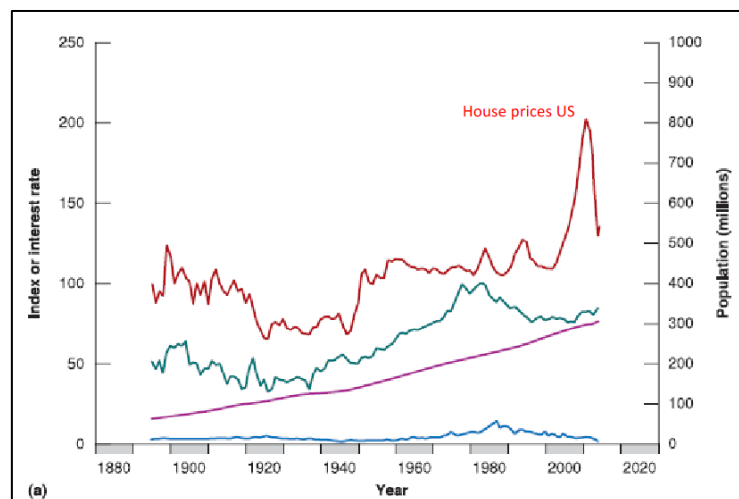
Waarom was deze stijging er dan wel?

- Hoge prijsverwachtigingen stimuleren hoge prijs: self-fulfulling
- Risky credit supply:
  Ongeacht geloofwaardigheid van de consument, iedereen kon lening krijgen met zeer lage interest.

Wat liep er mis in 06-09: hypotheken en leningen gaan over kop

- Value loan > value house   underwater mortgages
- Risico van leningen onderschat

Faillisementstatistieken van gezinnen schieten in de hoogte, mensen kunnen hun lening niet afbetalen, deels omdat er zo veel zijn uitgedeeld aan minder-waardige klanten. Mensen gaan failliet, e nook hun huis verkopen waarvoor de lening initieel diende lukt niet meer.

US BANKS AND ABROAD

US BANKS

Concept: **Bank leverage**

= assets/capital → hoe verdeelt een bank zijn activiteiten met hetzelfde kapitaal

High leverage = risky, but can be high profitable

EXAMPLE:

	Assets	Liabilities		Leverage
	Loans + other assets	Deposits	Capitaal	
Bank 1	100	80	20	100/20 = 5
Bank 2	100	95	5	100/5 = 20

	Assets	Liabilities		Profit	Return to capital
	Loans + other assets	Deposits	Capital	Loans: +10% Deposits: 0%	
Bank 1	110	80	20	100*10%=10	10/20 = 50%
Bank 2	110	95	5	100*10%=10	10/5 = 200%

	Assets	Liabilities		Leverage
	Loans + other assets	Deposits	Capital	
Bank 1	80	80	0	Solvent
Bank 2	80	95	-15	Insolvent

As long as house prices were rising, high leverage created huge profit for banks, when the prices turned a lot of banks went bankrupt.

Leverage Pre-Crisis

- High leverage: underestimated risk
- Banken geven fouten incentives aan consumenten: contract rewarding short term return
- Incomplete financial regulation: SUP-PRIME MORTGAGES, rommelhypotheken, uitgeleend aan minderwaardige hypotheeknemers
  → dit type hypotheken wortd pas sinds de Jaren 2000 uitgeschreven. Het concept en de data waren nog niet op punt, net als de regelgeving. Er ontstaat een wildgroei, zonder dat er ooit een degelijke risicoanalyse werd gemaakt end at werd de doodsteek van de banken.

Wat met banken die de prijsdrop overleefden: proberen positive te versterken

- Raise more capital
- Reduced amount of loand
- Sold liquid assets (stock)

Dit resulteerde in een fire sale, paniekverkoop: iedereen wil van zijn aandelen af, er is geen ondergrens aan de prijs, als de banken nog iets over hebben zijn het nu waardeloze aandelen.

Banken probeerden door de Jaren zichzelf te verzekeren door **diversificatie**

- Mortgage back security: claim on portfolio of loans
  "zal nooit failliet gaan"
- Collateralized debt obligation: claim on return certain assets

Nieuwe vormen van liquiditeit (deposito-rekeningen) creeëren nieuwe dynamiek:

- Wholesale funding: deposito-achtige rekeningen, zonder verzekering, zeer flexible
- Cash pools at big firms
- SIV: nieuwe financiële producten waar grote hoeveelheden geld naar vloeien en zo potentieel naar **toxic assets** vloeit

Samengevat:

House prices↓ => mortgages↓

Value of bank assets↓ => bank capital ↓

Requires more asset sales => fire sales

Value of assets falls further

Complexity => willingness to lend to banks↓
- Funding dries up: wholesale, interbank (fig) – bank/funding run

Willingness of banks to lend (to banks, firms and consumers) ↓

=> Macroeconomic crisis:
- Expensive loans
- Lack of confidence
- Both essential for I, C

Effecten in de reële economie: IS-LM-model, IS shifts

$$i_{loan} = i_{deposit} + spread$$

$spread = \rho = i + x$ en x = external finance premium
→ een nieuwe schokkenbron voor het model
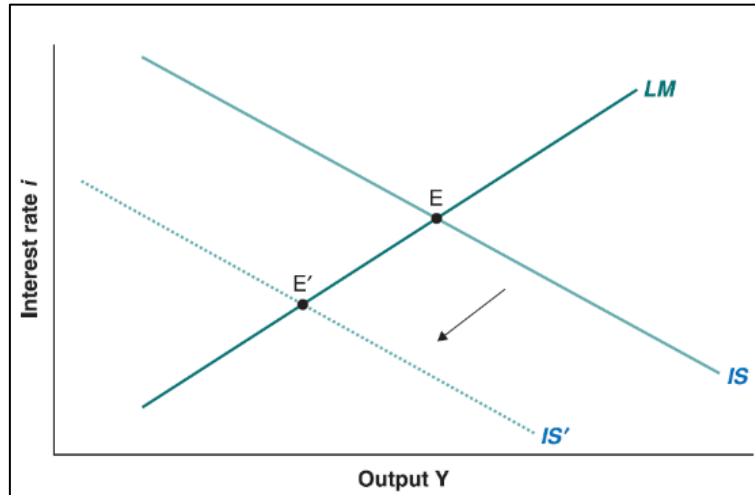
Spread geeft aan hoe duur het is voor banken om aa elkaar te lenen, schiet de hoogte in tijdens de crisis. Liquiditeit wordt dus veel duurder.

ABROAD: INTERNATIONAL TRANSMISSION
- Internationale handel neemt af
- Inkomen in de US valt terug, sleept andere (gedollariseerde) landen mee
- There are only global banks: omdat er zo sterk is gediversifieerd is na de jaren '90 heeft elke bank overal ter wereld ketels op het vuur. Schokken in Amerika worden sterk gevoeld en verspreiden zich zo ook wereld wijd.

POLICY

FINANCIAL POLICY

- Deposit insurance: type-2 consumenten overtuigen dat ze hun geld terug krijgen (zie bank runs deel III)
- Additional liquidity: banken kunnen met ander obligaties naar de CB komen
  → prevent fire sales
- Troubled Asset Relief Program: waarde van de active verstevigen door zelf te kopen uit de overheid, later increase bank capital

MONETAIRY POLICY
=use of i

- Conventional policy is constrained: liquidity trap
- Unconventional:
  - Changing interest rates separable (firms, households, mortgages, etc.)
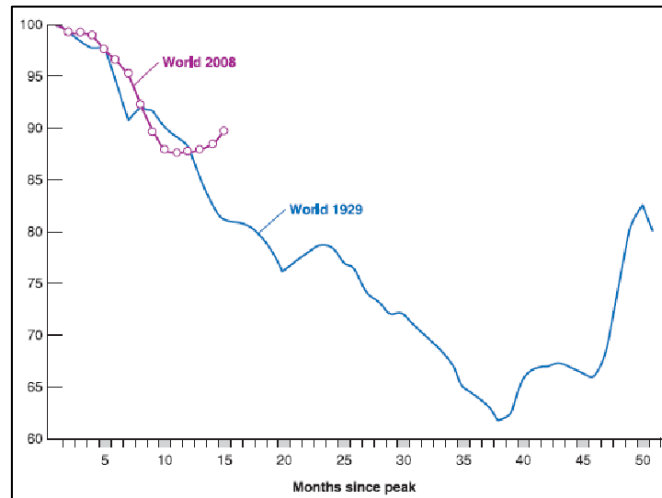 - Credit easing

FISCAL POLICY
= use of G and T

Potentially effective, constrained by initial level of indebtness

## POST-CRISIS
Verschil met de Grote Depressie in jaren '30

TEGENVOORBEELD: POLEN

- Fiscal expansie: tax cut and boosted consumption
- CB: monetary expansion
- Exchange rate depreciation: focus on domestic goods

Recovery

- Slowly in US
- AS: reduction in Y because of less efficient financial intermediation
- AD: limits of policy and adjustment failure (liquidity trap)

Liquidity trap:
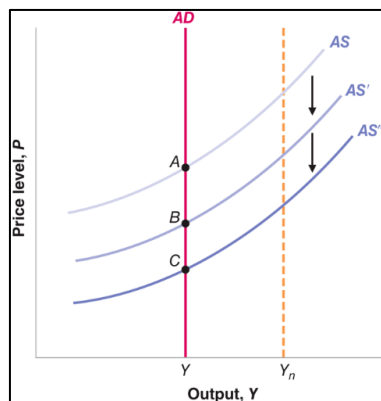
HIGH DEPT

GOVERNMENT'S BUDGET CONSTRAINT
Budget deficit:

$$deficit = rB_{t-1} + G_t - T_t$$

B = bonds and bills held by private sector
r = real interest rate
G = government spending
T = taxes

Governments budget constraint = interest payments + primary deficit:

$$B_t - B_{t-1} = rB_{t-1} + (G_t - T)_t$$
$$B_t = (1 + r)B_{t-1} + (G_t - T)_t$$

Official deficit:

$$official\ deficit = iB + G - T$$

adapted to inflation $r = i - \pi$

$$iB + G - T - \pi B = rB + G - T$$

Repayment of deficit

$t = 1$: $\quad B_1 = (1 + r)B_0 + (G_1 - T_1)$

$\quad\quad\quad 0 = (1 + r) + (G_1 - T_1)$

$\quad\quad\quad T_1 - G_1 = (1 + r)$

$t = n$: $\quad B_n = (1 + r)^n + (G_n - T_n)$

$\quad\quad\quad T_n - G_n = (1 + r)^n$

Conclusieon: the interest accumulates, so high dept ís a problem

Primary surplus EACH YEAR: $\quad T_t - G_t = r$

EVOLUTION OF DEBT/GDP RATIO
Rewritten budget constraint: relative to GDP

$$\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} = (r-g)\frac{B_{t-1}}{Y_{t-1}} + \frac{(G_t - T_t)}{Y_t}$$

invloed op schuldgroei: rente r en groeivoet van de economie g
→ als het inkomen stijgt dan dealt de schul t.o.v. het inkomen

Long term:

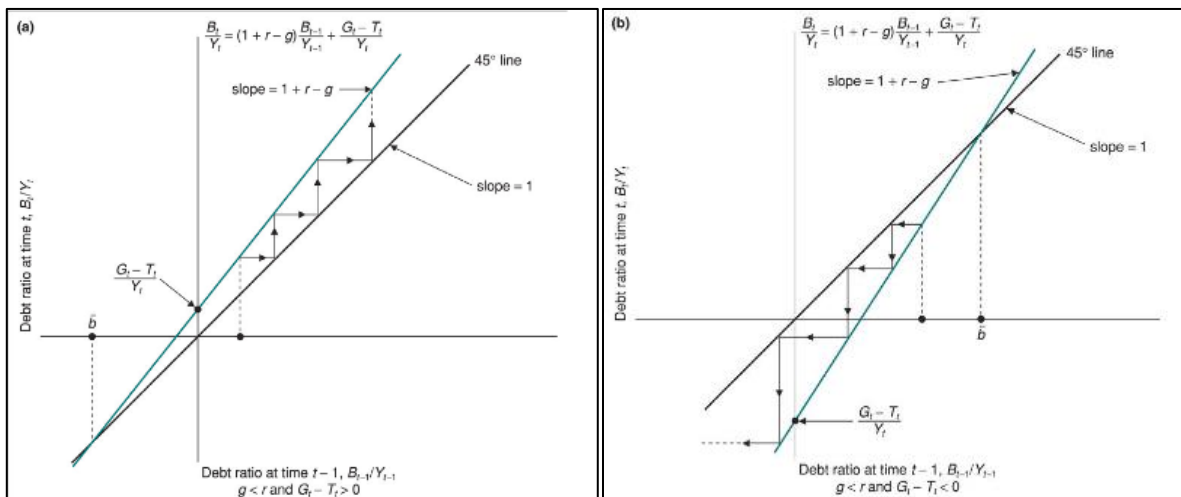$$\frac{B_t}{Y_t} = (1+r-g)\frac{B_{t-1}}{Y_{t-1}} + \frac{(G_t - T_t)}{Y_t}$$

$$y_t = \beta y_{t-1} + A$$

$\beta = 1 + r - g$ constant
$A = \frac{(G_t - T_t)}{Y_t}$ constant
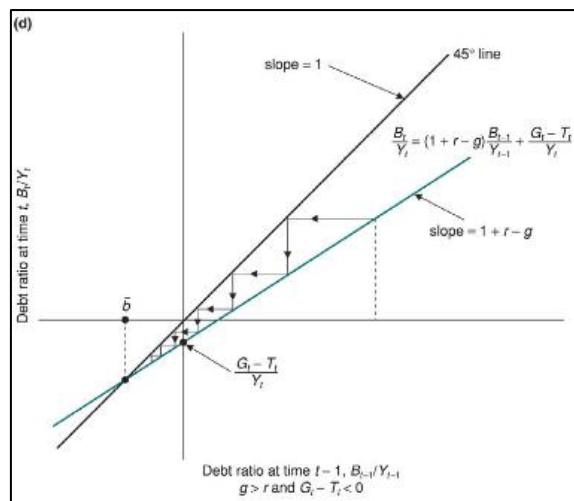
NORMAL CASE

$$g < r \Leftrightarrow 1 + r - g > 1$$

Schuld verergert naarmate de tijd verder verstrijkt

$$g > r \Leftrightarrow 1 + r - g < 1$$

Er treed 'convergentie op' → schuld zou dus eigenlijk vanzelf verminderen

Chronological:
<mark>Verder aanvullen, niet heel essentieel</mark>

RETURN FROM HIGH DEPT
Why late measurements?

- No sense of urgency
- Avoid losing political consensus

3 policies:

- Sufficient primary surpluses: afbetalen
- Monetary financing (CB)
- Repudiate the dept: niet betalen

Voorbeelden:

- Duitsland na WOII
- Frankrijk na WOI
- UK na WOI
- USA na WOII

HIGH INFLATION

Context:

- Developed economies
  - High inflation before 90's
  - Low and stable inflation 90's-00's
- Other economies
  - High inflation with high growth: Philips curve
  - High inflation and hyperinflation: problematic

Precondition: after war, debt crisis, large transition to market economy
→ high budget deficits

MONEY DEMAND

Money demand $\quad \frac{M}{P} = L(Y, i)$

- Keynesian school: large sensitivity to interest rate
- Monetarist school: small sensitivity to interest rate
- Classical school: zero sensitivity to interest rate $\quad \frac{M}{P} = kY$

Fisher equation:

$$MV = PY$$

M = quantity of money
V = income velocity, niet afhankelijk van M
P = Consumer price index, price level
Y = real GDP, niet afhankelijk van M

Short run: disagreement in different economic schools

Long run: agreement, no trade-off $i \leftrightarrow$ economic activity
→ long term Philips curve is vertical: inflation independent or always and everywhere monetary phenomenon?

Growth rates: $\quad\quad m + v = \pi + y$
assume $v = y = 0$ $\quad\quad \boldsymbol{m = \pi}$

So: in short run high M has some positive effects, but in long run only inflation

DEFICIT AND MONEY

Quantity theory: no high inflation without high money

→ why so much cash from CB?

Government budget constraint: $deficit = \Delta B_p + \Delta B_{CB}$

Central bank balance sheet: $B_{CB} + IR = MB$

govern bonds + international reserves = base money

$$deficit = \Delta B_p + \Delta MB - \Delta IR$$

so there are 3 ways to finance a deficit:

- Borrow: BAU, but a finite option
- Monetary policy: **the inflationary option**
- Reduce foreign reserves: finite option

INFLATION TAX

Model where you interpret inflation as a tax

All finite options depleted: $deficit = \Delta M = \pi M$

so in terms of nominal GDP:

$$\frac{deficit}{PY} = \pi \frac{M}{PY}$$

$\pi \frac{M}{PY}$ is the inflation tax: tax rate · tax base

Mechanism:

- Government creates money ΔM
- Buy real goods & services $\Delta M/P$
- Price increase ΔP
- Purchasing power of the public reduces, of the government increases: "tax"

Beperkingen om de consument beschermen:

- Incentivce minimalizing: debt/deficit limits
- Forbidding tool: monetary financing forbidden

HYPERINFLATION

High inflation → less money demand: people consume and save in different currency → tax base shrinks → more inflation (people evade taxes, less willingness to pay)

Hyperinflation in terms of MONTHS ↔ high inflation in terms of YEARS
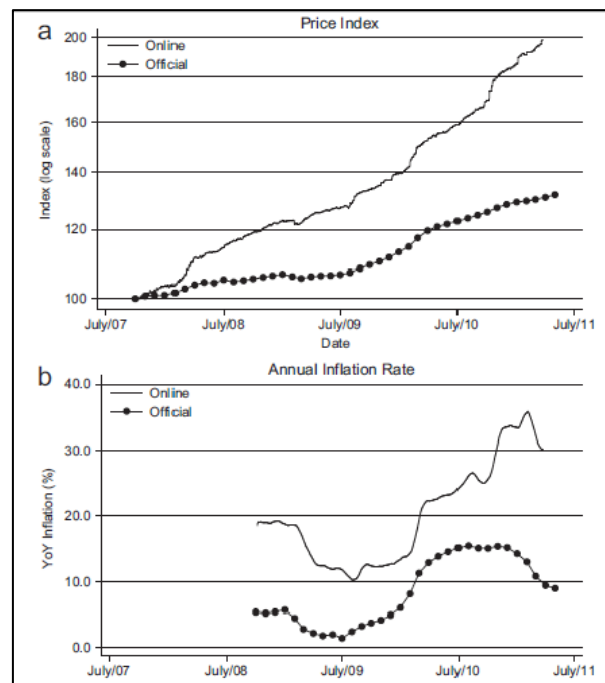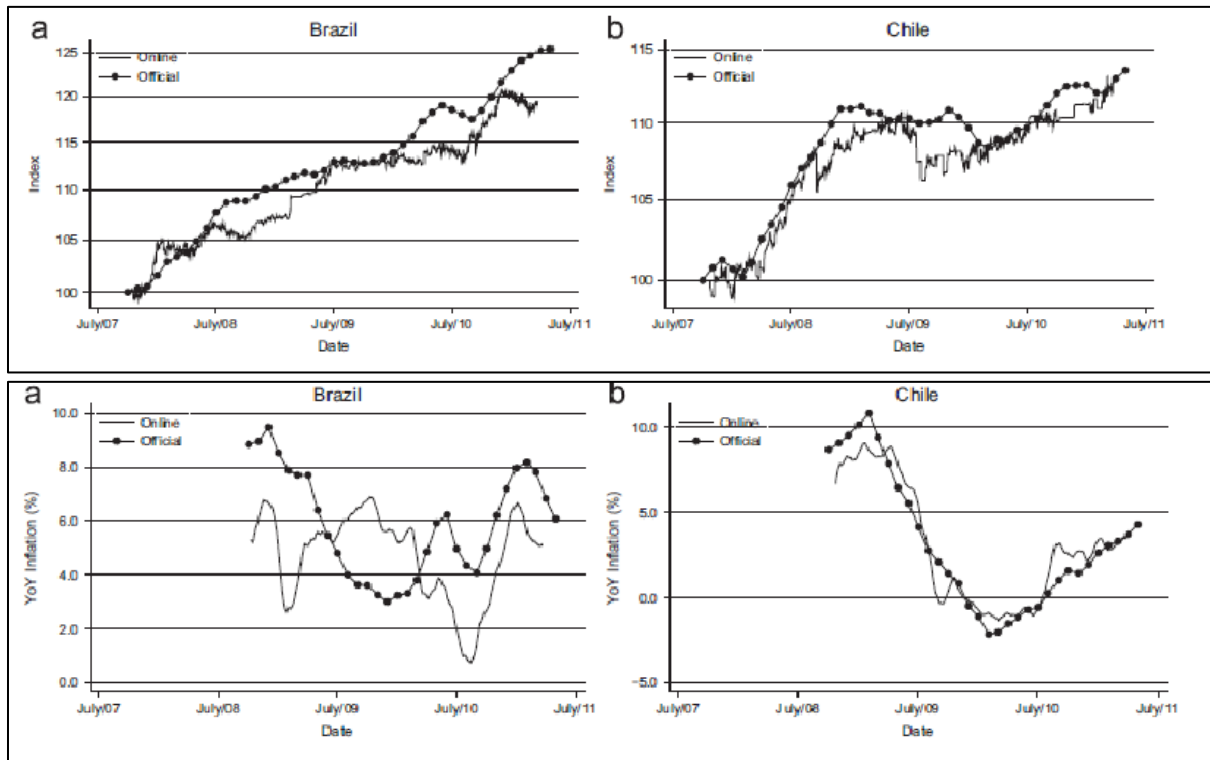
APPLICATIONS

MONEY CREATION AS HIDDEN TAX: ARGENTINA

Hyperinflation = government creating money trough inflation tax, people are not willing to pay
→ what if the government lies about the inflation rate? Argentina

Cavallo's idea: own data base from online prices

QUANTITATIVE EASING

= QE =massive money creation

Quantity theory: $\qquad m = \pi$

Not true though after 10 years: $\qquad m + v = \pi + y$

- y: short term argument still applies?
- v: liquidity trap, low velocity, new money is saved

MODERN MONEY THEORY

= "elk problem valt te financieren met drukgeld"

$$spending = taxes + \Delta B_p + \Delta MB$$

Obvious problem: inflation
→ avoided?

- Spending wisely: only when $y < y^*$
- Preventing inflation: wage and price controls, tax it away

ISSUES:

- A lot of interventionism
- **Fundamental: if you need to tax the inflation away, you are not creating extra economic activity, just extra quantities money**

Traditional thinking: first taxing and borrowing, later spending

MMT-thinking: first spending, later taxing and borrowing