

Institutt for samfunnsøkonomi

Eksamensoppgave i SØK2009 – Internasjonal makroøkonomi International macroeconomics

Faglig kontakt under eksamen: Simone Valente

Tlf.: 73 59 19 32

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Hjelpemiddelkode/Tillatte hjelpemidler: C /Fig formelsamling: Knut Sydsæter, Arne Strøm og Peter Berck (2006): Matematisk formelsamling for økonomer, 4utg. Gyldendal akademiske. Knut Sydsæter, Arne Strøm, og Peter Berck (2005): Economists' mathematical manual, Berlin.
Enkel kalkulator Citizen SR-270x, HP 30S eller SR-270X College

Målform/språk: Norsk og engelsk

Antall sider: 5

Antall sider vedlegg: 0

Bokmål**Oppgave 1: Penger og Valutakurser: Kort og lang sikt**

Betrakt en modell der den nominelle valutakursen $E_{\$/\epsilon}$ (dollar per euro) er fastsatt i henhold til portefølje tilnærming (the asset approach), og de nominelle rentene i USA og Europa, $R_{\$}$ og R_{ϵ} , er bestemt fra likevekten i pengemarkedet i henhold til teorien om likviditetspreferanse. På kort sikt er prisnivåene faste og absolutt kjøpekraftsparitet (PPP) holder ikke. På lang sikt er penger nøytral, priser fleksible, og absolutt PPP holder. I den initiale likevekten er inflasjon lik null overalt og nominelle pengetilbud er konstante. Anta at sentralbanken i USA (Federal Reserve) bestemmer en *engangs permanent økning* i nivået på USAs pengetilbud. Svar på alle spørsmålene nedenfor.

(1.a) Hva skjer på kort sikt med renter, forventet avkastning og valutakurs? Beskriv disse umiddelbare effektene grafisk og forklar hver bevegelse verbalt.

(1.b) Tegn tidsbanene for USAs pengetilbud, USAs prisnivå, USAs rente og valutakursen for å vise hva som skjer både på kort og lang sikt. La tidspunkt t_0 stå for tidspunktet det monetære sjokket inntreffer. Begrunn hver tidsprofil verbalt og forklar spesielt langsiktig nivå på renten.

Oppgave 2: Kortsiktige effekter av finanspolitikk

Betrakt DD-AA modellen: varemarkedet og finansmarkedet oppnår simultan likevekt i punktet "a", med koordinatene (E_1, Y_1) . Betrakt kortsiktige effekter av en *midlertidig økning i skatter* T (forventninger endres ikke). Den nye simultane DD-AA likevekten er beskrevet ved punktet "b". Svar på alle spørsmålene nedenfor.

(2.a) Hvilke av de to kurvene skifter og i hvilken retning? Forklar den økonomiske intuisjonen verbalt.

(2.b) I forhold til den initiale likevekten "a", impliserer det fiskale sjokket en appresiering eller depresiering? Hva er effekten av det fiskale sjokket på driftsbalansen? Forklar den økonomiske intuisjonen verbalt.

Oppgave 3: Faste valutakurssystem

Svar på alle spørsmålene nedenfor.

(3.a) "Teori". Hva er det *N-te* valutaproblem (the *N-th* Currency Problem) som følger av reservevaluta systemer? Forklar den generelle mekanismen ved hjelp av et eksempel med to land der sentralbanken som utsteder reservevaluta endrer pengetilbudet: beskriv virkningene på det andre landets sentralbank.

(3.b) Som en utdyping av ditt forrige svar, hvilken konflikt kan oppstå med perifere land når sentralbanken som utsteder reservevaluta *øker* pengetilbudet? Og hva slags konflikter kan oppstå når sentralbanken som utsteder reservevaluta i stedet *reduserer* pengetilbudet?

(3.c) "Praksis". Nevn minst en historisk begivenhet der det *N-te* valutaproblem hadde

betydning for kollapsen av fast valutakurs mekanismen.

(3.d) Beskriv mekanismen ved betalingsbalansekriser: kan forventninger tvinge et land til å forlate en fast valutakurs? Hvordan?

Oppgave 4: Seddelfond og 'harde' fastkurssystemer

Svar på alle spørsmålene nedenfor.

(4.a) Hva er seddelfond (Currency Board)? Er det forskjeller i forhold til fastkurssystemer som forvaltes av uavhengige sentralbanker?

(4.b) Nevn fordeler som visstnok oppstår fra 'harde' fastkurssystemer ('hard pegs') som seddelfond eller offisiell dollarisering. Er disse prediksjonene konsistent med data? Diskuter erfaringen til noen utviklingsland.

English

Question 1: Money and Exchange Rates: Short and Long Run

Consider a model in which the nominal exchange rate $E_{\$/\epsilon}$ (dollars per euro) is determined according to the asset approach, and the nominal interest rates of US and Europe, $R_{\$}$ and R_{ϵ} , are determined by the money market equilibrium according to the theory of liquidity preference. In the short run, price levels are sticky and absolute purchasing power parity (PPP) does not hold. In the long run, money is neutral, prices are flexible, and absolute PPP holds. In the initial equilibrium, inflation is zero everywhere and nominal money supplies are constant. Suppose that the Federal Reserve decides a *one-time permanent expansion* in the *level* of US money supply. Answer all of the following questions.

(1.a) What happens in the short run to interest rates, expected rates of return and exchange rate? Describe graphically these instantaneous effects and justify verbally each movement.

(1.b) Draw the time paths of US money supply, US price level, US interest rate and exchange rate to show what happens both in the short and in the long run. Denote by time t_0 the instant in which the monetary shock occurs. Justify verbally each time-profile and explain, in particular, the long run level of the interest rate.

Question 2: Short-run effects of fiscal policy

Consider the DD-AA model: both the goods' market and the asset market achieve a simultaneous equilibrium in point "a", with coordinates (E_1, Y_1) . Consider the short-run effects of a *temporary increase in taxes* T (expectations do not change). The new simultaneous DD-AA equilibrium is described by point "b". Answer all of the following questions.

(2.a) Which of the two curves shifts and in which direction? Explain verbally the economic intuition.

(2.b) With respect to the initial equilibrium "a", does the fiscal shock imply appreciation or depreciation? What is the effect of the fiscal shock on the Current Account balance? Explain verbally the economic intuition.

Question 3: Fixed Exchange Rate Systems

Answer all of the following questions.

(3.a) "Theory". What is the *N-th* Currency Problem generated by Reserve Currency Systems? Explain the general mechanism by means of a two-country example in which the Central Bank issuing the Reserve Currency modifies the money supply: describe the effects on the other country's Central Bank.

(3.b) Elaborating on your previous answer, what type of conflict may arise with peripheral countries when the Central Bank issuing the Reserve Currency *expands* money supply? And what type of conflict may arise, instead, when the Central Bank issuing the Reserve Currency *restricts*

money supply?

(3.c) "Practice". Mention at least one historical event in which the *N-th* Currency Problem played a role in determining the collapse of a fixed exchange-rate mechanism.

(3.d) Describe the mechanism of Balance-of-Payment crises: can expectations force a country to abandon a fixed exchange rate? How?

Question 4: Currency Boards and "hard pegs" in general

Answer all of the following questions.

(4.a) What is a Currency Board? Are there differences compared to systems of fixed rates managed by independent Central Banks?

(4.b) List the benefits that supposedly arise from adopting hard pegs like Currency Boards or Official Dollarization. Are these predictions consistent with evidence? Mention the experience of some developing countries.

Comment SØK2009 – H-2013

Candidate: 10059

"The exam SØK 2009 (International Macroeconomics, December 2013) delivered by candidate nr.10059 stands out for combining completeness and synthesis. While each step of the solution to the answers is carefully explained, the student's discussion goes straight to the point without going off-topic. The exposition is good because it provides the economic intuition behind the theories' conclusions in a concise but rigorous manner, linking the theories to historical facts."

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Question 1

(a) One-time permanent expansion in the level of money supply

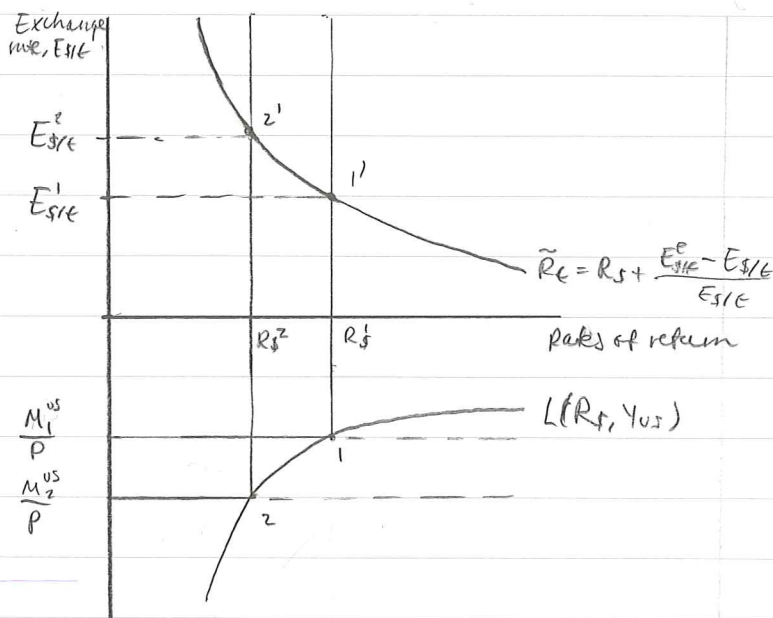
Short run assumptions

Asset Approach

- sticky prices
- Absolute PPP does not hold

$$R_{\$} = R_{\text{€}} + \frac{E_{\text{€}}^e - E_{\text{€}}}{E_{\text{€}}} \quad \text{Uncovered Interest Parity}$$

$$\frac{M^{\$}}{P} = L(R_{\$,} Y_{\$,}) \quad , \quad \frac{M^{\text{€}}}{P} = L(R_{\text{€}}, Y_{\text{€}})$$



Short-run effects:

Money market

1. The permanent expansion of the nominal money supply $M^{\$}$ induces a fall in the dollar interest rate: $M^{\$} \uparrow \Rightarrow R_{\$} \downarrow \Rightarrow R_{\$}^2 > R_{\1
2. Since the price levels are sticky the real money supply also increases.

Foreign Exchange market

1. The fall in the dollar interest rate means the return on dollar deposits is below the expected dollar return on euro deposits, $R_{\$}^2 < \tilde{R}_{\text{€}}^1$. This induces excess demand for euros, that is dollar depreciation ^{due to} the Uncovered Interest Parity until $\tilde{R}_{\text{€}} = R_{\$}$.

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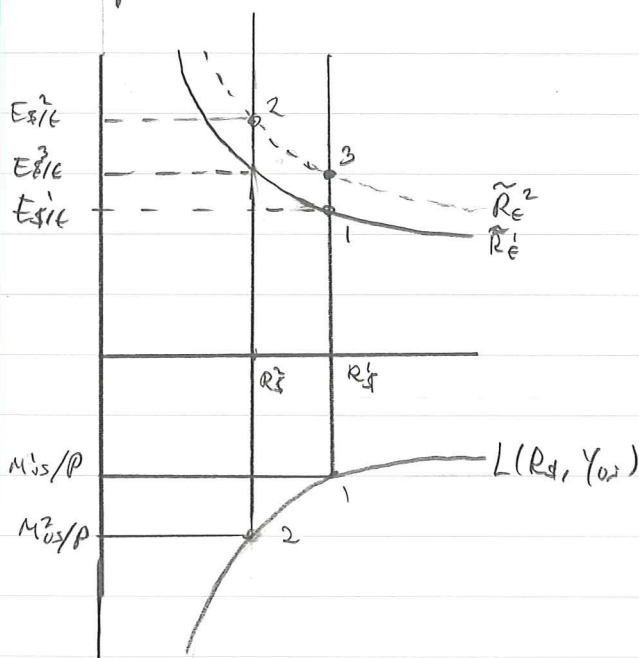
Long-run assumptions

- money is neutral
- prices are flexible
- Absolute PPP holds
- Initial equilibrium: $\pi_{US} = \pi_E = 0$, $M_{US}^s, M_E = \text{constant}$

Because Absolute PPP holds in the long-run, this leads to a change in expectations. Because of money neutrality, market participants expect a future price increase in proportion to the nominal money supply expansion. This changes the expected exchange rate, through absolute PPP =

$$P_{US} \uparrow \Rightarrow E_{t/E}^e \uparrow = \frac{P_{US} \uparrow}{P_E}$$

further, this causes a rise in the expected dollar return on euro deposits, $\tilde{R}_E \uparrow$. We see this as a shift in the expected euro return-schedule, inducing further dollar depreciation.

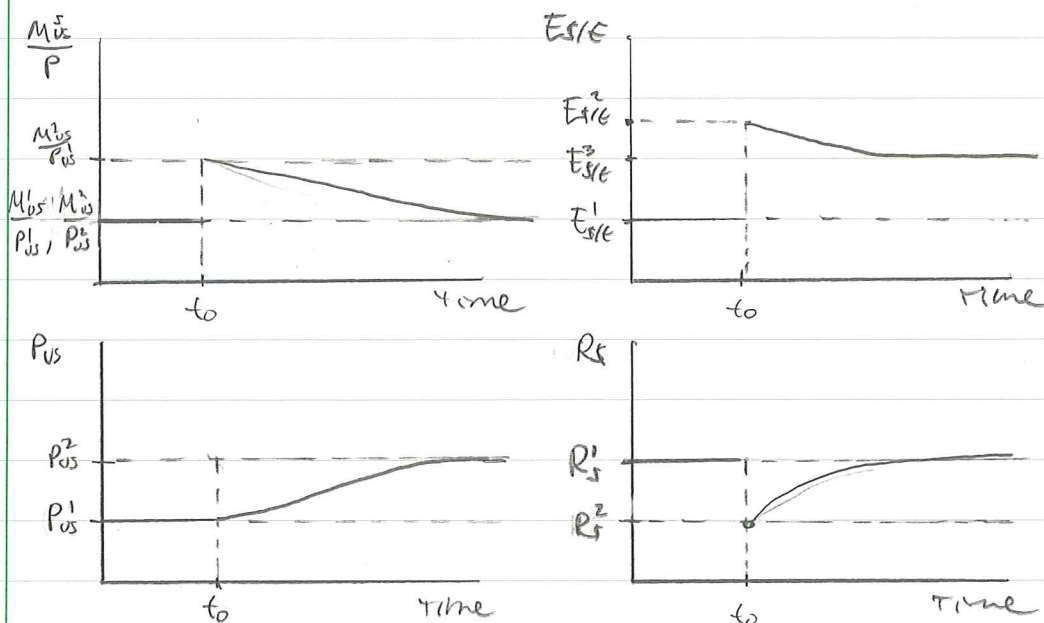


Exchange rate overshooting.

The instantaneous effects are: Dollar depreciation $E_{t/E}^e \uparrow$, dollar interest rate fall, unchanged euro interest rate, fall in the expected dollar return on euro deposits (must equal the lower R_t).

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(b) Time-paths:



the short run effects involve the instantaneous effects under short run assumptions. The ^{real} money supply increases instantaneously at t_0 from $\frac{M^1_{US}}{P^1_{US}}$ to $\frac{M^2_{US}}{P^2_{US}}$ due to the expansion in nominal money supply. From this follows depreciation of the dollar from $E^1_{\$/\text{€}}$ to $E^2_{\$/\text{€}}$, and a fall in the dollar interest rate, $R^1_{\$} > R^2_{\$}$.

Long-run:

In the long-run, money is neutral, prices are flexible and Absolute PPP holds. Due to money neutrality, prices will adjust in proportion to the increase in nominal money supply - The real money supply decreases to the initial level, $\frac{M^2_{US}}{P^2_{US}} = \frac{M^1_{US}}{P^1_{US}}$. This drives the dollar interest rate back to the initial level, $R^1_{\$}$, which further induces appreciation of the dollar relative to the euro.

The long run level of the dollar interest rate is equal to the initial interest rate, $R^1_{\$}$. This is also reflected in the monetary approach with flexible prices, where prices adjust and the interest rate is unaffected.

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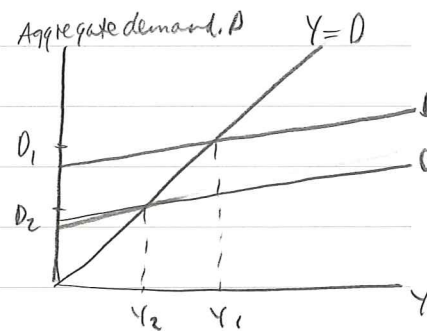
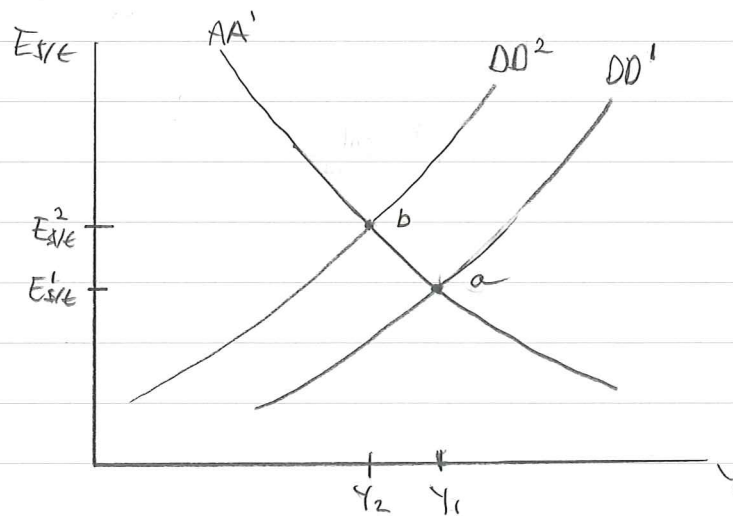
Question 2

Temporary increase in taxes T in

the DD-AA model

- Short-run, temporary changes

- Expectations do not change



(a) A temporary increase in taxes T implies a fiscal contraction, which shifts the aggregate demand curve downwards.

$$T \uparrow \Rightarrow D \downarrow = C(Y-T) + I + G + CA(E-P^*/P, Y-T)$$

This induces a fall in real income from Y_1 to Y_2 . The AA-curve represents the asset markets (Money market + FOREX), while the DD-curve represents the goods market.

A temporary fiscal contraction means the DD-curve shifts to the left, from DD^1 to DD^2 as a consequence of the fall in real income from Y_2 to Y_1 .

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(b) The fiscal shock implies depreciation

Direct effect: The temporary increase in taxes T involves a fall in real income, Y .

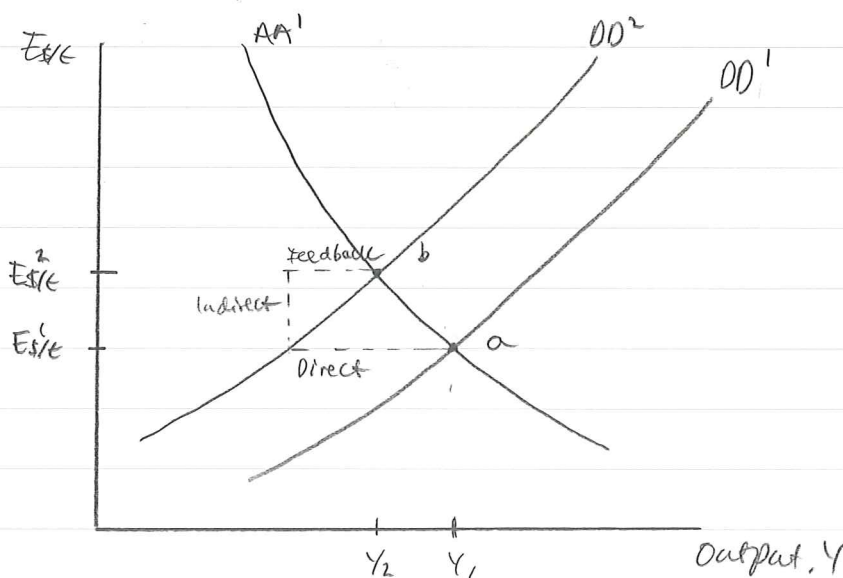
$$T \uparrow \Rightarrow \downarrow Y = D = C(Y-T) + I + G + CA(E \cdot P^*/P, Y-T)$$

Indirect effect: The fall in real income Y induces a fall in real money demand: $Y \downarrow \Rightarrow L(R, Y) \downarrow$

This results in a decline in the domestic interest rate, $R \downarrow$, meaning excess supply of domestic currency and causing depreciation of the domestic currency, $E \uparrow$.

Feedback effect: Assuming the Marshall-Lerner condition holds, the depreciation has a positive effect on the Current Account balance: $E \uparrow \Rightarrow \uparrow CA(E \cdot P^*/P, Y-T)$
This increase in the Current Account causes an increase in real income Y , which partially offsets the initial fall in real income.

The equilibrium moves from (E_1, Y_1) to (E_2, Y_2) :



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The effect on the Current Account is positive :

As mentioned earlier, assuming the Marshall-Lerner condition holds ($\eta + \eta^* > 1$), the depreciation of the domestic currency will have a positive effect, increasing the current account balance : $E \uparrow \Rightarrow \uparrow CA(E \cdot P^*/P, Y - T)$

The effect of a depreciation is increased exports, as domestic output becomes relatively cheaper compared to other countries' output.

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Question 3

(a) The Nth Currency Problem

The Nth Currency problem is the greatest drawback of the Reserve Currency system. It illustrates the deep asymmetry of the Reserve Currency system.

In a Reserve Currency system, there are $N-1$ exchange rates to fix. The reserve currency ^(the Nth currency) pegs to gold, holding gold as official reserves, while the $N-1$ central banks peg their exchange rates to the reserve currency, holding the reserve currency as official reserves.

The problem of the reserve currency system is that the burden of adjustment falls entirely on the $N-1$ currencies. The Nth currency (the reserve currency) has free hands to follow domestic objectives. The only constraint on the reserve currency being the physical limits on gold available in the world.

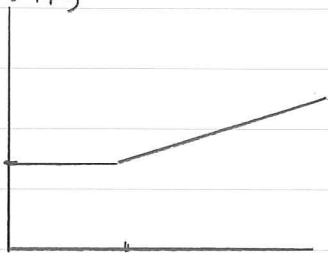
Because the $N-1$ central banks must follow whatever the reserve currency central bank does, in order to keep the exchange rate fixed, the $N-1$ central banks effectively lose monetary policy autonomy. If the Nth central bank expands money supply, the $N-1$ central banks must also expand money supply, reducing their interest rates to keep the parity.

Using a two-country model of the US and the UK, we can illustrate the mechanism of the Nth-currency problem and imputed inflation. With the dollar as the reserve currency and the British pound as one of the $N-1$ currencies,

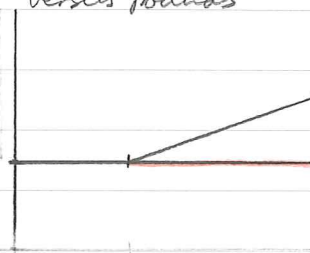
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a monetary expansion in the US causes a lower dollar interest rate which induces pressure for pound appreciation (excess demand for pound). In order to keep the peg, the UK must also expand money supply by purchasing dollar denominated assets. This purchase increases official Reserve holdings of dollar asset in the UK. The UK money expansion itself puts pressure on the UK price levels (Money neutrality in the long run), implying inflation in the UK due to the US monetary expansion. This is an example of imported inflation, a result of the Nth currency problem.

M_{US}^S US money supply

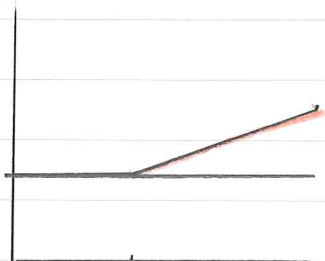


Excess supply of dollars versus pounds

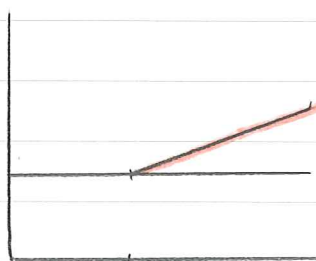


- if the UK intervenes
- if the UK does not intervene

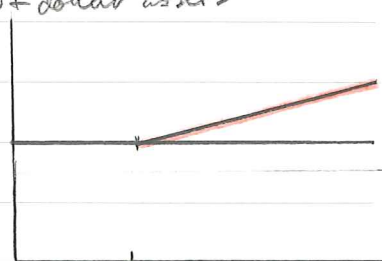
M_{UK}^S



P_{UK}



UK Official reserve holdings of dollar assets



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(b) When the central Bank issuing the Reserve Currency expands money supply this might conflict with the domestic objectives of peripheral countries. Δ

As illustrated in (a) a monetary expansion of the reserve currency leads to a monetary expansion in the N-1 currencies. This induces imported inflation. This is what happened at the end of the Bretton-Woods system. Imported inflation causes rising price levels, which may conflict with other countries' objectives of fighting inflation, like with Germany under the Bretton-Woods system (keeping overvalued dollars as official reserves).

When the Central Bank issuing the Reserve Currency restricts money supply, the N-1 central banks must sell foreign assets (denominated in the reserve currency) in order to keep the peg. This might cause conflict, especially when other countries are on the verge of recession, desperately needing to print money and cut back interest rates. This happened during the reunification of Germany when European countries pegged to the Deutsche Mark. Another issue with a monetary restriction might be deteriorating foreign reserves. In order to keep the parity, countries must sell foreign reserves at the time of a monetary restriction. If reserves are deteriorating, this might motivate speculative attacks which induces pressure for depreciation. The central bank must take the opposite action in order to avoid devaluation, thus selling reserves. This could give rise to a balance-of-payment crisis, if pressure for devaluation keeps on regenerating. (More on this in d).

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(c) The collapse of the European Monetary system:

During the 1980s some European countries (Germany, France, Belgium, the Netherlands, Denmark, Great Britain, Italy, Spain) pegged their exchange rate to the European Currency Unit. The objective was to increase credibility, thus reducing inflation. Because the ECU did not physically exist, the EMS was in reality a reserve currency system in which the other countries pegged to the Deutsche Mark. The Bundesbank had a reputation as a fierce inflation fighter, something that would increase the credibility of the other countries.

During the reunification of Germany, the country needed new infrastructure for "half-the new country". This output increase put pressure on the German prices. As the Bundesbank would not let inflation go, it restricted money supply. Because of the fixed exchange rate regime, the other countries also had to restrict money supply in a time when most European countries except Germany was closing in on a crisis. Because of this conflict of interest, the European countries pegging their currencies to the DM had to lose the panties. Devaluations followed and floating rates were adopted.

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(d) Balance-of-Payment crisis:

Definition: An abrupt change in reserves followed by high interest rates. (Fixed exchange rate).

A balance of payments crisis occurs when market agents expect a future devaluation. In order to counteract this pressure for devaluation, the Central Bank must sell foreign reserves, hence restricting money supply. A BOP crisis is characterized by a sequence of speculative attacks, making the Central Bank further reduce official reserves through monetary restrictions.

After the monetary restrictions, the speculative attacks may come to an end, allowing the Central Bank to keep the parity. Alternatively, the speculative attacks regenerate, emptying the country's official reserves and forcing the Central Bank to leave the parity.

A balance of payments crisis may be plausible, the Central Bank truly keeps low reserves, or it may be self-fulfilling, as the central Bank sells foreign reserves the central Bank runs out of foreign reserves.

A balance-of-payments crisis is driven by expectations.

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Question 4

(a) Currency Boards

A currency board is a system where the country gives up monetary independence to fight inflation. The country adopts a fixed parity with another major currency, with reserves back entirely by foreign currency (100%). There is a rule of no open market operations, which means there is no sales/purchases of domestic assets. Because of this the Central Bank functions more like a "reading machine", selling and purchasing foreign assets.

The rationale for currency boards are: keeping a fixed exchange rate, impart credibility (avoid speculative attacks), and reduce domestic inflation. ^{and restrict fiscal policy.} The drawbacks are: loss of monetary independence, no lender of last resort, loss of residual monetary powers.

The economy gives up monetary independence by adopting a currency board because the central bank only modifies money supply in line with the policy of the currency it pegs to. The country loses the residual powers that countries with independent central banks have. This involves the freedom to buy and purchase domestic assets through OMOs, and sterilize transactions. Another drawback is that there is no lender of last resort. Because OMOs are prohibited by law, the Central Bank cannot rescue domestic enterprises and banks during times of crises. Neither are there anyone to buy government debt bonds, meaning

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that the government must take up loans at the market interest rates. This restricts fiscal policy because politicians will think twice before borrowing money -

(b) Benefits from adopting hard pegs like Currency Boards and official dollarization:

- 1) Stable exchange rate improving trade and ensuring stable conditions for developing countries with debt, no depreciation causing heavier burdens (original sin).
- 2) Input credibility as an inflation fighting economy, which will reduce speculative attacks and stabilize inflationary economies.
- 3) Reduce domestic inflation. Hands are tied for domestic authorities, which means money supply and thus inflation are controlled by the currency being pegged to.
- 4) Constant fiscal policy. Because domestic authorities must take up loans at market interest rates, this places a constraint on the amount of fiscal expansions authorities will be willing to perform.

Evidence shows that countries adopting hard pegs, like Argentina, Estonia have been successful. Argentina adopted a currency board, which was successful for about 10 years. This was eventually abandoned because people fled the currency; they did not trust the peso to be stable. Unofficial dollarization was adopted by the country's citizens to a greater degree, which

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led to the official adoption of dollars as legal tender as a result of crisis - Estonia adopted a currency board, pegging to the DM and then the Euro, before finally adopting the Euro as the national currency in 2011. Dollarization means adopting an even harder peg than Currency Boards.

Dollarization = peg to USD